WRRIM ITB

Office of Vice Rector for Research, Innovation and Partnership

RESEARCH, INNOVATION & PARTNERSHIP

ITB 2017

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Assalamu'alaikum Warahmatullahi Wabarakatuh.

Praise be to God Almighty for all the grace conferred upon all of us in the journey of the Institut Teknologi Bandung (ITB), carrying out the mission of higher education for 98 years since the founding of the Technische Hoogeschool, Bandung in 1920. As the oldest university in Indonesia, focusing on science, technology and arts, ITB will be celebrating its 100 years anniversary two years from now. This may be old for a human but it is relatively young for a university. Together with other world class universities, ITB has always been committed to playing a significant role in shaping the future of higher education in the world.

In its journey, ITB has executed its tri dharma[1] mission by supporting research, innovation and entrepreneurship that have impacts on society through technology and building synergy between university, industry, government and community. As an autonomous public university (PTN BH) that upholds academic excellence, ITB is required to produce graduates who can compete at an international level and display character, integrity and a pioneering spirit.

In carrying out its mission of transforming from a research university into an entrepreneurial university, ITB strives to increase the number of international publications and citations, improve its global and regional university ranking position, to serve and contribute to community empowerment, and realize entrepreneurship through innovative works that benefit the nation. To achieve it's national goals, ITB also intensifies collaboration with world-leading education and research institutions in various forms, such as dual degrees, exchanges of staff and students, joint research and conferences.

In the current era of rapid technological change, global competition and research budget constraints, ITB has to give its best efforts to align the focus of its research and innovation with the goal of improving Indonesia's competitiveness. With the support of all our stakeholders, we pursue the realization of our mission in achieving these goals.

On this occasion, I would like to thank all researchers and inventors who have given their dedication to ITB in improving ITB's research performance and all our partners who have supported the improvement of ITB's role in building the nation.

Wassalamu'alaikum Warahmatullahi Wabarakatuh

Rector
Prof. Kadarsah Suryadi

August 2018

[1]*Tri dharma perguruan tinggi = three pillars of tertiary education: education, research and community service.*

Prof. Kadarsah Suryadi
Rector for Research, Innovation and Partnership

Preface from the Rector for Research, Innovation and Partnership

“ITB has to give its best efforts to align the focus of ITB’s research and innovation with the national goal of improving the nation’s competitiveness”

Prof. Bambang Riyanto Trilaksono
Vice Rector for Research, Innovation and Partnership

Preface from the Vice-Rector for Research, Innovation and Partnership

“ITB as a leading technological institution aims to contribute scientific breakthrough and technological advances in a number of frontier science and technology fields for improving the nation’s competitiveness”

Assalamu'alaikum Warahmatullahi Wabarakatuh

The Office of the Vice-Rector for Research, Innovation and Partnership has set strategic goals in research, innovation and community empowerment as the main pillars for achieving ITB's vision of becoming an entrepreneurial university. As a research-based institute our objectives are: 1) to improve research quality within the institute; 2) to enhance collaboration with partners, both domestic and foreign; 3) to improve research performance measured in terms of the number of publications in reputed scientific journals; 4) to enhance the impact of research publications in terms of number of citations; 5) to promote multidisciplinary research activities; 6) to encourage research collaboration. The societal impact of our research is also important for ITB to contribute to society through the development of science, art and technology; and 7) to support and promote the improvement of the position in international rankings of ITB's journals.

ITB as a leading technological institution in Indonesia aims to contribute scientific breakthroughs and technological advances in a number of frontier science and technology fields, including but not limited to bioscience and biotechnology, information and communication technology, nanoscience and nanotechnology, renewable energy, infrastructure and regional development, disaster management, cultural production and the environment.

ITB is engaged in an active role toward community empowerment as part of its tri dharma mission of solving national and societal problems. This mission is represented by the following strategic objectives, which are executed in bottom-up as well as top-down programs: 1) to enhance ITB's contribution in shaping Indonesia's competitiveness through research-based industrial consultative projects; 2) to promote an active role of staff in professional and training services for the community and; 3) to engage in the development and implementation of appropriate technologies and enhancement processes within the community, including small and medium enterprises, societal problem-solving and local infrastructures.

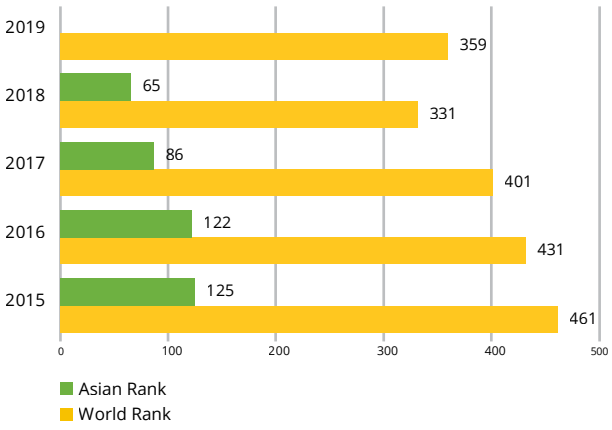
ITB as an entrepreneurial university always promotes the continuous development of ITB's contribution in shaping the nation's competitiveness through research and innovation. Our goals are: 1) to drive innovation and stimulate an entrepreneurial spirit and mindset among students, faculties and alumni; 2) to commercialize research output/results by improving their technology-readiness level and transforming knowledge into products; 3) to produce a significant number of patents and other forms of intellectual property; and 4) to develop science and technology based start-ups and spin-offs with the ultimate goal of building an ecosystem of which invention and innovation are the key components.

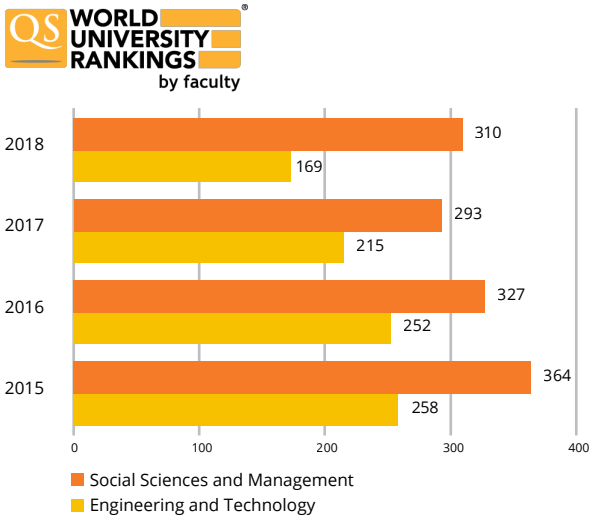
An innovation park that will promote the development of such an innovation ecosystem, involving researchers and innovators, industries and government, is under construction. In order to achieve these objectives with the available resources, strategic partnerships with other domestic and foreign universities, research institutions, industries, and governmental bodies will be continuously developed.

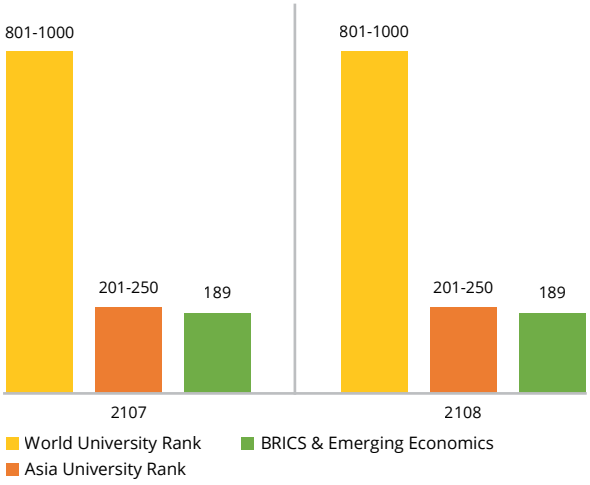
We highly appreciate all ITB researchers and inventors who have contributed to improving ITB's research and innovation profile at the national as well as at the international level. The publication of the book Research, Innovation and Partnership ITB 2016, containing facts and figures and selected researchers and inventors, is intended to provide an overview of recent research, innovation and partnership activities for all ITB stakeholders.

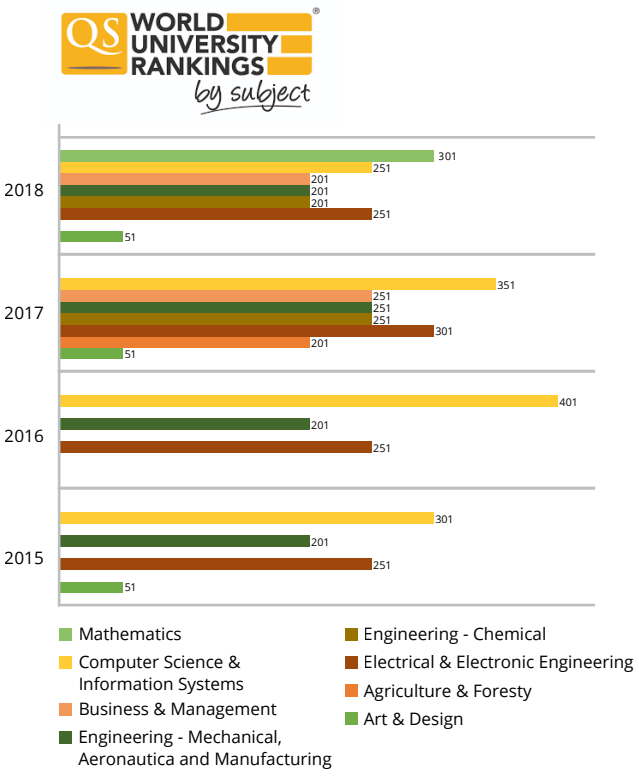
Wassalamu'alaikum Warahmatullahi Wabarakatuh
August 2018

World, ASIA & National Ranking







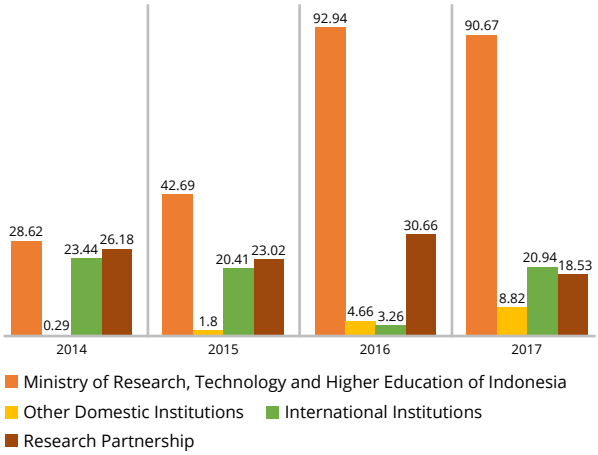


NATIONAL UNIVERSITY RANK

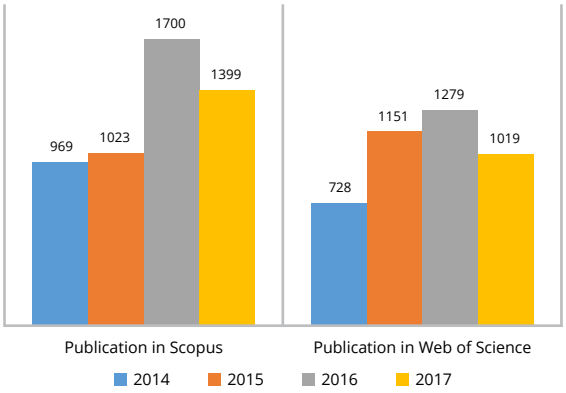
	2015	2016	2017	2018
Ministry of Research, Technology and Higher Education of Indonesia	1	1	2	1

Research Grants, Publications, and Citations

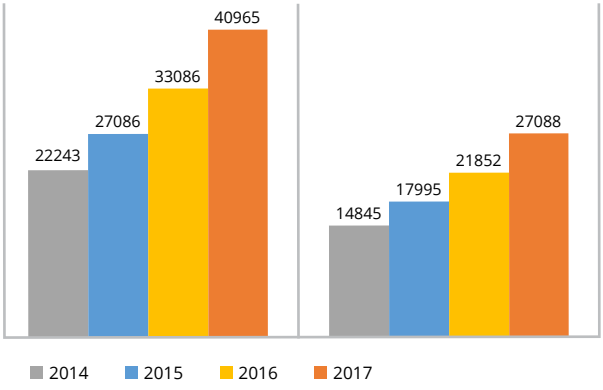
RESEARCH FUNDING SOURCE (IN BILLION RUPIAHS)

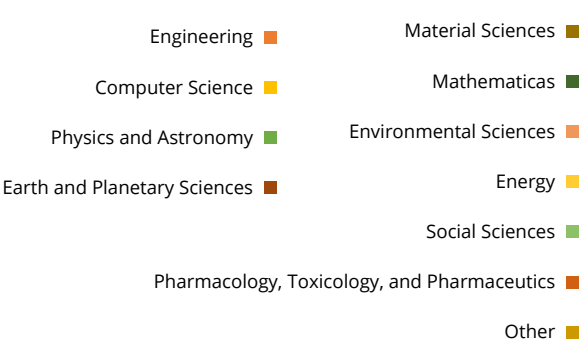


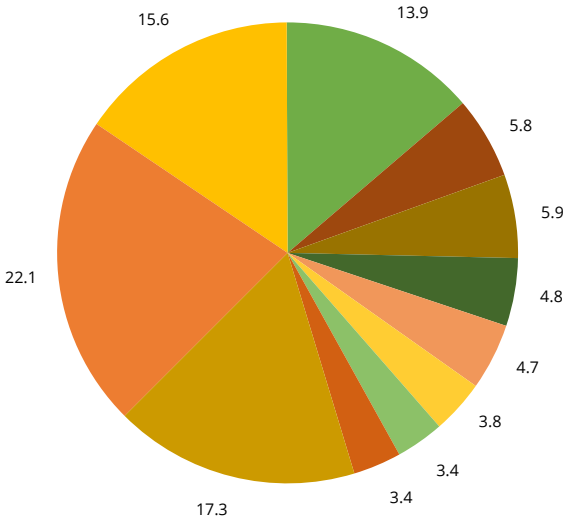
PUBLICATIONS



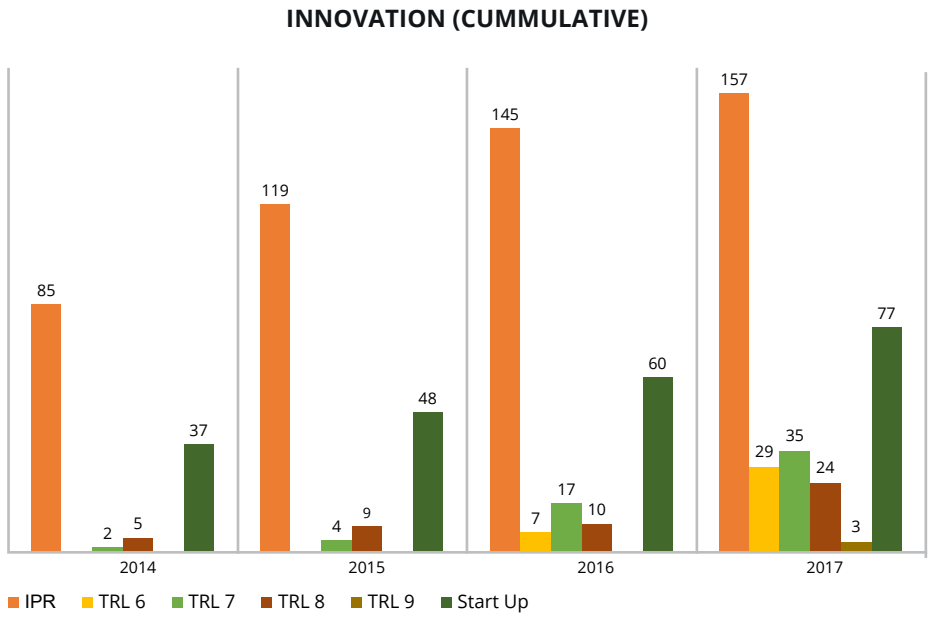
CITATION (CUMMULATIVE)



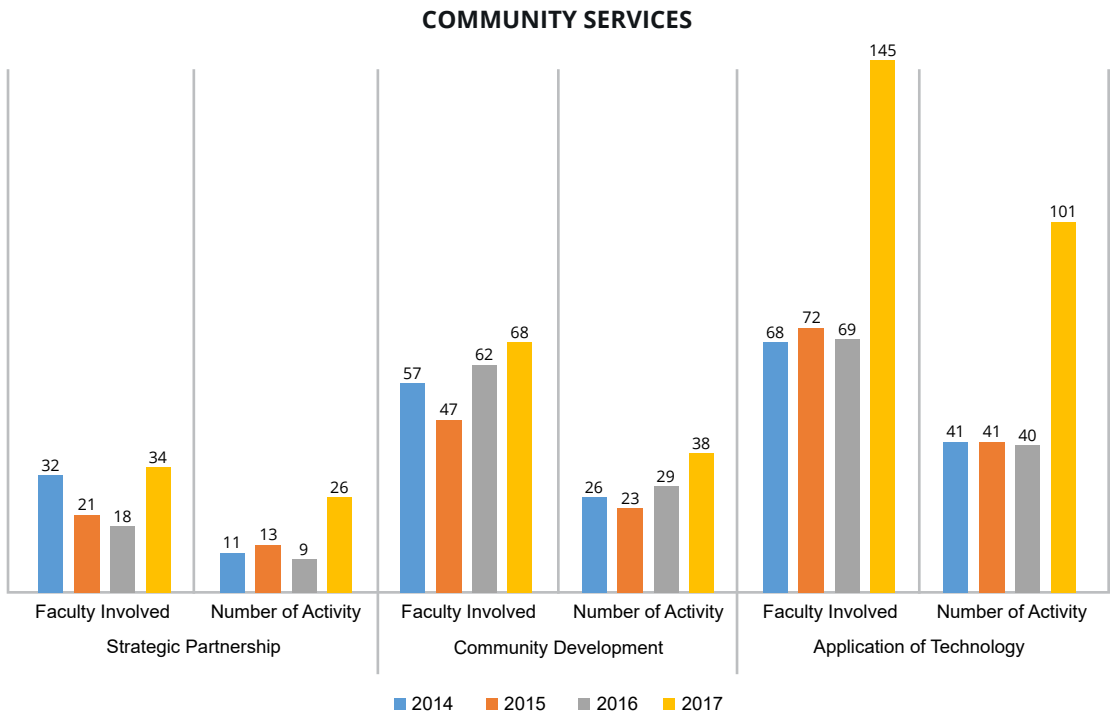




Start-up, Patent, Innovation Product

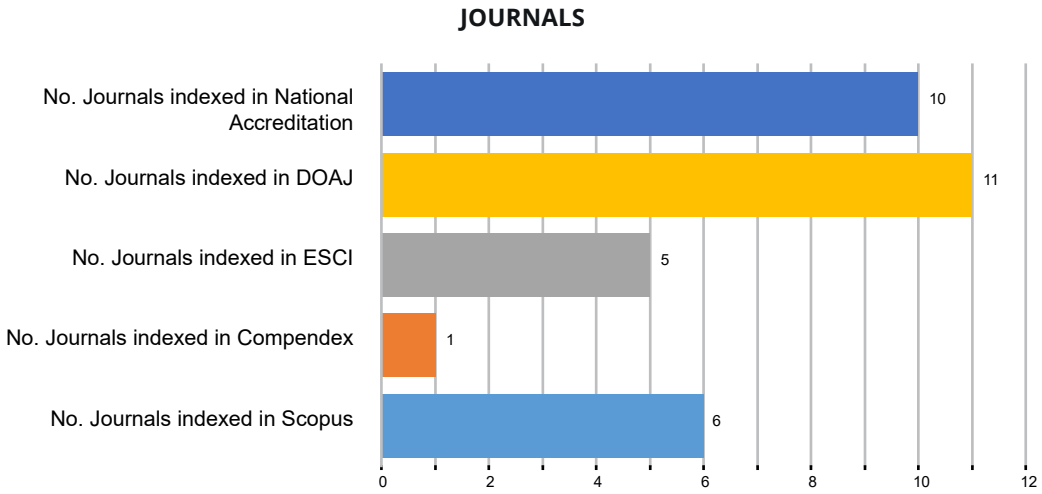


Community Services

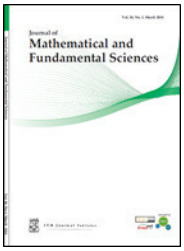


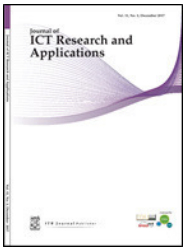
Journals

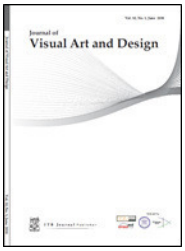
Journal Title	National Accreditation	DOAJ	ESCI	Compendex	Scopus
Journal of Engineering and Technological Sciences	v	v	v	v	v
Journal of ICT Research and Applications	v	v			v
Journal of Mathematical and Fundamental Sciences	v	v	v		v
Jurnal Manajemen Teknologi	v	v			v
Jurnal of Regional and City Planning	v	v	v		v
Electronic Journal of Graph Theory and Applications	v	v	v		v
Asian Journal of Technology Management	v	v			
International Journal on Electrical Engineering and Informatics		v			v
JMS (Jurnal Matematika & Sains)		v			
Journal of Visual Art and Design	v	v	v		
Jurnal Sosioteknologi	v				
Jurnal Teknik Sipil	v	v			

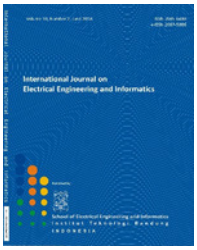


Journals

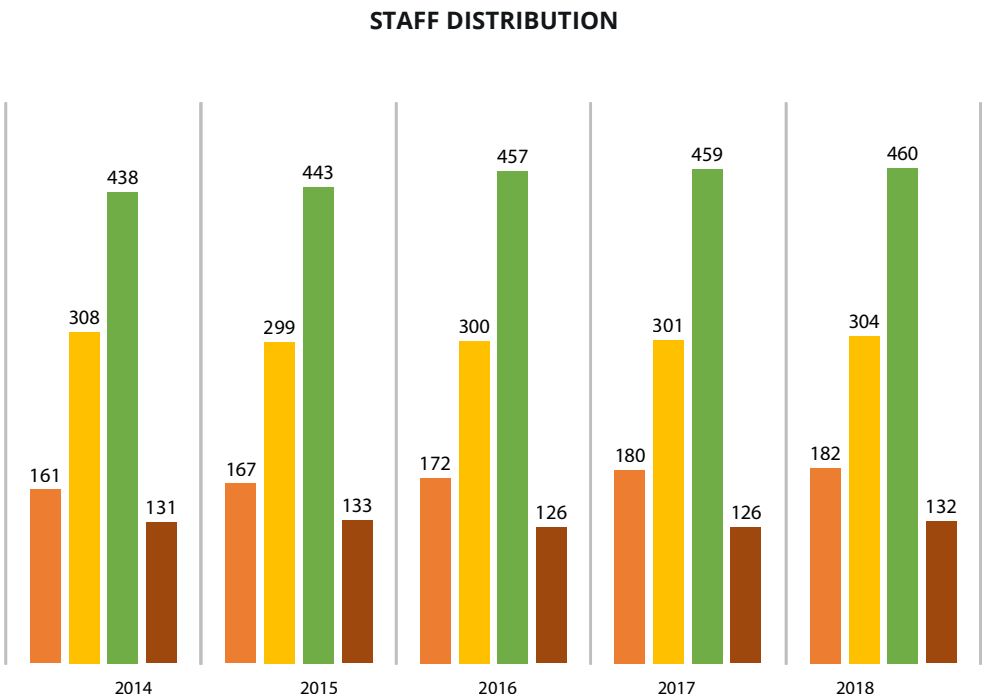




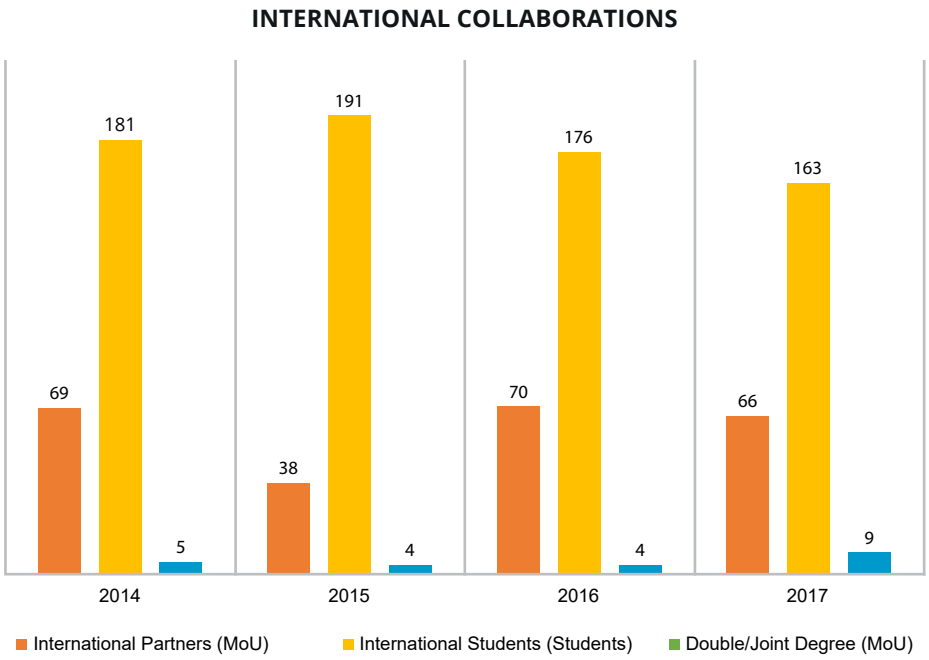


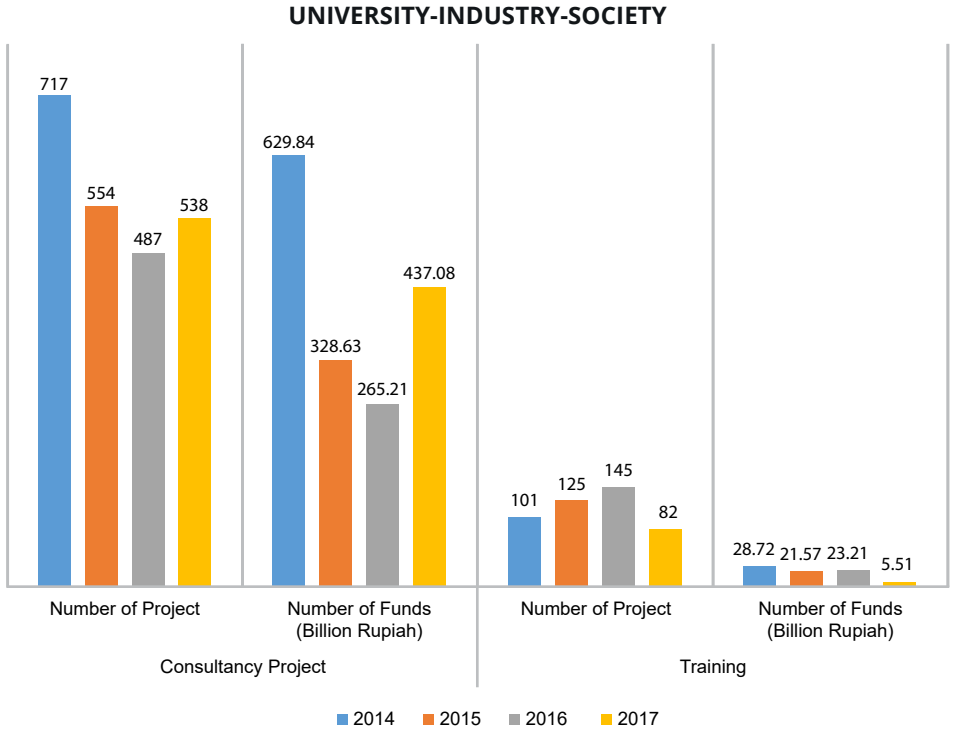


Staff Distribution



List of International Research Collaboration





List of International Research Collaboration

Collaborating Institute	Number of Joint Publications
Australian National University	36
Brown University	15
Chiba University	40
CNRS Centre National de la Recherche Scientifique	47
Delft University of Technology	34
Deutsches GeoForschungsZentrum GFZ	11
Fukui Science Education Academy	17
Gunma University	10
Hiroshima University	85
Hokkaido University	28
Ibaraki University	13
IEEE	11
Japan Advanced Institute of Science and Technology	10
Japan Atomic Energy Agency	27
Julius-Maximilians-Universitat Wurzburg	12
Kanazawa University	15
Keio University	20
Khulna University	16
King's College London	18
Konkuk University	23
Kumamoto University	13
Kyoto University	73
Kyungpook National University	11
Kyushu Institute of Technology	21
Kyushu University	60
Massachusetts Institute of Technology	12
Monash University	10
Nagoya University	36
Nakhon Pathom Rajabhat University	13
Nanyang Technological University	35
National Institute of Advanced Industrial Science and Technology (AIST)	21
National Institute of Aeronautics and Space	10
National Institutes of Natural Sciences - National Astronomical Observatory of Japan	13
National Taiwan University of Science and Technology	14
National University of Singapore	47
Oregon State University	14
Osaka University	58
Pukyong National University	16
Purdue University	17
Radboud University Nijmegen	13
Resilience Development Initiative	10
Riken	21
Sejong University	21
Technical University of Kosice	14
The University of British Columbia	11
The University of Sydney	16
Tohoku University	40

Collaborating Institute	Number of Joint Publications
Tokyo Institute of Technology	**106**
Tokyo University of Science	38
Toyohashi University of Technology	14
UCL	15
Universitat Hamburg	19
Universite de Bretagne Occidentale	11
Universite de Montpellier	12
Universite de Toulouse	18
Universite Grenoble Alpes	11
Universite Paul Sabatier Toulouse III	17
Universite Pierre et Marie Curie	11
Universiti Kebangsaan Malaysia	32
Universiti Putra Malaysia	36
Universiti Sains Malaysia	89
Universiti Teknologi Malaysia	51
Universiti Teknologi MARA	13
University of Adelaide	12
University of Amsterdam	35
University of California, Berkeley	23
University of Cologne	19
University of Durham	20
University of Fukui	45
University of Groningen	137
University of Kent	10
University of Malaya	22
University of Maryland	10
University of Michigan, Ann Arbor	11
University of New South Wales UNSW Australia	33
University of Newcastle, Australia	38
University of Oxford	11
University of Queensland	17
University of Tokyo	115
University of Twente	50
University of West Bohemia	17
University of Western Australia	31
University of Wisconsin Madison	12
Utrecht University	13
Van der Waals-Zeeman Institute for Experimental Physics	22
Virginia Polytechnic Institute and State University	13
Wageningen University and Research Centre	23
Waseda University	14

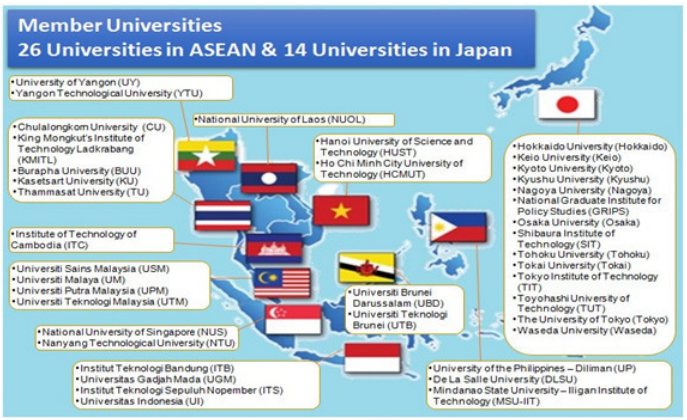
International Office Activities

AUN/SEED-Net

AUN/SEED-Net established in 2001, is a sub-network under auspices of ASEAN University Network (AUN). The Network currently composed of 40 members Institutions from ASEAN, supported by 14 Japanese Universities, was established to develop human resources in Engineering in South East Asia. Within this network, ITB currently host Master and PhD programmes in Mechanical and Aerospace Engineering, as well as Energy, Environment and Disaster Mitigation. More than 60 Masters and PhD mainly from Cambodia, Vietnam, Laos and Myanmar has graduated from ITB through AUN-Seed Net Scholarship.

Program & Activity

- Graduate Degree Program
- Research Program
- Mobility and Networking
- University-Industry Linkage



Source: http://www.seed-net.org/

PARE Project

This program will establish a collaborative educational system involving HU's six partner institutions in Indonesia and Thailand for the purpose of developing personnel to become global leaders that will be active in resolving challenges related to populations, activities, resources and environments (PARE) in ASEAN countries.

The program will foster human resources with the following four requisites: field research capacity, cross-cultural capability, frontier spirit, and problem solving competencies, which are essential for practical resolutions in the PARE chain.

Source: http://pare.oia.hokudai.ac.jp/en/infromation

PARE Members:

1. Hokkaido University, Japan
2. Chulalongkorn University, Thailand
3. Institut Teknologi Bandung, Indonesia
4. Kasetsart University, Thailand
5. Thammasat University, Thailand
6. Universitas Gadjah Mada, Indonesia
7. Bogor Agricultural University, Indonesia
8. Hokkaido Summer Institute, Japan
9. Nitobe School Hokkaido University, Japan
10. RJE3, EAST Russia-Japan Expert Education Program

International Joint Capstone Design Project (I-CAPS)

International Joint Capstone Design Project (I-CAPS) is a collaboration program initiated by three universities: Institut Teknologi Bandung (ITB), Universiti Kebangsaan Malaysia (Malaysia), Chonbuk National University (Republic of Korea).

This program aims to improve the students' ability to function in cross-cultural teamwork and their problem-solving skills. In this program, each participant works in an international team to develop ideas, invent and design a product through prototype making based on a given theme. The consortium is now expanding, involving students from NTU (Singapore), Tunghai University (Taiwan) and 11 Korean university members of the Innovation Center for Engineering Education in consortium with Chonbuk National University (CBNU). The participants come from various engineering disciplines and product design from each participating university and are grouped into teams consisting of 4-6 people from 2-3 different countries.

In 2017, ITB-Korean team won:

1. Grand Prize with the Relax Me prototype, a stress level detector and working as well as aromatherapy.
2. Silver with the Re-lease prototype, a urinal tool that can detect health condition from urine.
3. Bronze with the Deblice prototype, a tool that can help communication for the visually impaired and deaf.
4. Bronze with the Azco prototype, an elderly companion tool for the elderly.
5. Bronze with Kof prototype, portable cough filter tool.

International Joint Architecture Studio

International Joint Architecture Studio has been conducted for several years, organized by School of Architecture, Planning and Policy Development of Institut Teknologi Bandung in collaboration with ITB partners. In this activities, ITB students and partners working together for several weeks on a real project to explore sustainable urban planning and design solutions in certain areas.

In 2016 ITB and University of Melbourne working together in "Redefining of New Urban Space Bandung Technopolis in Gedebage".

In 2017, ITB and University of Sydney work together with a research on Settlement Area of Bandung City with Tamansari area as the case study.

The workshop was held as an implementation of academic cooperation between SAPPD ITB and the Melbourne School of Design. In the near future, several schemes of academic engagement (joint research/ publications and faculty exchange) will be further developed to foster the cooperation between both institutions.

AIMS Program

The ASEAN International Mobility for Students (AIMS) programme, formally known as M-I-T, is a student mobility program for citizens of all SEAMEO member countries. Starting from 2010, currently the network consist of 43 Member Institutions of ASEAN plus 15 from Korea and Japan. 500 students has taken parts in the program within 10 subject area. Every year about 5 ITB students are studying at partner Institution and International students from member institutions also come to ITB under this program.

The 11th Review Meeting of the ASEAN International Mobility for Students (AIMS) Programme

Gaming Simulation Class Discussion

Sharing at International Study Bazaar

Playing your-own-designed game in the Gaming Simulation Class

International Exchange Student

Every years, about 400 international students come to ITB for short and semester exchange. ITB organized several activities such as orientation week, cultural trip, International day, survival Indonesia language, culture and services to ensure the welfare of International students and create one of the best experiences for the students while staying in ITB.

How to Make Batik

Cultural trip to Bali

International Students Outing Program

International Students Gathering

Visit and Students Interview with Tokyo University of Agriculture and Technology

International Student Orientation Days

Graduation Celebration

Parade at the Asia Afrika Conference, 24 Juni 2016

ITB International Day

International student gathering

ITB International Students

International Staff Exchange Program

International Relations Office send and receive staff exchange to share and expand the knowledge on nternationalisation issues with partners around the globe.

International Staff Week Erasmus+ Goes Global In Vilnius Gediminas Technical University

International Staff Training Week
- Radboud University

Staff Mobility with 4 Universities Alliance (A4U) Spain

Visiting Profesor from Vilnius Gediminas Technical University

Lecture by Nobel Laureate Prof. Gerard 't Hooft

Visit to AUN Secretariat, Singapore

ITB Partnership

ITB is actively participating in several networks, as an implementation of ITB's Internationalisation Policy. Various ITB staff and students participate in activities within the network such as mobility, academic collaboration and research collaboration

Map of ITB Partners

The awarding of an Honorary Doctorate to Nobel Laurate Dr. Peter Agre

The Institute for Research and Community Services (LPPM ITB)

Prof. Khairurrijal
Director of LPPM ITB

Institute of Technology Bandung (ITB) as a research university is the center for development of science, technology and art (IPTEKS) on the basis of research and orientation to community services. Sustainable development of IPTEKS has been conducted in order to improve the quality of ITB as one of the leading and most prestigious educational institutions in the world.

LPPM, Institute for Research and Community Services, is an organization within academic unit of ITB and institutionally responsible for facilitation and coordination of collaboration in research and community services activities so as to increase mutual synergy of academic competence of ITB and the community LPPM was established at the end of 2001 wherein the Institute for Research of ITB, settled in 1959, merged with the Institute for Community Services of ITB as a form of transformation program of ITB toward academic excellence within an efficient, transparent, accountable, and professional management and consistently non-profit educational institution in order to perform TriDharma, the three duties of the institution which cover education, research, and community services in balance.

LPPM-ITB has well-managed its national and international collaboration with other research institutions, government, industries, private and state-owned enterprises, and community organizations, and formulated the collaboration in research trainings, partnerships, and consultancies. The occurrence of such collaboration reflects a high degree of community reliability to the competence of LPPM-ITB.

To the community as clients and stakeholders, we would like to give a great deal of gratitude for the collaboration which has resulted in empowering each other towards prospering people by the development of IPTEKS through the achievement of improving scholarships of discovery, integration, application, and teaching.

Contact Address:
CRCS Building,
6-7th Floor, Jl. Ganesa No.10, Bandung
Email : lppm@lppm.itb.ac.id

Directorate of Partnership and International Relations (DKHI ITB)

Dr. Edwan Kardena
Director of DKHI ITB

Contact Address:
Ganesha 17 Bandung 40132
Email : iro@itb.ac.id

Directorate of Partnership and International Relations is established to manage cooperation at the central level of ITB. It has sub directorate of domestic partnership and sub directorate of international Relation which is also manage the international relation office (IRO). The directorate has the main function of developing network and cooperation with academic, industry, private sector as well as government institutions, both inside and outside the country. Equality, mutual objective, trust and benefit, as well as transparency are our basic principles for partnership. As the office that putting service as the mindset, we always try to be in the position of problem solving oriented. The directorate is performed itself as a bridge between competences inside and outside the campus.

The directorate is helping ITB to play significant role in sharpening the future of global higher education. We could not do active partnership, or push driven partnership as it will need a lot of resources which we do not have. So, being active in many networks, forums, meetings, are the effort to make ITB more visible in the international map. Such approach enable ITB to be seen by partners and that opportunities are created. We still be able to select cooperation that meet ITB standards and vision. All of cooperation must give impact to the continuous improvement of quality research and education. With partnership, ITB would like to progress together and willing to share knowledge as a part of ITB contribution to society, national development, as well as global community.

International relations for a university is a kind of academic diplomacy. Partnership in this case, means also friendship. So, we do realize not all opportunity could meet our expectation. However, being a friend in the network or bilateral engagement could always create unexpected result in the future. So we value friendship more than a rigid partnership.

As unit under directorate, The International Relation Office (IRO) provides professional supports and advising services to international students who are coming for full-time study and exchange programs, regarding their study and immigration status in Indonesia. This office is also committed to provide quality advising services and supportive programming to ITB students who are participating in exchange programs. The main objective of the office is to help the international students, scholars, and ITB faculty and staff, navigate many complexities associated with student and employment-based visa arrangement. We are committed to providing information and services, taking into account institutional policies and ever-changing state regulations.

LPiK Head Quarter and ITB Innovation Park at Ganesha Campus

Institute for Innovation and Entrepreneurship Development

LPiK ITB
Lembaga Pengembangan Inovasi dan Kewirausahaan ITB

The Institute for Innovation and Entrepreneurship Development (IIED / LPiK) was established to bring the innovation ecosystem in ITB. The institute main objective is to develop ITB as an etrepreneurial university which has three main characteristics, which are excellence in teaching, excellence in research, and excellence in innovation. The LPiK is responsible for the management of innovation with the goal to encourage the culture of innovation and entrepreneurship of ITB in order to create a direct and significant impact on the community.

Activities related to the LPIK's main tasks and functions include the development of new entrepreneurs as actors for students and faculty members in the form of entrepreneurship training, mentoring, socialization for Intellectual property rights, and various activities that aim as a form of promotion, introduction and data collection of innovation results in ITB.

The LPiK ITB activities are developed to contribute to the development of innovative and creative industrial independence to cultivate the natural wealth and culture of the nation itself. The key to this success is the growth of innovation and entrepreneurship from the academic community of ITB. The Innovation ecosystem often arises from research output, where the value-adding process of the research results has been processed into a form that is ready to be disseminated to society. One process to diffuse the innovation result is through the establishment of a new (industrial) (start-up) business unit, or the establishment of close cooperation with the industrial world that will utilize the innovation. Therefore, the linkage between the results of research, innovation, and entrepreneurship is very tightly related.

A. Vision and Mission

The LPiK mission is to become a reliable and reputable institution, in an effort to bring Indonesian society into a prosperous nation by advancing the competitiveness of Indonesian industries and human resources.

The LPiK missions are:

a. To conduct mediation and coordination within the framework of innovative fundraising through business and industry partnership, and

b. To guide the development and changes made by the community through high quality innovation and entrepreneurship development activities, directly beneficial and have a significant impact on improving the welfare of the people, nation, and state.

B. Divisions

LPIK-ITB consists of 4 divisions with duties and functions that support the efforts of entrepreneurship development and commercialization of research results. The divisions are as follows:

(1) Division of Industrial and Business Incubator

The industrial and business incubator has a role in helping the success of new ventures. This concept is very relevant to be implemented in Indonesia. The development of the incubator practically encourages creation and fosters new business growth in particular with regard to the innovation themes of a product. The development of incubators in universities has a goal in helping the process of commercialization of research products in universities that are building new business coming from research results and encouraging students and alumni to become business actors. The incubator focuses on startups that have high innovation content as a value-added characteristic of the product or service they produce. The establishment of the incubator at ITB is to encourage the commercialization of research results that have been produced by faculty members and or students in the hope that the results of the research can benefit society.

Co-Working Space at LPiK ITB

The LPiK ITB is furnished with the co-qorking space to provide facilities and support to the tech-startups. The co-working cpace accommodates startup within ITB to run their business and to improve the quality of innovation and technology. By working in the co-working space environment, it is expected that the sturtups and entrepreneurs can build interaction, communication, cooperation, and co-creation for succesful entreprises. Located at the ITB Innovation Park Genesha Campus, this Co Working Space has the following facilities: high-speed internet, cloud service and entrepreneurship development services and supported by industry partners to make this area the best innovation ecosystem model in Indonesia.

Figure 1 Co-Working Space at LPiK ITB

(2) Division of Intellectual Property and Legal

The Division of Intellectual Property and Legal has a role in helping the academic community of ITB to obtain information and direction in the management/acquisition of Intellectual Property Rights (IPR) and facilitate the administration of IPR management. In carrying out its role, the Division of Intellectual Property and Legal has various dimensions of activities such as patent draft writing assistance, patent and legal consultancy, patent submission, administration, and arrangements.

(3) Division of Entrepreneurship Development

Entepreneurship Development in universities aims to create educated new business actors, generations that create employment opportunities, as well as the commercialization process of research outputs. Universities produce research outputs and highly competent people in their fields. However, it is a fact that very little output from universities is directly beneficial to the community. Universities need a strategy to encourage entrepreneurship independently. Therefore, LPIK-ITB undertakes one of the efforts, namely by opening partnership opportunities with various parties to support the development of new entrepreneurs.

(4) Division of Innovation Park

The Innovation Park is designed to serve early-stage enterprises in various stages of development, including business with commercial applications expected from ITB research outcomes. Innovation Park accommodates both research and business activities within a commercial area equipped with supporting facilities. Technological innovation encompasses a range of activities from technical knowledge including ideas, knowledge, and technology translated through a transformation into a product as a physical reality and has a usefulness for society. Collaboration with various parties will be very helpful in identifying and looking at innovation opportunities that arise from research in university. Innovation Park has a role in connection interests to support knowledge-based innovation processes. The various stakeholders on innovation development are: academia, industry, government, and society.

Innovation Ecosystem

The ITB Innovation Park is developed with the integrated innovation ecosystem comprises of strong talented entrepreneurs, state of the art laboratories, strong network with anchor industries, and research innovation product based on Technology Readiness Level 5-9. These innovative products are ready for industrial implementation.

ITB Innovation Parks are aimed at developing a strong innovation ecosystem involving universities, research institutions, companies, entrepreneurs, investors, government, and communities. ITB Innovation Parks exist to stimulate the establishment new companies based on innovation.

Facilities that will be available in ITB Innovation Park:

1. Co-working space
2. Prototyping laboratory
3. Testing room
4. Seminar room
5. Intellectual property service office
6. Partner services
7. Lounge and cafe

ITB will develop 2 types of Innovation Parks:

1. As a general hub (multi-cluster) that links various technology sources to foster innovation that can be commercialized by start-ups or joint ventures with established companies
2. As a specialized hub focusing on one particular area in which all stakeholders foster innovation that can be commercialized by start-ups or joint ventures with established companies.

ITB Innovation Park Ganesha Campus

As a general hub, ITB Innovation Park connects various technology sources at ITB, government, businesses, entrepreneurs and investors to increase innovation. The ITB Innovation park at Ganesha Campus represents the general hub for 4 major clusters: Energy, Transportation, Life Science, and ICT. The building construction was started in April 2018.

ITB Innovation Park Gedebage

ITB Innovation park at Bandung Teknopolis Gedebage will focus on Smart and Creative Industries. ITB Innovation Park Gedebage) has various facilities, such as laboratories and testing facilities for IC and PCB design. ITB Innovation Park Gedebage will also include software production services for companies in the games, animation, radar, smart city, and medical equipment sectors.

Figure 2 ITB Innovation Park Ganesha Campus

Figure 3 ITB Innovation Park Bandung Teknopolis

Activities at ITB Innovation Parks include:

1. Business incubator
2. Legal consultation and patent information center
3. Entrepreneurship development
4. Business consultation and management information center
5. Information dissemination and discussion activities
6. Fostering business cooperation.

Selected List of ITB Startups

Figure 4 Dr. Sigit Puji Santosa, MSME, Director of LPIK ITB

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Selected Researchers

Design and Development Chemical Engineering Products

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A Journey in Developing a Laboratory for Studying Materials with Home-made Instruments and Tools: My Precious Experience

Prof. Khairurrijal
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Compressive Sampling, Subsurface Magnetic-Field Imaging, Adiabatic Quantum Computing

Prof. Andriyan Bayu Suksmono
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An Early Modern Human Presence in Sumatra 73,000–63,000 Years Ago

Prof. Jahdi Zaim
Research Group of Geology,
Faculty of Earth Sciences and Technology
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Nanostructure Materials for Sensors and Energy Application

Dr. Brian Yuliarto
Advanced Functional Materials Laboratory,
Engineering Physics Department,
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Development of High Resolution Seismic Tomograpy for Subsurface Imaging

Dr. Andri Dian Nugraha
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Dr. C.B. Rasendra

"Design and Development Chemical Engineering Products"

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Dr. C. B. Rasrendra was born in Klaten, Indonesia, in 1978. He obtained both of his Bachelor's (2002) and Master's (2004) degree in chemical engineering from Institut Teknologi Bandung, Indonesia. He obtained his PhD degree at the University of Groningen (2012) with topic of Platform Chemical from Lignocellulosic Biomass. He has appointed as a lecture at Department of Chemical Engineering, ITB since 2008. He has authored and co-authored about more than 20 papers in peer-reviewed journals (h-index 10). His works has been cited more than 1500 times.

His research focuses on the catalytic conversion of lignocellulosic biomass for the production of biobased chemicals within biorefinery approach. The biorefinery concept is an attractive integrated model for biomass utilisation. A biorefinery resembles a crude oil refinery. It not only produces a multitude of products (fuel, power and chemicals) but also is designed to achieve full valorisation of the feed. There is two major strategies to obtain value added chemicals from lignocellulosic biomass through the platform chemical approach, namely drop-in strategy and emerging strategy. The first approach involves a so called drop-in strategy. By this approach, the lignocellulosic biomass source is converted into a platform chemical that is currently produced by the petrochemical industry and available on the market. As such, this strategy exploits existing value chains, markets and infrastructure, which will speed up the pace of the development and reduce

investment costs. In addition, the product is green, which in some cases is an additional bonus. The second approach involves the conversion into a novel platform chemical for which new value chains need to be developed. Typically, the bio-based platform chemical or derivatives thereof have the inherent functionality to substitute existing products.

His current research focuses are developing biomass fractionation, catalyst development and catalytic conversion to enhance the economic potential of lignocellulosic biomass such as empty fruit bunch of palm oil. Empty fruit bunch (EFB) of palm oil as lignocellulosic biomass basically consist of three primary biopolymers: 1) cellulose, a glucose based polymer, 2) hemicellulose, a polymer containing predominantly pentose sugars and 3) lignin, a highly cross linked network consisting of phenolic building blocks. New catalytic conversions have been identified and some are in development to obtain platform chemicals from lignin. A promising pathway is the conversion of lignin to benzene, toluene, xylene, phenols (drop-in strategy) and various alkyl-phenolics (emerging strategy).

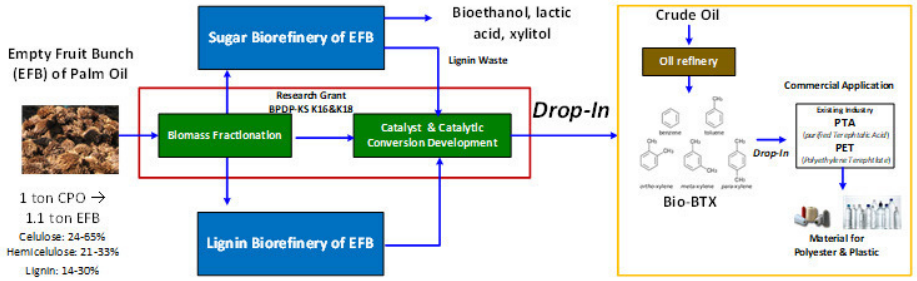

Figure 1 Empty Fruit Bunch (EFB) of Palm Oil Fractionation & Bio BTX Production from EFB

Apart from his biorefinery-related research, he has also involved and developed teaching industry for strengthening and accelerating catalyst innovation in the Chemical Reaction & Catalyst Engineering Group. The mini catalyst-plant as part of teaching industry is designed for competency development of lecturers, researchers, and students with direct involvement in the catalyst innovation & production systems.

"A promising pathway is the conversion of lignin to benzene, toluene, xylene, phenols (drop-in strategy) and various alkyl-phenolics (emerging strategy)"

Prof. Khairurrijal

“A Journey in Developing a Laboratory for Studying Materials with Home-made Instruments and Tools: My Precious Experience”

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Integrated Laboratory of Materials & Instrumentation,
Department of Physics,
Research Center for Biosciences & Biotechnology,
Institute for Research & Community Services,
Research Center for Disasters Mitigation, Institute for Research & Community Services, Institut Teknologi Bandung

Recognizing Limitations and Focusing on Potential

Back to the period 1988-1989, when I was doing the final project in the undergraduate program at Department of Physics, FMIPA ITB. At that time, Prof. M. Barmawi, my supervisor, had bought a microwave oven brought directly from Tokyo. I had modified the oven to produce a thin film of amorphous carbon. A glass reactor tube had been placed inside the oven. The glass reactor tube had been vacuumed with a rotary vacuum pump and then fed by methane gas to achieve a pressure slightly below atmospheric pressure. Next, a blue-purple-pink plasma had been observed in the reactor tube and a thin layer of amorphous carbon had formed on the glass substrate inside the reactor tube. It had been amazing to me as an undergraduate student and the results of this research had been presented and published in a proceedings book. Actually, this research had been conducted because we had not possessed a stainless steel reactor with a better vacuum pump to produce a thin layer of amorphous silicon.

In the doctoral program at Hiroshima University, Japan, starting from 1995, I had continued the experiment on the synthesis of a thin layer of amorphous silicon and amorphous hydrogenated silicon-germanium using a chemical/radical beam epitaxy and low-pressure chemical vapor deposition systems. Because I had realized the limitations when returning home, I had also started modeling and simulation studies with a PC computer (not a super computer) to be compared to experimental results. On the other hand, at that time, a project of ultra-large scale integrated circuit (ULSI) or advanced metal-oxide-semiconductor field-effect transistor (MOSFET) had been running. The ULSI or advanced MOSFETs required the use of a thin layer of silicon dioxide with a thickness of less than 5 nm. Some research results related to the model and its comparison had been published. Since I came home in 2001, along with my colleague Dr. Sukirno and my undergraduate student, Ms. Fatimah Arofiati Noor, we had published theoretical and simulation studies on the tunneling time in MOS devices. My doctoral students, Mrs. Lilik Hasanah, Mrs. Fatimah Arofiati Noor, and Mr. Endi Suhendi, had continued the studies of modeling, simulation, and its comparison to experimental results using more complex formulations. They had produced several papers published in reputable international journals. Currently, they are associate professors at Physics Education of UPI, Physics of ITB, and Physics Education of UPI, respectively.

Home-made Instruments and Tools for Research and Teaching

After had returned to ITB in 2001, there had been other things that also had concerned me. Many of our alumni, who work as lecturers in various regions, had come back to ITB to characterize their thin film samples and electronic devices with available I-V Meter instruments. Finally, in 2005, I had decided to do research to provide the instrument at an affordable price and then the results of such research could be published. With my colleague as well as my graduate and master students, Dr.Eng. Mikrajuddin Abdullah, Mr. Muhammad Miftahul Munir (currently a lecturer in Physics ITB), and Mr. Asep Suhendi (a lecturer in Engineering Physics Tel-U), respectively, we had completed the instrument in 2006. Subsequently, there had been some orders made by the lecturers. On the other hand, as expected, the research results had been published in a reputable international journal in 2007. Today, the I-V Meter can be found in dozens of laboratories from several universities in Sumatra, Java, Kalimantan, and Sulawesi islands.

The spirit to overcome the limitations had been transmitted to the field of teaching. A variety of home-made tools to better explain the concepts taught in the classroom had been produced. In the period of 2002-2008, I had taught electronics and instrumentation-related courses. Difficulties in teaching these subjects had inspired me to make a variety of tools. In 2005, with Dr. Maman Budiman, we had created micro- controller-based single board computers, which are still used till now in the Laboratory of Electronics, Physics, FMIPA ITB as well as STT PLN, Jakarta and Sriwijaya Polytechnic, Palembang. These research results had appeared in a reputable international journal in 2007 as expected. Likewise with the existing I-V Meter, the tool is still used in Advanced Physics Laboratory, Physics, FMIPA ITB, to obtain the characteristics of basic electronics components that are essential for enriching electronics and instrumentation courses. The results of this research could then be published. The tool for the laboratory work on control system had also been created and then published by a reputable international

journal in 2011. To help understand the topic of spectroscopy taught in some courses of the Physics undergraduate program, a simple spectrometer had been produced and published together with my undergraduate student Mr. Eko Widiatmoko (currently a teacher in Aloysius High School Bandung). For the topic of spring elasticity, with Dr. Siti Nurul Khotimah, we had examined the dependence of spring constants on spring parameters and published the results. An easy way of mapping the static electric field had also been studied and subsequently published with Dr. Sparisoma Viridi and our master student in Teaching in Physics Program, Mr. Herfien Rediansyah (currently a teacher in SMK Pangkalpinang).

"Limitless collaborative researches among various disciplines must be developed using this electrospinning system"

Electrospinning System for Producing Nanofiber Mats

It had been started from a discussion with Prof. Kikuo Okuyama, a prominent professor from Hiroshima University, on our collaborative research in the near future. I had then sent one of my best master students, Mr. Muhammad Miftahul Munir (now a lecturer in Physics ITB) to pursue doctoral program under his supervision in 2006. We had finally focused on producing functional nanofibers using electrospinning technique in which its equipment had been assembled from several commercial parts. The research results had then published in reputable international journals. Due to the absence of an electrospinning system in my laboratory, together with Dr. Muhammad Miftahul Munir, we had built the system in 2012. The system, which had been designed and made ourselves and is now named Nachriebe 600 and 601, consists of a syringe pump with controlled flowrate, a movable drum collector, as well as a high voltage DC power supply. These research results had also been published. At present, this home-made electrospinning system has been spreading to several departments of universities, including Department of Chemical Engineering (University of Riau), Faculty of Computer Science (University of Sriwijaya), Department of Chemical Engineering (University of Diponegoro), Faculty of Medicine (University of Airlangga), and P.T. Soho.

I have been doing various research collaborations in the applications of nanofibers. Together with Prof. Effionora Anwar from Faculty of Pharmacy of Universitas Indonesia, we had studied on loading asiaticoside into gelatin/chitosan nanofibers in 2013 and we had then published the research results. I had also worked with Dr. Tri Suciati from School of Pharmacy of Institut Teknologi Bandung to supervise our doctoral student, Mrs. Ade Yeti Nuryantini (now a lecturer in Physics Education, UIN Sunan Gunung Djati). We had studied on polyvinyl alcohol/chitosan and polyvinyl pyrrolidone nanofibers loaded with binahong leaves extract for wound healing and these studies had been published in reputable journals. Then, a research collaboration with Dr. Heni Rachmawati and Ms. Annisa Rahma from School f Pharmacy of Institut Teknologi Bandung, had been done to study curcumin encapsulation into polyvinyl pyrrolidone nanofibers. Further research collaboration with Dr. Heni Rachmawati has been continuing in supervising a doctoral student, Mrs. Ida Sriyanti (currently a lecturer in Physics Education, University of Sriwijaya) on encapsulating mangosteen pericarp extract einto polyvinyl pyrrolidone nanofibers. Again, these research results had been published in reputable journals. The applications of nanofibers are not limited to realize drug delivery systems or functional foods. I open up the widest possible opportunity for other applications, such as water and air filtrations as well as various sensors and various structural functions. Limitless collaborative researches among various disciplines must be developed using this electrospinning system.

Prof. Andriyan Bayu Suksmono

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"Compressive SAmpling, Subsurface Magnetic Field Imaging, Adiabatic Quantum Computing"

Andriyan Bayu Suksmono is a Professor of Imaging and Signal Processing in The School of Electrical Engineering and Informatics, ITB (Institut Teknologi Bandung). He received B.S. and M.T./M.S. degree from ITB and PhD degree from the Faculty of Engineering, The University of Tokyo, Japan. His main interests are compressive sampling, radar, subsurface imaging, and quantum computing.

COMPRESSIVE SAMPLING

Compressive Sampling/Sensing (CS) is an emerging technique in Signal Processing with various applications. In the CS, an N-length K-sparse signal can be reconstructed exactly from its O(log(N)) sub-samples. The CS principles can be employed to develop a better reconstruction method or build a faster device. We have developed various CS applications, among others are: CS-based Radar, CS-based VL¬BI method, CS-based interpolation and its applications in dark-matter mapping.

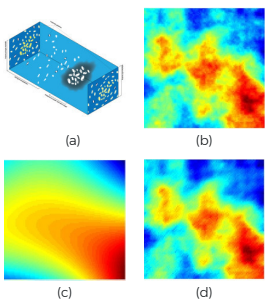


Figure 1 CS reconstruction applied in weak-gravitational-lensing survey. Distribution of PSF (Point Spread Functions) represents image of stars used for telescope correction: (a) light from galaxies lensed by gravitational field [Wikipedia] (b) Original field modeled as 2D fBm which is sparsely sampled, (c) Interpolation by Polynomial Method, (d) Reconstruction by the proposed CS-based method. [Source: A.B. Suksmono, MNRAS, 443, 919–926 (2014)]

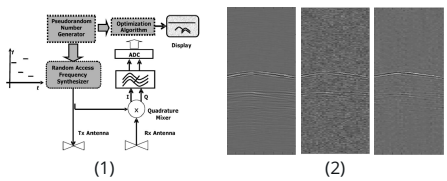
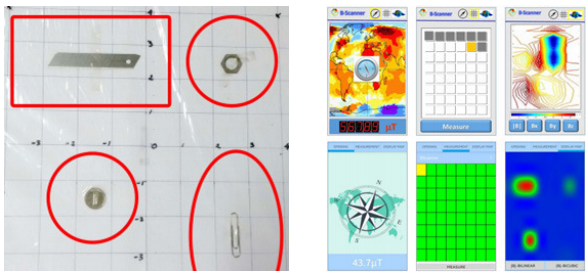


Figure 2 Compressive SFCW Radar: (1) Block diagram and (2) B-Scan image: original, direct reconstruction, and CS-reconstruction. The number of samples have been reduced 8-times, which means that the data acquisition is 8 times faster. [Source: A.B. Suksmono et.al., IEEE-GRS Letters, Vol. 7, No. 4, Oct. 2010]

SUBSURFACE MAGNETIC-FIELD IMAGING

We have built a magnetic subsurface imaging system on a smart-phone that employs the built-in magnetometer. The smart-phone's sensor measures magnetic field strength at sparse locations on a user-defined grid of the surveyed area. Based on the collected data, magnetic field distribution of the entire area is then reconstructed by using an interpolation algorithm, which yields field values in all of three-axial directions. The system is capable to perform subsurface imaging of small hidden objects in a laboratory test-range.



(a) (b)

Figure 3 B-Scanner: Smartphone based (Apps) magnetic field subsurface imaging: (a) Targets placement in test-range, (b) Smartphone screen displaying the Apps and imaging results. [Source: A.B. Suksmono, D. Danudirdjo, A.D. Setiawan and D. Rahmawati, IEEE-Trans. Magnetics, Vol. 53, No. 11, Nov. 2017, 3200405].

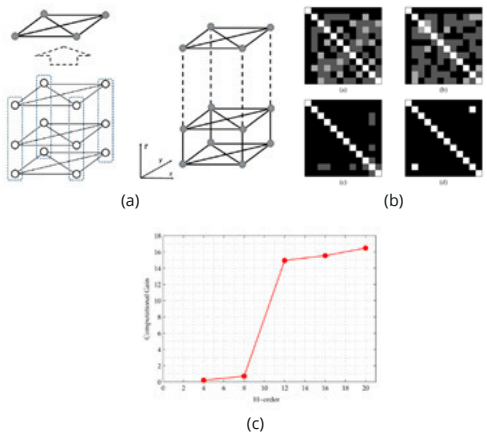
We have constructed an imaging device that capable to show a spatio-temporal distribution of magnetic field intensity in real-time, which is called B-Camera. The device employs a set of AMR (Anisotropic Magneto Resistance) 3-axis magnetometers, which are arranged into a two-dimensional sensor array. An interpolation algorithm and display software in the PDU present the field as a high-resolution video. We can use the B-camera to map the field distribution of a hidden object. It also capable to image a loaded powerline cable carrying a 50 Hz alternating current.

(a) (b) (c)

Figure4 B-Camera, a magnetic field camera: (a) Capability of B-Camera to image an object behind a 12 cm wall, (b) Capability of B-Camera to image a (hidden) powerline cable with various current values. [Source: A.B. Suksmono, D. Danudirdjo, A.D. Setiawan, R.P. Prastio, and D. Rahmawati, IEEE-INTERMAG 2018 Digest]

ADIABATIC QUANTUM COMPUTING

We use simulated quantum annealing (SQA) to find a Hadamard matrix, which is itself a hard problem. We reformulate the problem as an energy minimization of spin vectors connected by a complete graph. The computation is conducted based on a path-integral Monte-Carlo (PIMC) SQA of the spin vector system, with an applied transverse magnetic field whose strength is decreased over time. In the numerical experiments, the proposed method is employed to find low-order Hadamard matrices, including the ones that cannot be constructed trivially by the Sylvester method. The scaling property of the method and the measurement of residual energy after a sufficiently large number of iterations show that SQA outperforms simulated annealing (SA) in solving this hard problem.



(a) (b)

(c)

Figure 5 Adiabatic quantum computing for finding a Hadamard matrix: (a) extension of the classical model into imaginary-time trotter- dimension, (b) The first and the last Trotter slice at the end of iteration, (c) computational gain showing that QA outperforms SA. [Source: A.B. Suksmono, Entropy, 2018, 20(2), 14]

"The CS principles can be employed to develop a better reconstruction method or build a faster device"

Prof. Jahdi Zaim

"An early modern human presence in Sumatra 73,000–63,000 years ago"

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K. E. Westaway, J. Louys, R. Due Awe, M. J. Morwood, G. J. Price, J.-x. Zhao, M. Aubert, R. Joannes-Boyau, T. M. Smith, M. M. Skinner, T. Compton, R. M. Bailey, G. D. van den Bergh, J. de Vos, A. W. G. Pike, C. Stringer, E. W. Saptomo, **Y. Rizal, Y. Zaim, W.D. Santoso, A. Trihascaryo,** L. Kinsley and B. Sulistyanto, Nature (2017); doi:10.1038/nature23452;

The research had been done in 2015 in the Lidah Air Cave – formerly, in a Dutch spelling as Lida Ajer – West Sumatera (Figure1). The cave initially was excavated by a Dutch paleoanthropologist, Eugene Dubois in the late 1880's. During the excavation, Dubois found many vertebrate remains, including teeth, which he described 70 years ago as belongs to the teeth of "Orangutan fossils". Since there were no human fossils found in the excavation, Dubois ceased the cave Lidah Air excavation and moved to Java for doing other field researches and excavations in a river bank of Bengawan Solo, at Dusun Trinil. A hundred years later, the cave Lidah Air then revisited by other Dutch researchers, John de Vos and Randy Skelton. They did short observation and small excavation in the cave, but they had no any significant result. The cave Lidah Air then revisited again by Dr. Kira Westaway from Macquarie University, Sydney – Australia, and again she did not acquired any satisfying results.

Figure 1 Lidah Air cave - a small but well decorated front entrance (Photo credit Julien Louys and Gilbert Price).

In 2014, Julien Louys from Australian National University (ANU), Canberra – Australia signed Minute of Agreement (MoA) with Yahdi Zaim, from Geology Research Group (formerly, now Zaim is affiliated with Paleontology and Quaternary Geology Research Group), Geological Engineering Study Program ITB to build research collaboration with the topic: "Paleoenvironment Study of the cave deposits in Padang Highland – West Sumatera".

In September 2015, the ITB team consists of Yahdi Zaim, Yan Rizal, Agus Tri Hascaryo and Wahyu Dwijo Santoso, in collaboration with the team from Australian National University (ANU), Canberra – Australia: Julien Louys and Gilbert J. Price went to the Lidah Air, Ngalau Sampit, and Ngalau Gupin Caves. The teams undertook a detailed study on the geology of the caves including sedimentology, stratigraphy and paleontology. The excavations that have been done were successfully unearthed significant vertebrate fossil findings.

Fossil and rock samples were taken from the caves for laboratory analyses. Some samples were analyzed in the laboratory in Australia due to unavailability of laboratory equipments in Indonesia. One of the groundbreaking results is, human teeth were found among the vertebrate fossils collected from the excavation. These teeth specimens discovered from the Lidah Air Cave. The presence of human teeth fossils from Lidah Air was reminding the researchers to the "Orangutan fossils" teeth found by Dubois in 1880.

Figure 2 Lidah Air cave deposits containing a wealth of fossils (Photo credit Kira Westaway)

The Dubois specimen then reexamined and the analyses confirmed that the teeth are anatomically modern human, indicating that they were present on the Sumatran landscape since at least 73,000–63,000 years ago, as indicated by the dating on the rock samples where human teeth are found. This result indicates "An early modern human presence in Sumatra 73,000–63,000 years ago".

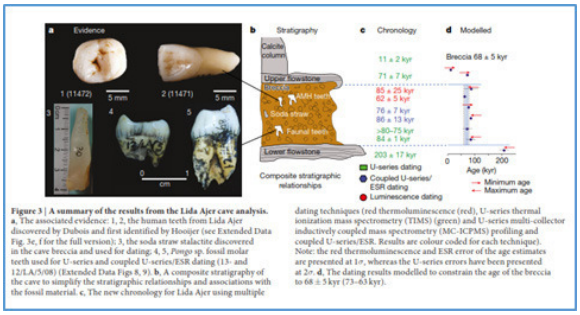

Figure 3 | A summary of the results from the Lida Ajer cave analysis. **a**, The associated evidence: 1, 2, the human teeth from Lida Ajer discovered by Dubois and first identified by Hooijer (see Extended Data Fig. 3e, f for the full version); 3, the soda straw stalactite discovered in the cave breccia and used for dating; 4, 5, *Pongo* sp. fossil molar teeth used for U-series and coupled U-series/ESR dating (13- and 12/LA/5/08) (Extended Data Figs 8, 9). **b**, A composite stratigraphy of the cave to simplify the stratigraphic relationships and associations with the fossil material. **c**, The new chronology for Lida Ajer using multiple dating techniques (red thermoluminescence (red), U-series thermal ionization mass spectrometry (TIMS) (green) and U-series multi-collector inductively coupled mass spectrometry (MC-ICPMS) profiling and coupled U-series/ESR. Results are colour coded for each technique). Note: the red thermoluminescence and ESR error of the age estimates are presented at 1σ, whereas the U-series errors have been presented at 2σ. **d**, The dating results modelled to constrain the age of the breccia to 68 ± 5 kyr (73–63 kyr).

“An early modern human presence in Sumatra 73,000–63,000 years ago”

Dr. Brian Yuliarto

"Nanostructure Materials for Sensors and Energy Application"

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Sensors

Nowadays, researchers over the world make an effort to get nanoscale of materials. This scale is well known can significantly improve the properties as well as performance of materials in many applications. In field of sensor, especially gas sensor, they have high demand of high perfomance of sensitive materials i.e high sensitivity, high selectivity, short time response, short time recovery, long life time or good stability, and good repeatibility occurred. In these days, high performance of gas sensor is highly required because the air quality become worst day by day as an impact of rapid growth of industry and transportation which emitt toxic gases such as Carbon Monoxide, Carbon Dioxide, Nitrogen Dioxide, Nitrogen Oxide, Sulphur Dioxide, and some of Volatile Organic Compound. Recently, it was found that decreasing size of materials sensors or modification of surface morphology of materials sensors are the key for high performance gas sensors. There are two kind of route to obtain sensing materials, dry route and wet route. Among them, wet route offer easy control of size and morphology shape of materials as well as easier synthesis process than dry route. Our laboratory have been developed some method to synthesize nano structure materials including Chemical Bath Deposition, Solvothermal, Dip Coating, Spin Coating, Ultrasonic Spray Pyrolysis, and Sol Gel. Those methods which have been develoed in our laboratory, are very simple and can modify nanostructure of materials by controling their parameter such as time, precursor concentration, temperature and doping agent. Those methods also can produce one dimensional, two dimensional, and three dimensional materials.

For example, we successfully developed multilayer of zinc oxide nanorod using combination of dip coating and chemical bath deposition with control their time reaction and template agent (fig.1). This structure provide longer difusion path and high specific surface area hence improve the sensitivity of gas sensor toward sulphur dioxide gas. This method is also adapted to obtain nanocube and nanosheet tin oxide. Furthermore, we also developed three dimensional zinc oxide with wool ball like structure using solvothermal method (fig.2). This structure combine with carbon nanotubes was found exhibited three times signal response compare to zinc oxide without carbon nanotubes.

Metal organic frameworks are recently developed as gas sensor. The idea of the useness of this material is their structure and high porosity which has abundan of

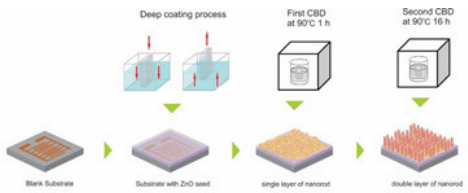

Figure 1 Synthesis process of multilayer ZnO using CBD method

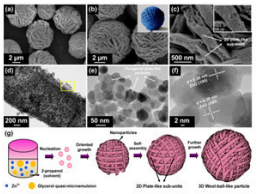

Figure 2 Wool ball like ZnO synthesized by solvothermal method

active site. Their capasitance can be altered with the present of gas or other analite. The improvement of their performance including shortened their recovery time is become a great challenge. Moreover, MOF also has potential to be applied as bio sensor as they exhibited good response toward glucose. Increasing rate of death because of cancer become our challenge to develope sensing material to detect cancer marker analyte. Our strating project is magnetite material for protat cancer early detection material. This material shows good signal and high sensitivity toward prostat cancer marker. This result show us high potential to conduct deep investigation about suitable materials for other marker cancer. In the future we will develop MOF as sensitive material for cancer detection.

Energy

In energy field our laboratiry has been developed dye sensitized solar cells and Copper-Zinc-Tin-Sulphide (CZTS) based solar cell. We conducted theoretical and experimental research to get the best result. The theoretical method can highly support experiment result. In DSSC, we focus on unique nature dye for light harvest and modification of metal oxide nanostructure as electrode. Recently we success fabricated black rice, banana peel, orange peel, and grass as a dye and get the highest efficiency ~3.16% for black rice extract (Fig. 3). Titanium Dioxide as electrode has important role to convert light into electric signal, so the structure of materials become a one of key for improve high performance of DSSC. CZTS solar cell system, has high potential to be developed because their efficiency theoretically can reach 33% and they have relatively simple structure (Fig. 4). In CZTS we focused on changing buffer layer Cadmium Sulphide which is rare earth material with alternative material such as Bismuth Sulphide, Tin Sulphide or Zinc-Tin Oxide. This alternative material are expected result in same performance as Cadmium Sulphide but spend lower cost.

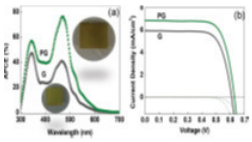

Figure 3 Dye sensitized solar cell system using grass extract as a light harvester.

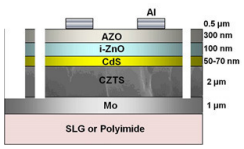

Figure 4 Copper-Zinc-Tin-Sulphide Solar Cell System.

Dr. Andri Dian Nugraha

"Development of High Resolution Seismic Tomography for Subsurface Imaging"

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Faculty of Mining and Petroleum Engineering
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Dr. Andri Dian Nugraha was born in Ciamis on September 8, 1978. He has received a Doctor of Science in Seismology and Tomography from Kyoto University in March 2009 and then has conducted Postdoctoral researcher in Kyoto University Pioneering Research Unit for the next Generation. In April 2010, he returned to Indonesia and joined Institut Teknologi Bandung (ITB) as lectures in Geophysical Engineering Study Program and as member of Global Geophysics Research Group, Faculty of Mining and Petroleum Engineering. Currently, he has been assigned as Head of Geophysical Engineering for Master/Doctor program and also Head of Volcanology and Geothermal Laboratory, ITB since January, 2018.

He has been collaborating his work about seismic tomography and seismicity analysis through national and international cooperation. He has advised and co-advised more than 5 doctors, 25 masters and 50 undergraduate students since 2010. He has authored and co-authored scientific papers in peer-reviewed national and international journal (h-index 8), many workshop/conference proceeding papers/presentations and 1 Intellectual Property Rights (Copyright).

He has received several awards, including (i) "Dosen Berprestasi Tingkat Nasional" from the Ministry of Research Technology and Higher Education of Indonesia (Kemristekditi RI) in 2015 and (ii) Young and Bright Contribution of Geophysics from Indonesian Association of Geophysics (HAGI) in 2013.

His current major research focuses on development of high resolution seismic tomography for subsurface imaging and seismicity analysis which can be applied for:

1. Local & regional earthquake tomography (subduction and active fault zones)
2. Volcano, geothermal and oil & gas tomography
3. Passive seismic of micro-earthquake monitoring in active faults, exploration/ production geothermal, DAM reservoir, oil & gas, coal-bed methane (CBM), and carbon capture storage (CCS) fields.

More details, seismic tomography can be used to delineate high resolution subsurface seismic structure of the subduction zone in relationship with arc volcanism and to determine weak zone around the active faults zone in order to support of seismic hazard mitigation (see Figure 1). Seismic tomography is also important for the interpretation of a conceptual model of the "plumbing system" of the hazardous volcano. In the geothermal and oil/gas fields, seismic tomography is one of power full tool to infer fracture, permeability, fluid, and steam zones.

He has also active in professional association organization, where he has been elected as President of Indonesian Association of Geophysics (HAGI) for 2018 – 2020.

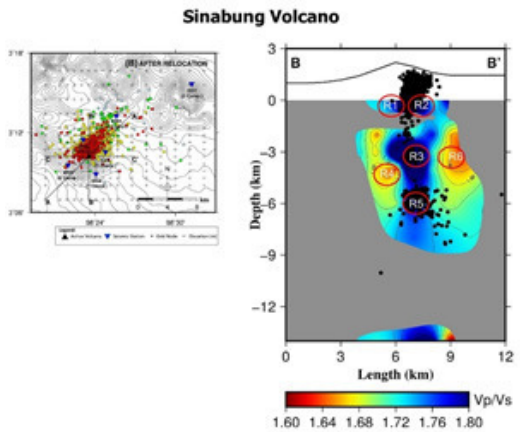

Figure 1 Schematic of Vp/Vs ratio structure beneath Sinabung volcano along the B-B' cross section. The Vp/Vs ratio is plotted as an absolute value. Blue and red colors indicate high and low Vp/Vs ratios, respectively (Nugraha et al., 2017, J Volcanol and Geotherm Res).

"Seismic tomography can be used to delineate high resolution subsurface seismic structure of the subduction zone in relationship with arc volcanism and to determine weak zone around the active faults zone in order to support of seismic hazard mitigation"

Selected Innovators

Production of Recombinant Dengue Virus Proteins for Dengue Diagnostic Kit Development

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Wooden Modular Architecture as The New Indonesian Construction Method

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DC Microgrids for Powering Remote Islands

Prof. Pekik Argo Dahono
Research Group of Power Engineering,
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The Development of Indonesian Hepatitis B ELISA Kits

Dr. Ernawati Giri-Rachman
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Product Development of Explosive Resistant Structures for Combat Vehicles

Dr. Sigit P. Santosa
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Palm Oil Fresh Fuit Bunch (FFB) Grading System

Dr. Richard Karel Willem Mengko
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Development of Dosage Form of Fixed Dose Combination Contains Turmeric and Propolis Extracts for Treatment of Peptic Ulcer

Prof. I Ketut Adnyana
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Reinventing Scientific Knowledge and Innovation of Value Chain Management

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Dr. Dessy Natalia

"Production of Recombinant Dengue Virus Proteins for Dengue Diagnostic Kit Development"

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Dengue virus which is transmitted by *Aedes mosquito* can cause several clinical manifestations from asymtomatic infection to dengue fever (DF) and the severe form of dengue hemorrhagic fever/dengue shock syndrome (DHF/DSS). There are about 50 million annual cases of dengue fever worldwide. The number of dengue patients in Indonesia was 126,675 with case fatality rate of 0.97% in 2015. Therefore, in this situation, access to sensitive and rapid detection is necessary to enable proper treatment of dengue infected patient which in turn will help to reduce morbidity and mortality due to dengue infection. A rapid diagnostic kit based on antigen-antibody interactions is commercially available, however all of them are imported products. We have produced two dengue antigens, namely recombinant DENV-2 NS1 and DENV-4 NS1 proteins in Escherichia coli carrying NS1 synthetic gene encoding NS1 amino acid sequences from Indonesian origin Dengue virus. The recombinant proteins have been assembled into a rapid diagnostic kit aiming for detecting anti dengue IgM and IgG in dengue infected patient. The color appeared on the kit is derived from the positive interaction of IgM/IgG dengue infected patient with recombinant protein and anti human IgM/IgG gold conjugate. We continuously work on enhancing the performance of dengue diagnostic kit in term of sensitivity and specificity by introducing another dengue antigen, such as recombinant dengue envelope protein. Our success in producing recombinant dengue proteins, ultimately increases the local content level of the IgG/IgM based dengue diagnostic kit. Our research will contribute in the relevance and impact of research product at university to meet the technological needs of the diagnostic kit industry.

Figure 1 Dengue Diagnostic Kit

Research Team

Biochemistry Division ITB
Linda Januar, Christian Heryakusuma, Ignatius Yovin, Fernita Puspasari, Ihsanawati, Dessy Natalia

PT Pakar Biomedika Indonesia
Bachti Alisjahbana, Anita Yuwita

Faculty of Medicine, Universitas Padjadjaran
Silvita Fitri Riswari, Hofiya Djauhari

National Patents

1. (P00201506769) Recombinant protein DENV-4 NS1 for diagnostic kit and dengue hemorrhagic vaccine and its production process.

2. (P00201709895) Combination of DENV-2 NS1 and DENV-4 NS1 recombinant proteins for the detection of dengue virus antibodies and their production processes.

“Our success in producing recombinant dengue proteins, ultimately increases the local content level of the IgG/IgM based dengue diagnostic kit”

Permana, MT

"Wooden Modular Architecture as The New Indonesian Construction Method"

Research Group of Building Technology, School of Architecture, Planning, and Policy Development
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Macro Insight

The modular building construction system become the solution in the new era of technology disruption in conventional building construction. This research also implementing mass production in Architecture on fast growing manageable soft wood as a building material with low embodied energy (such as Albizia Chinensis, Acacia Denticulosa, and Neolamarckia Nadamba). This research try to find innovative ways of building construction system which can be produced in mass quantity, easy to deliver, affordable in assembly, effective system, efficient and zero waste in construction. This system represent the real green architecture as an integrated supply chain process in appropriate technology for tropical development countries. This research will anticipate shifting paradigm in Architecture design process using digital parametric tools in the future. Invention of this research has been registered patent at Property and Intellectual Rights.

"Flexible modular innovative design and construction in Architecture, using sustainable local wood building materials, done by manufacturing process"

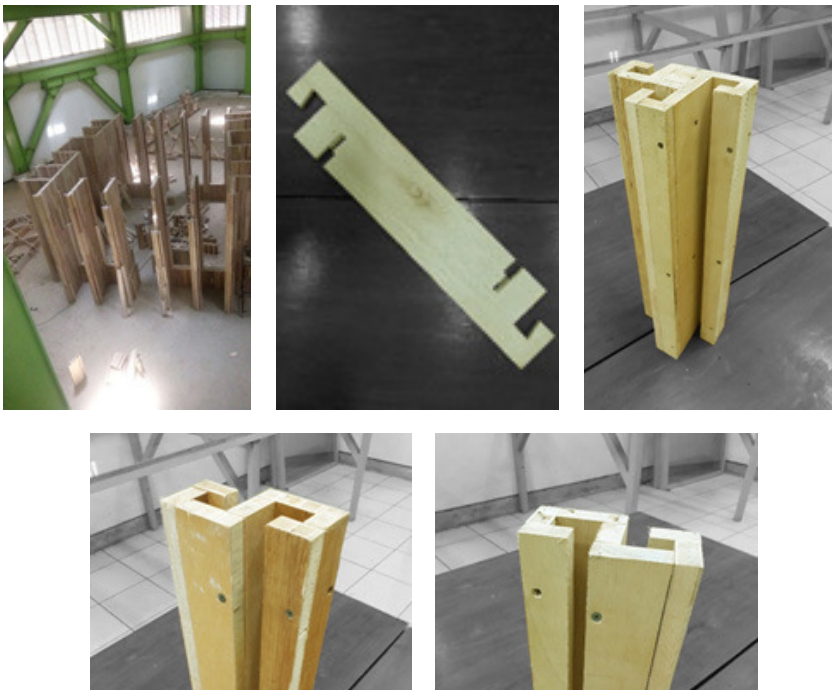

Figure 1 Softwood as building material

Micro Insight

This new invention is to provide building components in the form of softwood modular blocks to make wooden structures construction easy to assembly. The constructions are more simple, easy to made, mass production (manufacturing), easy to install, does not require adhesive materials (cement, glue, nails, etc.) and has many possibilities designs of wall combinations with flexible openings design of door panels and windows, and allow for repositioning while knockdown installation process, without the needs for high skilled construction workers. In addition, the purpose of this invention is to lighten the weight of the building, without reducing the reliability of the building standards, from the aspects of safety , health, and comfort.

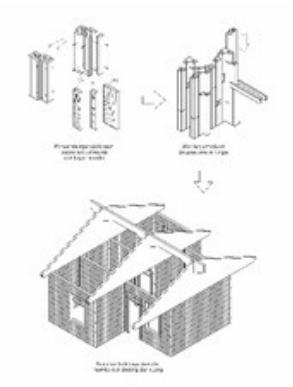

Figure 2 Wooden building construction

Prof. Pekik Argo Dahono

"DC Microgrids for Powering Remote Islands"

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School of Electrical Engineering and Informatics
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Indonesia has a target to increase the electrification ratio to be more than 99% by 2020. The biggest challenge is to electrifying the remote small islands. Indonesia has more than 10 thousands remote small islands waiting to be electrified. Unfortunately, the energy resources are not distributed evenly across the nation so that various special measures should be done.

The only energy resources in remote islands are usually solar, wind, microhydro, and/or bioenergy. These kinds of energy resources are usually intermittent and, therefore, these should be integrated into a small microgrid as shown in Fig. 1. Various renewable power sources are connected in the dc form through power electronics converters. In the dc form, various power sources can be integrated easily without the need of synchronization and the associated communication systems. Several microgrid systems can also be integrated to form a macrogrid or to the existing macrogrid system.

Fig. 1 shows that various power sources, energy storages, and loads should be connected to the dc grid through power converters. The power converters for these purposes should be efficient, less maintenance, and reliable. The power converters are required because renewable energy sources are usually generating electrical power not in the usable forms and can not be integrated directly. Though the demand of such power converters are very high, at present in Indonesia, we have not so many manufacturers produce it. In cooperation with PT. LEN and under supports

of PT. PLN, LPDP, and Menristekdikti, we have developed many power converters and the associated controllers.

We have developed various dc-dc power converter topologies that suitable for photovoltaics, fuelcells, and batteries. The proposed dc-dc power converters have tvery large gain capabilities with very small input current ripple. Very low current ripple is very important in these applications. Moreover, we have also developed partial rated dc-dc converters for microconverter PV systems. The rated power of microconverter is smaller than the rated of PV module because the task of the converter is just to compensate the voltage variation of PV module. As the rated power is small, the total efficiency of the system is very high.

"It has been shown theoretically and practically that the converter performance can be improved significantly by using the proposed virtual impedance"

We have also developed various control techniques based on the new virtual impedance concept. Virtual impedance is an additional control algorithm that makes the system behaves as if there is an additional impedance connected to the system. The implementation of virtual impedance is strongly determined by how the impedance is connected to the system. As the impedance is virtual, the impedance can be designed in such a way so that a special characteristic that cannot be possessed by a real impedance can be obtained. It has been shown theoretically and practically that the converter performance can be improved significantly by using the proposed virtual impedance.

It is expected that the proposed converters and dc microgrid systems can be useful to accelerate the electrification of many remote islands in Indonesia. This dc microgrid technology is also useful to serve special customers with very power quality requirements. Moreover, the proposed power converters are also useful in helping other national programs such as electrification of transportation systems and energy conservation.

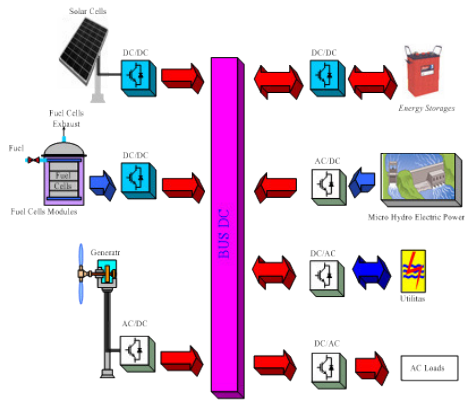

Figure 1 DC Microgrid System

Dr. Ernawati Giri-Rachman

"The Development of Indonesian Hepatitis B ELISA Kits"

Research Group of Genetics and Molecular Biotechnology, School of Life Sciences and Technology
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Hepatitis B is the most common liver infection worldwide since the disease is often associated with chronic liver diseases that can lead to the development of cirrhosis and hepatocellular carcinoma (HCC). Despite significant progress made in vaccination, antiviral therapy, and available of commercial diagnostic kit, Hepatitis B remains as one of the most serious medical problem, including Indonesia. In Indonesia, even though the Government has already started the mass immunization program for new born babies since 1997, the problem is still rising due to dependence of raw materials in vaccine production and diagnostic kit. In order to overcome this problem, ITB has involved in Indonesian Hepatitis B vaccine and diagnostic kit development and the research is in line with focus of Indonesian Government Program. In previous research, ITB became one of the member of National Hepatitis B Research Vaccine Consortium, a collaborative, integrative and interdisciplinary research group, led by pharmaceutical company PT Bio Farma. Through this consortium, few antigens as raw material which play an important role in inducing potential humoral and cellular immune responses, were developed based on the information from Indonesian Hepatitis B virus diversity. Recently, the collaborative research between ITB and PT Bio Farma is progressing. Together in our research group, we are focusing in the development of Indonesian Hepatitis B Diagnostic kits which are based on ELISA (enzyme-linked immunosorbent Assay). In this research, we have developed Indonesian Hepatitis B ELISA kit that could be used to detect Hepatitis B virus in blood serum, based on the interaction of surface protein that resides on Hepatitis B Virus (HBsAg). Part of reagents in the kit was derived in our laboratory. Comparing to commercial available imported kit, recent result of specificity and sensitivity test, are similar. In addition, we are also still working on the development of ELISA kit that could be used to detect the successful of vaccination through antibody anti-HBsAg detection. These developments have implications, not only for enhancing the research capacity, but also for strengthening the collaborative research to achieve the independence in fulfilling the needs of diagnostic kits in Indonesia.

Figure 1 Hepatitis B ELISA kit for HBsAg detection

Figure 2 Hepatitis B ELISA kit for anti-HBsAg detection

Research Team

ITB:
Wardono Niloperbowo (SITH), Marselina Irasonia Tan (SITH), Debbie Soefie Retnoningrum (SF), Ramadhani Qurrota A'yun (BBRC-ITB), Alfi Taufik Faturrahman (BBRC-ITB), Meutia Diva Hakim (BBRC-ITB)
Anindyajati (SF-ITB), Tina Lusiany (SITH-ITB), Ernawati A. Giri-Rachman (SITH-ITB)

PT Bio Farma:
Neni Nurainy, Dicky Mahardika Taryono

National Patents (Registered):
(P00201800256). Kit Diagnostik Untuk Mendeteksi Infeksi Virus Hepatitis B Menggunakan Antibodi Primer IgY Anti Hepatitis B Surface Antigen (HBsAg) dan Antibodi Sekunder Anti-HBsAg yang Terkonyugasi Horseradish Peroxidase (HRP) dan Proses Pembuatannya

Figure 3 Dr. Ernawati Giri-Rachman and team

"Comparing to commercial available imported kit, recent result of specificity and sensitivity test, are similar"

Dr. Sigit P. Santosa

"Product Development of Explosive Resistant Structures for Combat Vehicles"

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Dr. Sigit P. Santosa is currently the Director of the National Center for Sustainable Transportation Technology (NCSTT). He is also a faculty member at the Faculty of Mechanical and Aerospace Engineering, Institut Teknologi Bandung (ITB), Indonesia. Dr. Santosa is currently a Principal Investigator (PI) of various research collaborations, among other Joint ITB-MIT research collaboration on electric based transportation sponsored by USAID-SHERA program, Joint ITB-Oxford collaboration on the development of lightweight structure for railway vehicles. Dr. Sigit P. Santosa has more than 30 years experiences in the product development, research, and teaching in the field of automotive and transportation engineering. After completing his Doctoral Degree from Massachusetts Institute of Technology (MIT) USA, he joined General Motors Company, USA. During his tenure at GM (1999-2012), he has led and managed 7 product architectures and launched 14 brand vehicles, among others Hybrid & Electric Vehicles. His research works was published in International journals and conferences, he also owned a US/Global Patent related to Impact Deflection and Energy Absorption System. He joined ITB in 2013, and he currently teaches vehicle development process, design for manufacturing and assembly for automotive application, structural crashworthiness, occupant protection and safety, and numerical analysis and computational method.

His current research focuses are developing crash-worthiness and blast worthiness structure, structural dynamics and transportation system, including:

1. Research on blast resistance structure in application of aluminum foam sandwich panel under explosion loading for Armored Fighting Vehicle (AFV).
2. Research on crash box as a collision energy absorber device in crashworthiness.
3. Research on developing an electric vehicle (EV) for future sustainable transportation.
4. Research on noise, vibration, harshness (NVH) on vehicle system.

Blastworthiness Structure Design – Aluminium Foam Sandwich Panel

This research is currently being funded by LPDP for 2016-2019 with total funding of 5.6 billion Rupiahs.

Current research of Dr. Sigit Santosa is developing an aluminum foam panel sandwich as a blast resistance. In military context, armored fighting vehicle (AFV) is one of required components that needs to be protected from attack, especially from anti-vehicular (AV) mine. Based on Pentagon report, from April to June 2017, 1143 cases with 3043 personnel killed and injured by improvised explosive devices (IED) destruction. Increasing level of protection of AFV from IED or land mine is an essential key to reduce death and injury of military personnel. Most of previous work has a deficiency. The use of polyurethane foam as an energy absorber that is considered insufficient to withstand a mine explosion.

The research proposes a modular armor by constructing aluminum foam sandwich V-shaped provides reinforcement on the floors of existing combat vehicles that consists of an aluminum foam as an explosive energy absorber. This construction has proven resistant to a level 3 mine attack with no holes or cracks on the passenger side. The advantages of this concept that there is no need for major changes in existing design due to its modularity installation, can be applied at many types of AFV, ease of maintenance, and does not interfere vehicle mobility performance in terms of its lightweight mass and small spent-space.

This innovation is expected to be a basic scientific research to develop stronger and safer Indonesian AFV by PT PINDAD in real industry. PT PINDAD as a partner can produce this product and apply to their vehicle, trigger domestic material supplier and manufacturer to develop an advanced aluminum foam.

Figure 1 Experimental testing of Blastworthiness structure; aluminum foam sandwich panel. The explosion test is conducted on February 2018 in PINDAD testing facility

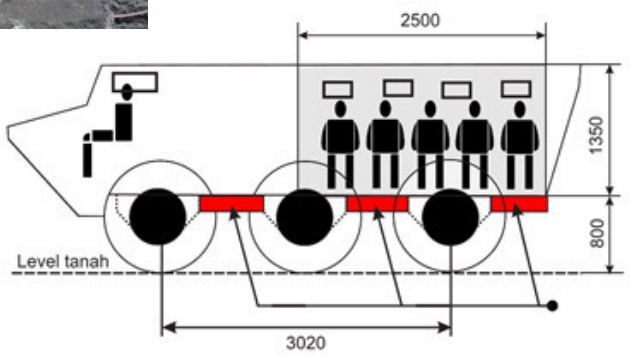
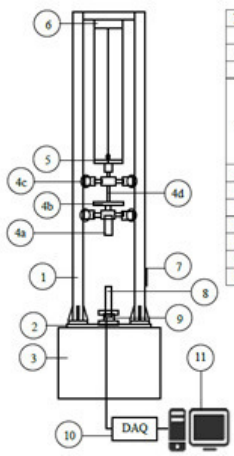


Figure 2 a) Anoa AFV, modern armoured fighting vehicle is developed by PINDAD b) Modular aluminum sandwich panel location on the Anoa, to deter the landmine explosion



No.	Name	Qty.
1.	Guide columns	2
2.	Steel plate	1
3.	Concrete base	1
4.	Impactor assembly	
	a. Impactor head	1
	b. Weighting mass	
	c. Wheels	4
	d. Frame	1 set
5.	Clamp & Release Mech.	1
6.	Hoist	1
7.	Speed sensor	1
8.	Specimen	
9.	Load cell	1
10.	Data Acquisition System	1
11.	Computer	1

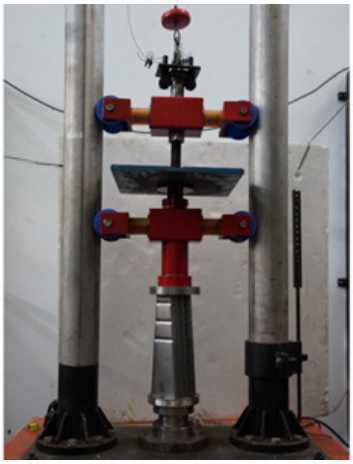


Figure 3 Dropped weight impact testing machine. The instrument used to experimentally test DTDH column as an efficient crush energy absorber.

Crashworthiness Structure - Double-tapered double-hat (DTDH) column as an efficient crush energy absorber

This research is partially funded by AUN/SEED and Ristek-dikti Desentralisasi Riset ITB 2015-2017.

Crashworthiness and vehicle safety are important issues in the automotive industry. According to statistics, traffic accidents are considered one of the most serious concerns for the public. The number of deaths from accidents in 2001 reached 9,204, while the year 2014 increased almost 300%, has reached 28,297, and accidents due to frontal crash was 25%.Therefore, designing a crash-worthy structure to achieve the best safety performance has always been a top priority for manufacturers and researchers. Crashworthiness structure of thin-walled columns is an essential component of the structure of the car mounted on the front side to absorb dynamic energy of frontal collision. Absorption of crush energy is done by progressive folding of column.

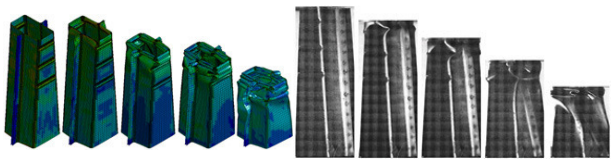


Figure 4 a) Numerical work of DTDH column impact simulation using LSDYNA b) Experimental result of DTDH column, impacted by dropped weight impact testing machine

The research proposes a new configuration of thin walled structure of double-tapered double-hat columns (DTDH) and single-tapered double-hat columns (STDH) to achieve a higher and more efficient energy absorbing system. Designing a system of crash energy absorbers for vehicle application requires robust geometrical and material modeling. However, most of the design process using math-based computational tools is usually under-predicting the actual experimental results due to lower crushing force prediction. To avoid this issue, the manufacturing and forming histories of the thin-walled column is included in the computational model.

In terms of the axial crushing force, spring back, and post-forming geometry, the computational models are correlated very well with the experimental results. The manufacturing process has a significant effect on the axial crash performance. The peak crushing force is 20% lower, while the mean crushing is 7% lower on the STDH columns without manufacturing process. From the parametric studies, the double-tapered double-hat columns (DTDH) represented an excellent crashworthiness characteristic and should be considered as an energy absorbing device.

Patent DTDH column is currently being submitted to the patent office, Directorate General of Intellectual Property Rights, Ministry of Law and Human Rights of Indonesia.

Noise, vibration, and harshness (NVH) of Railway Structure

This research is funded by Research Innovation for Industry Incentive Program of Ristekdikti 2017.

Noise and vibration (N&V) is the study and modification of the noise and vibration characteristics of vehicles. Harshness is a subjective quality, and is measured of a comfort by human subjectivity. In this engineering process and research, a system is developed to keep a minimum of exposure to noise vibration and harshness. Previous work in Indonesian railway system, some of part of bogie structure is constructed by concrete, steel or other brittle material. These material can be substituted by another material since there is no significant loading on it. Noise absorber material such a foam is proposed to be applied.

The research proposes a new structure configuration to reduce the NVH aspect on railway structure and increase passenger comfort on the train cabin. Noise and vibration analysis is conducted by experimental and numerical method to reduce the noise intensity in decibel (dB). The study substitutes the concrete material which is existing in the bogie construction by aluminum foam sandwich panel. This advantages of this applied research that the new configuration can reduce a noise intensity by absorbing vibration energy, less weight which is reduce a fuel consumption and easy on installation and maintenance without much effect on train operational.

Figure 5 INKA bogie design. The concrete floor structure is substituted by the aluminum foam panel to reduce the NVH and maintain the less weight.

Figure 6 a) Proposed aluminum foam panel is applied to the train floor structure to reduce the NVH aspects of the railway armada b) attached foam structure to the sub frame

“This advantages of this applied research that the new configuration can reduce a noise intensity by absorbing vibration energy, less weight which is reduce a fuel consumption and easy on installation and maintenance without much effect on train operational”

Dr. Richard Karel Willem Mengko

“Palm Oil Fresh Fuit Bunch (FFB)”

Research Group of Biomedical Engineering,
School of Electrical Engineering and Informatics
Email : richard@mengko.com

Oil extracted from Palm oil FFB is widely used for different purposes and is one of the vegetable oil mostly used in the world. From the process output point of view, there are three main categories: 1) Crude Palm Oil (CPO), 2) Palm Kernel Oil (PKO) and 3) Oleochemicals.

The main objective of this research is to develop an electronic grading system capable to detect the degree of ripeness of the FFB, so that the oil content that can be extracted from a FFB can be estimated and standardized further. The target of this research is to develop a FFB grading prototype, so that the sorting process can be done automatically. The benefit from this automatic grading system
is as follows:

1. Increasing production consistency (yield)
2. Lowering production cost (sorting stage)
3. Increasing production speed and output volume
4. Eliminating inconsistent manual sorting process (manual operators can be transferred to a more productive task).

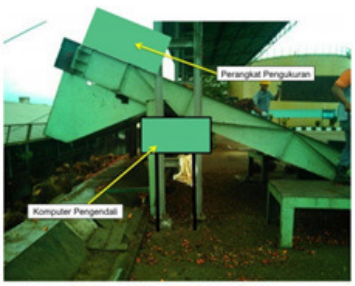


Figure 1 Illustration of grading sensors in an industrial ramp for individual FFB

This research activity is a part of the national effort to implement new technologies into the conventional manufacturing plants to increase speed and production efficiency. This is one of the national main goal in developing tehnologies in the food processing industry.

Research & Development Team:
Prof. Dr. Ir. Tati R. Mengko (STEI ITB); Dr. Donny Danudirdjo, S.T., M.T. (STEI ITB), Dr. Ir. Agung W.Setiawan, M.T., IPM (STEI ITB), Alfie Rizky Ananda,S.T. (STEI ITB), Afrizal Rifky, S.T. (STEI ITB), Dede Aisyah (STEI ITB), Ir. Ahmad Bafagih (PT. Elda Sarana Informatika), Dianty Soberlin, S.T. (PT. Elda Sarana Informatika), Anton Sudianto, S.Kom. (PT. Elda Sarana Informatika), Asep Saepurrohman (PT. Elda Sarana Informatika), Dani Ferana Putra, S.Kom. (PT. Elda Sarana Informatika), Iwan Aditya, A.Md. (PT. Elda Sarana Informatika), Development team PT. ESI (PT. Elda Sarana Informatika), Production team PT.ESI (PT. Elda Sarana Informatika), Tim Study Pasar PT. ESI (PT. Elda Sarana Informatika)

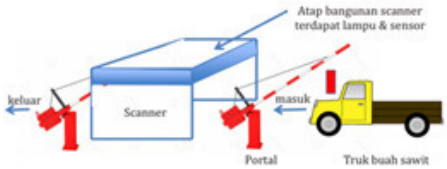


Figure 2 Illustration of an automatic grading system for a 'per truck' scanning

Figure 3 Illustration of automatic grading during FFB harvesting

"Develop an electronic grading system capable to detect the degree of ripeness of the FFB, so that the oil content that can be extracted from a FFB can be estimated and standardized further"

Prof. I Ketut Adnyana

"Development of Dosage Form of Fixed Dose Combination Contains Turmeric and Propolis Extracts for Treatment of Peptic Ulcer"

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Imbalance between defensive factors and aggressive factors in the stomach causes ulcer. The main causes of peptic ulcer are long term use of non-steroid anti-inflammatory drugs such as asetosal, stress and Helicobacter phylori infection. Turmeric (Curcuma domestica Val) is a plant that is widely spread in Southeast Asia and commonly used for broad range purposes. According to the former study, the content of curcumin in turmeric shows antiulcer, anti-inflammation and antioxidant activities as well as gastro-protective effect on the gastric mucosa. Propolis is a resinous hive products collected by bees from the plants. Its popularity increases as an alternative or additional health over the world.

The research successes to develop the extraction process of turmeric and propolis. Furthermore, develop a dosage form of fixed combination contains turmeric and propolis extracts. The developed dosage form shows anti-ulcer effect similar to conventional drug.

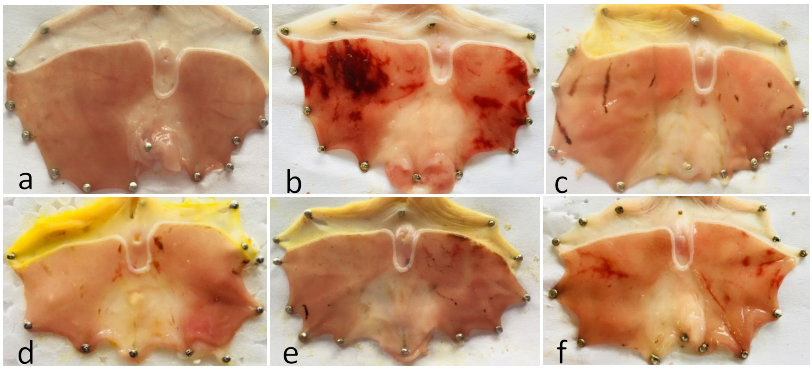

Figure 1 a: Normal, b: Control; c: FDC1 (50 mg/kg turmeric extract & 50 mg/kg propolis extract); d: FDC2 (100 mg/kg turmeric extract & 50 mg/kg propolis extract); e: FDC3 (100 mg/kg turmeric extract & 100 mg/kg propolis extract); f: omeprazole

Figure 2 Fixed dose combination (FDC) of turmeric & propolis extracts

"We succeeded to develop the extraction process of turmeric and propolis and furthermore, develop a dosage form of fixed combination contains turmeric and propolis extracts. The developed dosage form shows anti-ulcer effect similar to conventional drug"

Prof. Togar Mangihut Simatupang

"Reinventing Scientific Knowledge and Innovation of Value Chain Management"

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Prof. Simatupang holds a PhD degree from Massey University in New Zealand. At the School of Business and Management ITB, he teaches Technology and Operations Management, Supply Chain Management, Operations Management, and Creative Economy. He is well known as an expert in supply chain management and creative industry development.

Previously, Prof. Simatupang was Associate Dean for Academic and Student Affairs at the School of Business and Management, where he was responsible for articulating a vision of the future of business education and practice to faculty, students, and other stakeholders, implementing and updating plans for academic and student affairs and curriculum, and promoting the standards for scholarship and professional integrity. In pedagogical research, he invented four fields of business discipline, namely management, administration, entrepreneurship, and stewardship. He was part of leading team to establish the first bachelor program in Entrepreneurship in Indonesia. Recently, he was appointed as the Rector of Del Institute of Technology in North Sumatra.

His research interests include supply chain collaboration, inventory models, operations management, service science, co-innovation platform, entrepreneurship, and creative economy. His primary research intention focuses on the development and management of collaborative relationships such as how to design and manage supply chain collaboration, how to equalize their risks and rewards, and how to share the benefits of collaboration. The results of his research have been published in a variety of journals, including *the International Journal of Logistics Management, Total Quality Management, Management Decision, Business Process Management Journal, Supply Chain Management: An International Journal, Benchmarking: An International Journal, and International Journal of Physical Distribution & Logistics Management.*

Prof. Simatupang was a recipient of the Emerald Literati Network Award 2006 for the highly commended paper published in the International Journal of Logistics Management. He was also rewarded Endeavour Award from the Government of Australia for a postdoctoral study at the University of Newcastle in 2008. His present research projects include the development of Value Chain Design Lab, which strives to design value chains more responsive to human needs in the era of Industry 4.0 and gamification and simulation games which aims to provide extensive experience to practitioners and students in developing intuition and leadership skills in value chain management.

“Striving to design value chains more responsive to human needs in the era of Industry 4.0”

Selected Community Services

ASEAN YOUTH VOLUNTEER PROGRAM (AYVP) 2017

Dr. Irwan Meilano & Dr. Rahma Hanifa
Research Center of Disaster Mitigation,
Email : Irwan.meilano@gmail.com

DEVELOPMENT OF BARONGAN BLORA FOR TYPICAL SOUVENIR OF THE CITY

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INNOVATION FOR ALL

Dr. Yannes Martinus Pasaribu
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Faculty of Art and Design
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COMMUNITY SERVICE OF LPPM IN SEIMENGGARIS

Prof. Budi Sulistianto
The Institute for Research and Community Services
Email : bst@lppm.itb.ac.id

AGRO-INDUSTRY-BASED ENTREPRENEURSHIP DEVELOPMENT FOR COMMUNITIES AROUND LAKE MANINJAU

Prof. I Nyoman Pugeg Aryantha
School of Life Science and Technology
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"Aplikasi Pengembangan Barongan Sebagai Cinderamata Khas Blora
Dengan Sentuhan Teknik Potong, Tempel, Pahat dan Lukis"
Kerjasama Pemerintah Daerah Kabupaten Blora dan LPPM ITB
(Program Riset Inovasi KK dan IPTEKS Bagi Masyarakat)

Asean Youth Volunteer Program (AYVP) 2017

Dr. Irwan Meilano and
Dr. Rahma Hanifa

Research Center of Disaster Mitigation
Email : Irwan.meilano@gmail.com

Figure 1 AYVP Closing Ceremony 2017 in West Hall ITB

Introduction

ITB in collaboration with University Kebangsaan Malaysia hosted the 5th ASEAN Youth Volunteer Program (AYVP) in Indonesia, specifically in Bandung, for 4 weeks, from 1st August 2017 untul 26 August 2017. AYVP is a community leadership platform that creates opportunities for knowledge-driven volunteerism among youths through capacity development and exchange of learning experiences. AYVP is permanently based at Universiti Kebangsaan Malaysia (The National University of Malaysia – UKM) with the advice and support of the Ministry of Youth and Sports Malaysia (KBS), ASEAN Secretariat (ASEC), and the U.S. Agency for International Development (USAID), In 2017 AYVP collaborate with Institut Teknologi Bandung (ITB) Indonesia with theme Disaster Risk Reduction (DRR), focusing on Disaster Resilience Building. As much as 50 youths across all 10 ASEAN countries, along with 10 facilitators from Indonesia come together to Bandung, given and sharpen skills and compentencies in youth leadership, volunteerism, and disaster management. They are future leader in Disaster Risk Reduction in ASEAN, that build cooperation, coordination, technical assisstance and resource mobilization within ASEAN toward the ASEAN Vision 2025 on Disaster Management as stated the ASEAN Agreement on Disaster Management and Emergency Response (AADMER).

The activities focused on community engagement in building earthquake disaster resilience. Earthquake disaster is potential to cause catastrophic impact on human loss and economic loss. ASEAN countries located along the ring of fire are all prone to earthquake disaster. Indonesia has experience many catastrophic earthquake disaster such as the 2004 Sumatra Andaman Earthquake with Magnitude 9.0 followed by devastating tsunami that killed more than 200.000 people across Indian Ocean countries. 2014 Bohol inland earthquake in Phillipines has caused more than 200 casualties. Here in Bandung, we live near Lembang Fault running 29 Km from east to west of northern Bandung, about 7 Km from ITB. We are now investing in building resilient country, resilient city, and resilient community. This program is supported by 4 program of Community Services funded by ITB which are led by Prof. Krishna S. Pribadi, Dr. Irwan Meilano, Dr. Imam Sadisun, and Harkunti P. Rahayu, Ph.D, to support the resources, community engagement, module development and map production. More than 20 local stakehoders supported this event, including as Local Disaster Agencies, local government, and community including youth (Karang Taruna).

Week-1 AYVP 2017

During the first week of August 2017, youth participants were introduced to each other, bonding process, and given lectures to prepare for deployment to the local community. Series of lecture were mainly given on volunteerism, disaster management, earthquake risk, community based disaster risk management, social media and culture, from experts of ITB, UKM, ASEAN Secretariat, AHA Center, BNPB, BPBD West Java Province, BPBD West Bandung Regency, LIPI, etc. In the end of the first week, participants visited and learn about the Lembang Fault.

Figure 2 AYVP 2017 Opening Ceremony on 1st August 2017, In West Hall ITB, opened by the Rector of ITB

Figure 3 Geotourism Lembang Fault lead by Dr. Mirzam Abdurahman ITB and Dr. Mudrikh LIPI

Week-2 and 3 AYVP 2017

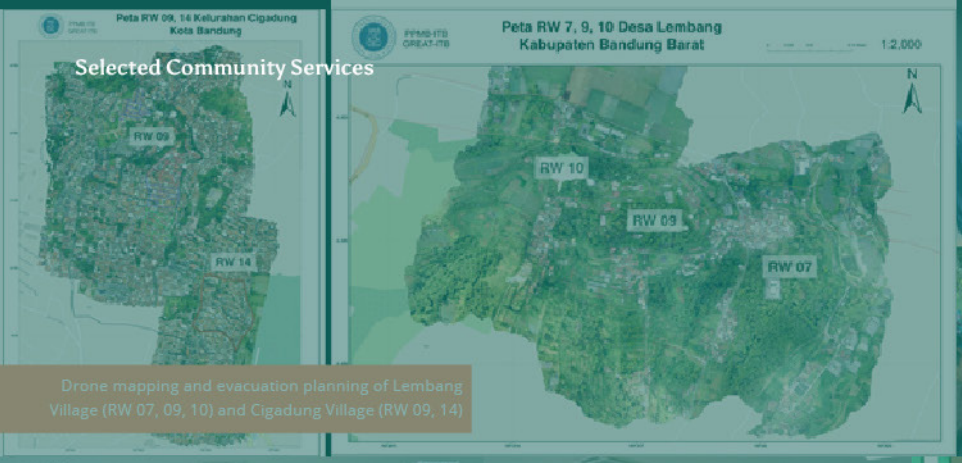
During the second and third week, they gain hands-on experience working with the community. There are two site location, Lembang Village, located just in the middle of Lembang Fault, and Cigadung sub-district in Bandung City.Those areas have different characteristic. Lembang village is rural with more rural characteristic, most nof the livelihood is farmer and cattleman. It is hilly area that is prone to landslide. Cigadung village has more city characteristic. Most of people are employee. It is dense area and is prone to fire.

Within these two weeks, the volunteers engaged with the community, empower them, and together with the community assesed the risk situation in their area. The volunteers and community determined the hazard that threat them, assesed the vulnerability situation toward the threaten hazard, and capacity they have to reduce the vulnerability as well as the disaster risk in their area. Due to limited time, the risk assessment was conducted for developing the evacuation plan when earthquake occured. They produced the evacuation map consisting of vulnerable area to be avoided, evacuation route, and safe places for meeting point and evacuation shelter. In the end of community engagement, they sucesfully conducted disaster drill. Around 1100 community involved in earthquake drill in Lembang and Cigadung Village on 19 and 20 August 2018. Besides, the volunteers also involved in commuity activity to have more engagement. For example, they are involved in many local activities to commemorate Indonesia Independence Day, such as carnival and many competition held by youth.

Figure 4 Lecture, Workshop And Group Exercise With Experts from ITB Prof. Krishna S. Pribadi, Dr. Irwan Meilano, Dr. Imam Sadisun, Harkuni P. Rahayu, PhD, Dr. Nuraini Rahma Hanifa, Aria Mariany, and Stakeholders

Figure 5 Visiting Cikahuripan, Resilient Village

Selected Community Services



Drone mapping and evacuation planning of Lembang Village (RW 07, 09, 10) and Cigadung Village (RW 09, 14)

TTX Simulation Assists by BPBD West Java

Inauguration of Lembang Village DRR Volunteer and working tog[illegible]th community v[illegible]ers

Safe School in Lembang and Cigadung Village

Cultural Night

Culture Exchange

During the program, several program on ASEAN culture exchange was conducted, such as Cultural Night, in which in each explained and performed culture and art from 10 ASEAN countries, visiting several places in Bandung and Lembang, tasting traditional food of Indonesia, served by the community.

Week-4 AYVP 2017

Finally on the 4th week, they prepare a program to conduct their our disaster risk reduction program in their home town.

Community Engagement
in Lembang and Cigadung Village

Earthquake Evacuation Simulation Drill
in Lembang (19 August 2017)
and Cigadung (20 August 2017)

Dr. Irwan Meilano
(AYVP 2017 Team)

"We are now investing in building resilient country, resilient city, and resilient community"

Development of Barongan Blora for Typical Souvenir of The City

Muksin, M.Sn.

Research Group of Visual Art,
Faculty of Art and Design
Email : muksin@fsrd.itb.ac.id

Figure 1 Barongan Blora

Barongan in Blora is one of the folk art that flourished in the villages of almost all districts in Blora. Barongan evolved as performing arts, previously functioning as a means of ritual ceremonies and a village salvation procession to reject the unexpected calamity.

For decades, barongan has become communal art that has been ingrained in the community, and being known and loved by people of all ages. At every important event, such as a national holiday, welcoming guest and / or celebration, barongan is often featured as a show, with a distinctive gamelan accompaniment inviting people to join the festivity.

With the decline of new barongan orders, many barongan craftsmen became unemployed and can not support their family only from this business. In 2012 LPPM ITB team was invited by Blora Government to identify the cultural product of Blora for the icon of the city. The team found a potential barongan which has a strong character as a product of Blora's cultural icon.

The survey indicated that there were only a few barongan craftsmen, there was no barongan souvenir, none of the craftmen wanted to produce souvenir and the market for barongan souvenir did not exist. From there the LPPM ITB team began to create a development program by making barongan prototype designs for typical Blora souvenirs with various alternatives. With endless effort through workshop, training and socialization, the team was able to convice the craftmen and young trainee, especialy in changing the mindset that barongan for souvenirs should be made for everyone to like and to buy as typical souvenirs from Blora.

Figure 2 Barongan as souvenirs

Currently significant results can be seen, along with the increase the demand, everywhere we can find kiosks selling barongan souvenirs, and souvenir barongan craftsmen also began to enjoy the results. More importantly, through out the program we witness the concern of the local government of Blora to support this issue. LPPM-ITB appreciates the support of the Mayor and related agency of the City of Blora which enable the success of the program.

Figure 3 Muksin, M.Sn and his activities

"Barongan has a strong character as a product of Blora's cultural icon"

Innovation for All

Dr. Yannes Martinus Pasaribu

Research Group of Product Design and Human Factors,
Faculty of Arts and Design
Email: ergolib@gmail.com

The spearhead of the progress of a nation is innovation because it can make a difference to the good in society. Innovation support is insufficient if merely comes from the government. The initiative and creativity of innovations emerging in society should encourage collaboration between industry, government, colleges and the community. Innovators need partnership. A strong cooperation between the government and universities, industry, and society will create positive collaboration for the advancement of innovation.

ITB's dedication for the government and the society of West Java

West Java Provincial Government needs expertise support from the academic world, in this case, Bandung Institute of Technology, related to the development of innovation system to become the leading province in Indonesia. The two programs that are running up to now are: "West Java Innovation and Initiative Award" and "West Java Innovation of Motor Vehicle Tax Award".

Bandung Institute of Technology has assisted the government of West Java Province in developing, controlling and evaluating the results of innovation and the implementation of their operational techniques in appreciating the residents of West Java who have participated in the settlement of regional development issues through outstanding works and ideas in their respective fields. The partnership program between the government of West Java Province and Bandung Institute of Technology is called "West Java Innovation and Initiative Award", lasted from 2011 to 2018 and has produced hundreds of proven innovators in various fields. All of these innovative figures have been developed to partner and synergize in brand business network until now.

Another program that have been conducted with the government of West Java Province from 2016 until now is the Award of "Intensification of Motor Vehicle Tax Collection" held by West Java Provincial Revenue Board. This is a program of West Java provincial government. The awards are given to those who contribute significantly through innovative works and/or extraordinary efforts that are closely related to the increase of local income, namely: 1) Taxpayers, 2) Tax-Driving Cadres, 3) Subdistrict (Kecamatan), 4) Regency/Municipal Government and Tax Service Branches that show the best order of performance and service innovation. The recognition is a tribute to individuals or groups/entities that have innovated and performed through innovative works and extraordinary efforts that are beneficial and contribute significantly in the increase of the income in West Java and in an effort to accelerate the achievement of West Java development targets.

In both programs, the key is the development of partnership patterns that will change the way they learn, create and innovate. The ultimate goal is that all stakeholders can share information and experience in creating great innovations for future changes. Together with partners, innovations can be exchanged to strengthen each other and fill the shortcomings for more innovative products and services. The appreciation of the nation's innovative work requires some of the prerequisites contained in the work: aesthetic-design value, prime quality, and matches with the conditions of society from technical, economic and social standpoints.

The task of pushing the innovation process does not lie only on the government's side. Through government-business partnerships - Academics, together we can appreciate and help develop innovators to be able to create novelty for the nation and state. Innovation does not always have to be necessarily big; it can start from something small. After all, innovation is not just about having ideas and initiatives. Innovation is an endless intelligent work - a dedication. Successful innovators can be seen from the ability to see opportunities in limitations, ready to face risks, and unyielding spirit.

ITB's dedication to the national automotive world

Since 2006 until now, Bandung Institute of Technology, through the assignment of its academic staff, has provided support to persons at GAIKINDO (Gabungan Industri Kendaraaan Indonesia), and some of its members to continue to innovate in producing automotive product design that is gradually improving from the engineering aspects to the product design.

Together with journalist members of Automotive Journalist Forum, printed and digital media, and work units in KPPU which oversees automotive activities in providing information on vehicle product design continue to be done. In addition, cooperation in the selection process of the best vehicle for the community continues until now as well. The design development program of vehicle in rural areas based on appropriate technology has also continued to run.

Finally, the testing program until the socialization in the development of electric vehicle technology is still ongoing by coordinating with several major universities in Indonesia, business actors and related ministries. The objective is that all economic-socio-cultural engineering ecosystems in Indonesia can be truly ready to move existing paradigms towards environmentally friendly technology and be able to reduce the burden of the government's subsidy on fuel oil and gas.

Dr. Yannes Martinus Pasaribu M.Sn.

Community Service of LPPM in Seimenggaris

Prof. Budi Sulistianto

The Institute for Research and Community Services
Email : bst@lppm.itb.ac.id

The introduction of the ITB Team with the citizens of Sei Menggaris, an isolated sub-district in the middle of palm plantations region on the outermost border of North Kalimantan, began with a team visit in 2015 facilitated by Mr. Budi Hartono from PT Duta Tambang Rekayasa. At the initial visit we witnessed a unique leadership of Mrs. Rusmini Hakim, only with the limited facilities, with her passion and dedication, has succeeded in providing new hope for young people through the development of a Vocational School SMK Sei Menggaris.

On subsequent visits we have always seen a more lively society, more organized and green environment, with the activities of young people and innovative teachers. The spirit and dedication of Rusmini has gone forward and been successfully grown in the environment of students and teachers.

Rusmini's character and leadership have been shown and proven by the winning of various awards for SMK Seimenggaris from both the District and the Province. The success in building the community of Seimenggaris is expected to build a role model for the development of other areas in Kaltara, especially in isolated areas.

Community Service Programs that have been accepted as part of the progressive process of community life in Seimenggaris has become the model for developing the Community Service of ITB in isolated areas and in outermost border areas. The success of the program is an example of a partnership with corporate CSR in the surrounding area supported by the relevant local government.

Testimony of Community Service LPPM ITB in Sei Menggaris

Rusmini Hakim, SP. Head of SMK Negeri 1
Sei Menggaris, Kabupaten Nunukan,
Provinsi Kalimantan Utara.

Working together with LPPM ITB is a special and blessing for us, especially for the District and Provincial Government, seeing this relationship to have a very high "Education Aesthetic", with much benefit resulting from this cooperation.

Sei Menggaris is a sub-district on the border of Indonesia and Malaysia in the mainland of northern Borneo. As a new frontier sub-district, this region desperately needs the touch of good people who willingly care for people though community services.

The presence of LPPM ITB has provided a special image not only for SMKN 1 Sei-Menggaris, but also for the community of Sei Menggaris in general. Through various programs, LPPM ITB has motivated us to do even better in raising and assisting the country's children in this border-land. Our hope in the future, this cooperation will sustain and can lead SMKN 1 Sei-Menggaris to be self-confident and become a useful school for the surrounding community, especially in maintaining the NKRI Front Line ".

Sei Menggaris Now

Budi Hartono
PT Duta Tambang
Rekayasa (Medco Mining)

In 2013 PT Duta Tambang Teknik (Medco Mining) initiated the support of teaching and learning activities at SMK Seimenggaris (still filial) which at that time was still going on under the house Rusmini with 14 students. This vocational school initiated by Rusmini Hakim continues to grow excitingly.

This excitement is growing as LPPM ITB is pleased to participate in improving the quality of teachers and students through various trainings at schools and apprenticeship in Microbiology Laboratory of ITB, from 2015 to 2017.

Since 2017 LPPM commitment of ITB and PT DTR (Medco Mining) is no longer limited to vocational education at SMKN Seimenggaris. The commitment is expanded to include community-based drinking water management systems, conservation of water catchment areas, and the development of the integrated Sei Menggaris area. The most recent agenda has been formalized with a legal MoU between Nunukan District and ITB on an institutional basis.

On behalf of the company and residents of Sei Menggaris, we would like to thank Prof. Budi Sulistianto, Prof. I Nyoman Pugeg Aryantha, Prof. Edy Soewono, Prof. Syahril Badri Kusuma, Dr. Muhammad Ihsan, Dr. Rofiq Iqbal, Dr. Irwan Meilano and all LPPM ITB team who have shared their affection and inspiration for young people and citizens at the outermost border land.

Bambang Ariyanto, ST
Supv. Goverment and Media Relations PT Sago Prima Pratama, Nunukan

LPPM ITB activities are very beneficial for SMK 1 Sei Menggaris and community of Nunukan district in general. Transfer of mushroom cultivation and water resources management for the area of Sei Menggaris which is also one of the outrmost regions of NKRI. Hopefully the cooperation that has been established can be improved in the future. Once again salute and success for LPPM ITB team led by Prof. Budi Sulistianto and Prof. Edy Soewono.

Agro-Industry-based Entrepreneurship Development for Communities around Lake Maninjau

Prof. I Nyoman Pugeg Aryantha

School of Life Science and Technology
Email : nyoman@sith.itb.ac.id

Lake Maninjau Lake is located in Agam District, West Sumatra Province, Indonesia. Most people around Lake Maninjau make a living as a keramba fish farmer. This kind of job for some period have been providing enough income and relatively easy to do, but then the wide spread of keramba became uncontrollable. The high population of keramba causes a decrease in water and air quality, and the destruction of ecosystems. In an effort to solve this problem, LPPM ITB in collaboration with ITB Alumni Association (IA ITB) and the District Government of Agam provide some alternative solutions such as agro-industry based-entrepreneurship growth for people around Lake Maninjau.

This entrepreneurship development program has been conducted since 2015 with a focus on developing white oyster mushroom cultivation around Lake Maninjau. Stages of the program begins with a survey of both environmental conditions and conditions of society. Furthermore, the training of oyster mushroom cultivation started from the process of making pure culture, seeds of grain, baglog until the harvesting process. Aside from being a keramba farmer, some people of Lake Maninjau depend on agricultural activities. To support the activity, training of fertilizer is given from the remaining fish feed taken from the bottom of the lake. The remaining feed in the form of this sediment has the potential to become fertilizer because high nutrient content which is needed for plants. In addition, it is environment friendly that does not damage the environment.

Various training activities are given to several groups of keramba farmers, PKK groups, and high school students. Furthermore, there are several monitoring activities to see the progress achieved and provide input if encountered obstacles in the process, especially for agro-industry of oyster mushroom. In 2017, the program then focuses on developing independent business centers. The program includes controlling the progress of white oyster mushroom cultivation, post-harvest management training and preservation, and processing of oyster mushrooms into ready-to-eat products, such as mushroom chips, mushroom satay, and flavored mushrooms. With the establishment of an independent business center of oyster mushrooms, it is hoped the community can have alternative jobs other than keramba fish farmer.

> **“A new program is needed for the community for alternative jobs other than keramba fish farmer”**

LPPM ITB training in April 2016 at SMAN 1 Tanjung Raya Maninjau for 60 participants

The mushroom cultivation training was responded at SMAN 1 Tanjung Raya by making the special subjects of Agricultural Skills containing "Cultivation of Oyster Mushroom", 2 hours lesson / week for Class XII (Sylabus and RPP compiled and inserted in Student Report)

In August 2017 LPPM ITB holds Advanced Training, led directly by Mr. Nyoman (Dean of Biological Science of ITB). “Post-Harvest Cultivation of Oyster Mushrooms "at SMAN 1 Tanjung Raya.

Starting in Year 2017/2018, the mushroom production has begin to be marketed to Teachers and Employees at SMAN 1 Tanjung Raya, also students have started making snacks from mushroom.

In the year 2018/2019 Agricultural Skill Course "Cultivation of Oyster Mushrooms" will be given at two levels of class XI and Class XII and will be developed to the community starting from Teachers and Employees whose land is willing to be made Mushroom House.

For entrepreneurship, activities will begin to be tried by selling in the form of packets krispy Mushroom and other snacks from this Oyster Mushroom.

Testimonial
SURYA CHANDRA, SPd
(SMAN 1 TANJUNG RAYA MANINJAU – West Sumatra)

Training on oyster mushroom cultivation provided by LPPM ITB to SMAN 1 Tanjung Raya in April 2016 and August 2017 has initiated a new course starting in 2016/2017 curriculum which we call the agricultural skills of "oyster mushroom cultivation" for the Class XII and later will be given for Classes XI and XII in 2018 / 2019. Since 2017 oyster mushroom production of students has been marketed to teachers and employees at the school. For the year 2018 we have started to sell not only mushrooms but also snacks made from mushrooms such as crispy, crackers, naget, meatballs and satay even though they are still new in the school environment. Insha'Allah by the year 2019 our target is to invite the community in Salingka Lake Maninjau to participate to develop cultivation of this oyster mushroom.

Selected Artist and Designer

Dr. Tisna Sanjaya

Research Group of Visual Art,
Faculty of Art and Design
Email : tisnasanjaya@yahoo.com

Born in Bandung January 28, 1958, Tisna Sanjaya raises as an outstanding artist. He has been getting exposures by national and international art observers since the end of 1980 when he was developing his artworks as a form of socio-political criticism. At the beginning of his works, he focused on graphic arts of intaglio (printing techniques in which the image is incised into a surface and the incised line or sunken area holds the ink with the opposite direction of the relief print). He learned this visual art during his studies at the Faculty of Fine Arts and Design of the Bandung Institute of Technology, Indonesia, and Hochschule Bildende Kunste in Braunschweig, Germany. For some reasons he developed approaches in his works beyond the conventional graphic arts and moved towards utilization of more various methods and mediums such as spices and local food ingredients. This is the statement of his criticism on a certain formality in the medium of fine arts.

Some awards show his outstanding achievements in the field: Top 10 Painters, Indonesian Art Awards (1996), Best Artist 1997 Phillip Morris Indonesia Art Awards, Award of the Sapporo International Print Competition 1997, Japan, Anugerah Adhikarya Seni Rupa 2014 from The Ministry of Tourism and Creative Economy of the Republic of Indonesia , Penghargaan ITB untuk Kategori Inovasi 2016. Anugerah kekayaan Intelektual Luar Biasa (2014) from The Ministry of Research, Technology and Higher Education of the Republic of Indonesia and some other national art awards. He exposes his ideas in many prestigious art events both national and international.

Here are some of his solo and group exhibitions among his expositions

Solo Exhibition

1. "Seni Karuhun", Erasmus Huis Jakarta, 2016
2. "Siklus Abu" ("Life Cycle of Ashes"), Erasmus Huis Jakarta, 2016
3. "Cigondewah Project of Art" at the Museum National University of Singapore (2011)
4. "Idiocracy" at the National Gallery Jakarta (2008)
5. "Sunset in Cigondewah" in Building Foundation Cultural Center, Bandung (2007)
6. Exhibition at the Gallery of Graphic Arts Santrian Denpasar, Bali (2006),
7. Installation and Graphic Arts at Bentara Budaya Jakarta (2004),
8. Graphic Art Exhibition at Gallery Lontar, Jakarta (1998),
9. Exhibition of Graphic Art, Image and Performance Art in the Gallery Bruecke, Braunschweig, Germany (1993),
10. Graphic Art Exhibition of etching and lithography Goethe Institute Gottingen, Germany (1991),
11. Graphic Art Exhibition of etching and lithography at the Gallery Soemardja Bandung (1988),

ORAY-ORAYAN (2016)
(Mediums: Kerosene stove, bamboo weaving steamer bowl, zinc rice cooker, water gallon, zinc, metal, oil color, pan, clay pot water, etc.)

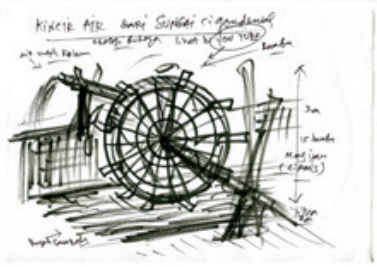
“Siklus Abu" ("Life Cycle of Ashes") (2016)
(Mediums: Woods, net, bamboo weaving, metal, plastic bags, etc.)

"Cigondewah Cultural Centre: Cultural Revitalisation and Community Empowerment".

Group Exhibition

1. Jakarta Biennale (2015)
2. "Secret Archipelago", Palais de Tokyo, Paris (2015)
3. Respond Soedjojono, in the Museum National University of Singapore (2008),
4. Biennale Jogja IX, Sangkring Art Space, Jogjakarta (2008),
5. "Manifesto" National Gallery, Jakarta (2008),
6. Fine Art Exhibition at World Trade Center, Beijing, China (2006)
7. Graphic Art Exhibition at Lahore Art Foundation, Pakistan (2005).
8. Gwangju Biennale, Korea (2004),
9. "Venice Biennale", Venice, Italy (2003),
10. Exhibition at Babakan Siliwangi with "Underground carriage" of Bandung (2003),
11. "Offside", Hiroshima Museum of Contemporary Art, Japan - "World Cup 2002" (2001),
12. Exhibition "Transition of Indonesia" - The Dramatic Transition Between Two Seasons, Pacific Bridge Gallery, Oakland, California, USA (1999),
13. 3th Asia-Pacific Triennale of Contemporary Art Exhibition, Queensland Art Gallery, Brisbane, Australia (1999),
14. "Against Impunity" Amsterdam, Holland (1999),
15. "Indonesia's Reformation" Nusantara Museum, Delft, Holland (1999),
16. "La Ferne du Boisson" France (1999),
17. Sapporo International Print Biennale Exhibition, Japan (1997),
18. "From Schrift to Abstraction" Jordanian National Gallery of Fine Art, Amman, Jordan (1997),
19. "ASEAN Modernism", Indonesia, Thailand and Philippines in Japan Foundation Asia Center, Tokyo, Japan (1996),

"Pesta Pencuri"
plat size: 50 x 50 cm, paper size: 64 x 69 cm, Etching on Hahnemühle paper, 1988



Dr. Dian Widyawati

Research Group of Craft and Tradition,
Faculty of Art and Design
Email : wdnilalang@yahoo.com

"UTILIZATION OF EMPTY FRUIT BUNCH OF PALM OIL AS NEW TEXTILE MATERIALS FOR ECO-FASHION PRODUCT"

Research Background

Indonesia has large variety species of plant that containing coloring matters which can be used as eco friendly coloring agent. Both natural fibers and natural dye plants in Indonesia have enormous potential for further exploration and development. One of the common natural fiber material found in Indonesia is oil palm empty fruit bunches (EFB). Indonesian is the main producer of palm oil, with its plantation spread in Sumatera, West Java, kalimantan, Sulawesi, Bangka, Belitung, and Papua. The national plantation occupies almost 7.099.388 ha width. The main of palm oil is the oilproduches, while after processing, there are some remaining Tandan Kosong Kelapa Sawit (oil palm empty fruit bunches (EFB) as the side products. Physically, the EFB has fiber charateristic. Currently EFB fiber is processed as organic fertilizer, paper manufacturing raw material, briquette, and generally as car and upholstery filler. Futher, some ideas merge to explore the EFB potencies as the natural fiber material applicable for art textile material products to raise the local wisdom values and the non-optimally processed natural resources, esplecially for textile material. EFB potencies are still not nationally and internationally well studied. Finally, futher development is expected on EFB fiber textile processing with this research.

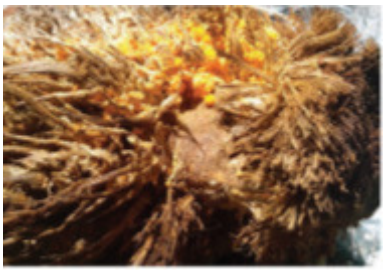
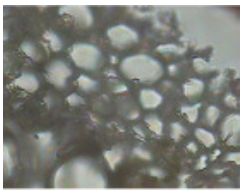


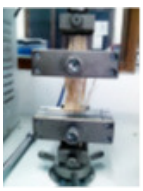
Figure 1
The oil palm empty fruit bunches (EFB) characteristics for this research.
These empty fruit bunches are taken from the waste storage in the open space, resulting in growing many mushrooms (doc: Wardani)

The result of tensile and strength tests shows oil palm EFB fiber has 0.255 kg average strength with 6.160 % ductility in every sheet of the fiber, while the tensile strength and ductility of the oil palm EFB fabric reach 7.928%. Oil palm fiber has high ductility compared to other cellulose fiber such as ramie that has 3-4% ductility.



(a)

(b)



(c)

Figure 2 Oil palm EFB waste after scouring and cooking process (Doc: Widiawati).
a) Cross section of oil palm empty fruit bunches. b) Longitudinal cross section of oil palm empty fruit bunches. c) Tensile strength test and elongation of empty palm oil bunches using Instron machine (doc: Wardani)

Figure 3 Natural dyes that applied in coloring process for this experiment are sappan wood (Caesalpinnia sappan), tegeran (Cudraina javanensis), pinang (Areca catechu), Kayu tinggi (Cerops tagal), mahogany (Swietenia Mahagoni L. Jacq.) and mango leaves (Mangifera indica) (Doc: Widiawati)

(a) (b) (c) (d)

Figure 4 a) Kayu tinggi (Cerops tagal), b) pinang (Areca catechu), c) Sappan wood (Caesalpinnia sappan), d) Indigo (Indigofera tinctoria) (Doc: Widiawati)

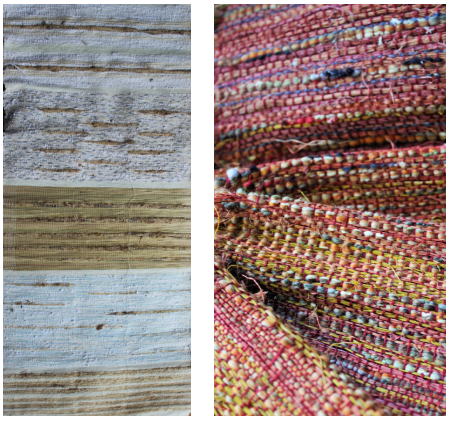
Figure 5 The experiment results of natural dyes extraction that mixed with some natural mordants (Doc: Widiawati)

Figure 6 Dyed natural fibers experiment using various Indonesian natural dyes (Doc: Widiawati)

(a) (b)

Figure 7
a) Hue and tone color classification based on kobayashi theory
b) Warm/cool and soft/hard color classification based on kobayashi theory.

Figure 8
The weaving experiment process using the palm empty fruit bunches (EFB), in lab scale used the table looms, to produce samples of woven structures which can then be made using larger tools (ATBM= Alat Tenun Bukan Mesin/ Non-Machine Loom)
(Doc: Widiawati)



(a) (b)

Figure 9
a) White on white weaving structure composition of oil palm EFB (No added colors), b) Alternative weaving structures with natural dyes (Fabric worked by: Widiawati)

Figure 10 Prototype : fabric design with oil palm EF
(Doc: Wardani)

Figure 11 Prototype : fabric made out of oil palm EF
(Fabric Worked by Wardani)

Selected Start-Ups

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GREENLIVING
Towards Sustainable Future

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RUMANAGA

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PT. SVARA INOVASI INDONESIA

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SMART ONLINE REPORTING
& OBSERVATION TOOLS

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CEO
Adi Reza

Mycotech is a company working in the field of renewable building materials. The Mycotech product adds value to local resources, which is to change the burden of waste that local farmers should dispose of into additional revenue streams. In addition, the material has the potential to create new industries, strengthen economic independence and excellence for export.

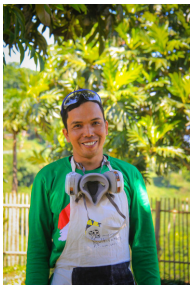
Mycotech uses adelia fungus adhesive technology. This technology is very affordable, environmentally friendly and can be recycled safely. With raw materials from agricultural waste, Mycotech can involve farmers to recycle their agricultural waste. Mycotech can replace the use of gypsum and MDF (medium density board) in building applications, whereas for industrial packaging it can replace EPS (Epoxy Poly Styrene) and also wood and plastic pallets.

Every year Indonesia builds 2,608,000 housing units. Mycotech wall panels targeting to the existing housing market in Indonesia, which reaches 3.9 billion USD per year. In the early stages, Mycotech target focuses on housing market in big cities (Jakarta, Surabaya, Bandung) which is equivalent to 121 USD million per year.

By becoming an LPIK tenant, Mycotech has the opportunity to get funding support from the Ministry of Research, Technology and Higher Education through Technology Beginner-Based Entrepreneur Program (PPBT) 2017. In addition, Mycotech can consult legal and intellectual property with professionals.













GREENLIVING

Towards Sustainable Future

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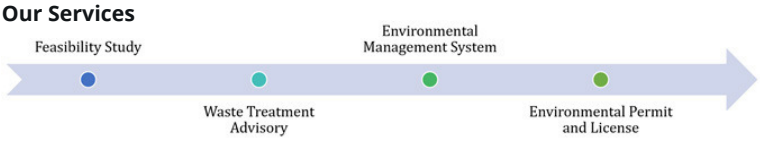
CEO
Ibrahim Aji

GreenLiving Indonesia is a company engaged in waste processing with a vision to provide solutions to the waste problem in Indonesia and to be a pioneer in realizing sustainable development. GreenLiving provides consultancy services for agriculture, waste treatment facilities and industries based on process and economics efficiency. GreenLiving supports regulators, producers, generators and users.

Our Value

Our Services



Sectors

Our Founder

GreenLiving Indonesia was initiated by a number of people to form a waste-based company based on the concept of sustainable development. Three founders have a bachelor's degree in chemical engineering. They love nature and are eager to increase the benefits of industrial waste processing in Indonesia. Two other founders also have a bachelor's degree and ample business experience in the field of agricultural products and derivatives.

Director
Dewi Larasati, Ph.D

rumanaga

RUMANAGA

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Rumanaga is a company that focuses on developing an industry for building simple homes. Rumanaga products range from the overall design of houses to house components and interiors using a prefabrication method that was adapted from a traditional building method used in Kampung Naga.

Rumanaga is based on the need for housing provision in Indonesia, which requires faster construction methods in order to close the housing backlog. Prefabrication is one of the answers to this problem. Inspired by the building method from the traditional village of Kampung Naga, we try to further develop a similar technique in order to make it more applicable in the modern world.

Currently, we have designed a house including all components using the prefabrication method from Kampung Naga. This design is still in the form of a 3D visualization and mock-up. In the near future, we will build workshops from our pre-fabricated building components and one house as a model house. In addition, we also plan to develop derivative products based on the same method.

LPIK helps us in promoting our products and expanding our network. LPIK plays an active role as a liaison between Rumanaga and various parties. In addition, LPIK also seeks to increase the capacities of tenants or companies through various training and/or mentoring sessions.

Rumanaga is open to cooperation in home construction with our prefabricated system and components. In addition, we are also open to cooperation with those who want to make furniture, building facade components, or home decorations using our method.

Figure 1 Rumanaga product development

Figure 2 Rumanaga design

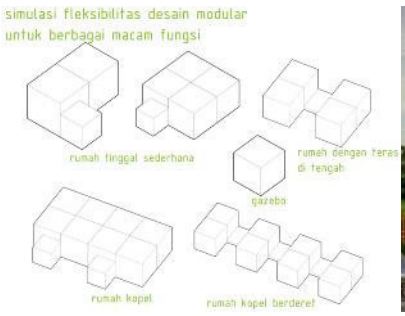

Figure 3 Flexible modular design of prefabricated homes

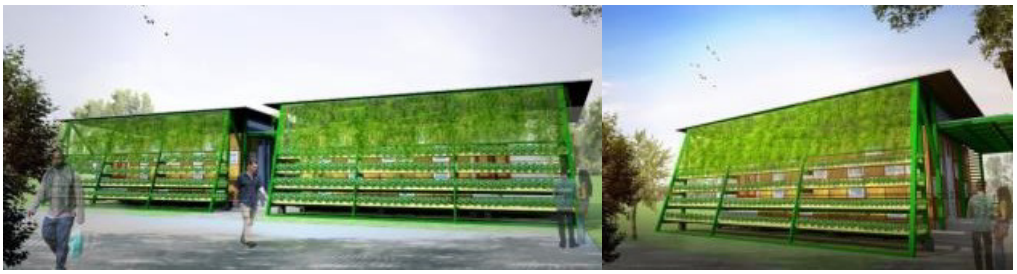

Figure 4 Blueprint of modular design development plan for prefabricated houses

PT. SVARA INOVASI INDONESIA

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Founder & Chairman

CEO


COO


CTO

CEO
Farid Fadhil Habibi

SVARA is a start-up initiated by Zamrud Technology and supported by LPIK-ITB. It was officially established on in 2017 but founding research already started in 2002. SVARA is engaged in supplying a new digital audio platform with the aim of modernizing on-air broadcasting and online broadcast monetization in the radio industry through digital radio transformation, using 100% work from Indonesia.

SVARA's vision is to redefine the music industry, make radio great again and become a unicorn company in 2022. SVARA not only wants to save thousands of radio stations in Indonesia from digital disruption, but also tens of thousands of radios worldwide, with more than 4 billion listeners. SVARA has the ambition to become a game changer in audio-based services through a global industry turn-around.

As a start-up, SVARA has received three awards in 2017. It was the 2nd-prize winner at the SwissInnovation Challenge Indonesia (5000 USD), won research funding from Kemenristekdikti for its blockchain music application (25,000 USD) and was among the top-100 start-ups at the Start-up Istanbul Challenge.

Founder & Chairman of SVARA is Hemat Dwi Nuryanto, who graduated from Paul Sabatier University in France and has more than 25 years experience in ICT and innovation. SVARA is supervised by 3 persons, 2 of whom are ITB graduates, namely Farid Fadhil Habibi (CEO, STI-ITB 2012) and Muhammad Irfan (CTO, STI-ITB 2013), and one senior who has more than 20 years experience in the radio industry, namely Ana Supriatna (COO).

SVARA carefully follows the latest state-of-the-art technological developments. Some of the technologies that have been adopted by SVARA are a recommendation system based on machine learning, big data analysis, and programmatic audio advertising. Meanwhile, technologies that SVARA is currently developing are the application of blockchain for music, voice computing & deep learning, and the implementation of SVARA on smart devices such as smart speakers and connected cars.

SVARA is supported by various parties, including radio association PRSSNI (Persatuan Radio Siaran Swasta Nasional Indonesia, which has stated to be ready to perform digital transformation for its 654 members), the Agency for the Creative Economy of the Republic of Indonesia (BEKRAF), Wahana Musik Indonesia (WAMI), and others.
SVARA's target in the near future is to officially launch the SVARA app and also to conduct fund-raising for Series A round funding. The SVARA app can already be downloaded from Google's Play Store and Apple's App Store, or go to SVARA's website at Svara.fm.

SVARA team

SMART ONLINE REPORTING & OBSEVATION TOOLS

Jl. Ganesa 15F, Bandung 40132

CEO
I Made Ariya Sanjaya

Website : sorot.id
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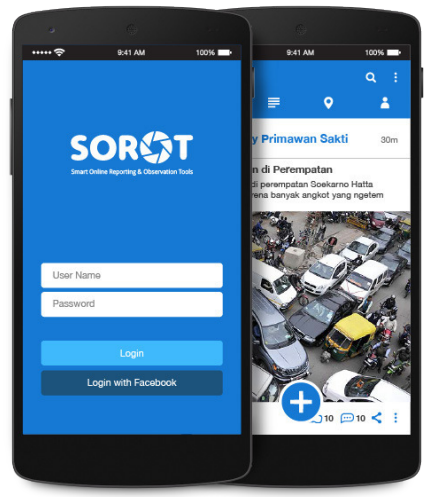
Phone : +62-811 989 1417

SOROT (Smart Online Reporting and Observation Tools) is a reporting and observation platform for cities and organizations. The development of SOROT is based on the desire to increase participation and collaboration between government, business organizations and the community to solve various city problems. SOROT was founded in January 2015 as one of the innovation and research outcomes of the Smart City and Community Innovation Center (SCCIC) ITB laboratory.

Along with the growth of the urban population, city problems increase as well. An innovative solution is needed to solve these problems effectively and efficiently. Through SOROT, residents can participate by conveying their wishes and observations to municipal organizations via a mobile application, website or social media. SOROT was developed not only for governments but also for various other types of organizations, such as private enterprises (property developers, hotels, malls) and universities.

The pre-launch of SOROT took place in March 2015 to coincide with the ITB Technology Exhibition. Currently, SOROT focuses on being able to contribute to the simultaneous implementation of smart-city initiatives in various cities and districts in Indonesia and expand its market to private targets. Until October 2017, SOROT has validated its business model through collaboration with several city and district administrations, such as Bekasi, Semarang, Sleman local, Tangerang Selatan, Jababeka, and East Kutai. SOROT has made a real impact on the community by resolving city problems more quickly, more transparently and more measurably.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di perempatan Soekarno Hatta
rena banyak angkot yang ngetem
10
10


USER GUIDE FOR REPORT SENDER
1
Find problems around you
2
Take a picture of the problems
3
Upload and tag in the maps
4
Add description for problems
5
FEEDBACK
10
Receive feedback and support


USER GUIDE FOR REPORT RECEIVER
1
see report dashboard from customer or people
2
choose the report that will followed you
3
STATUS
Follow up the report by give status to them, then finish the report with evidence attached
4
PROSES
Follow up another unprocessed report
5
FEEDBACK
Receive feedback and support

Research Center & National Center of Excellence

Research Center for Nanoscience and Nanotechnology	Website : nrcn.itb.ac.id
Research Center for Disaster Mitigation	Website : ppmb.itb.ac.id
Research Center for Bioscience and Biotechnology	Website : www.biosainsbiotek.itb.ac.id
Research Center for New and Renewable Energy	Website : www.ppebt.lppm.itb.ac.id
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National Center for Sustainable Transportation Technology	Website : ncstt.itb.ac.id
National Center on Broadband Wireless Access	Website : www.pme.itb.ac.id
Center for Defense and Securit Technology (PUSTEKHAN)	Website : www.pustekhan.itb.ac.id

Research Center for Nanoscience and Nanotechnology

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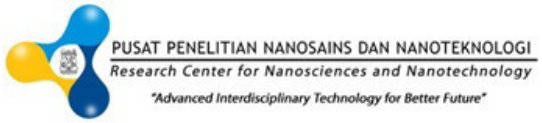

The Research Center for Nanoscience and Nanotechnology (RCNN), Institut Teknologi Bandung (ITB) is one of the research centers most recently established by ITB in response to modern complex challenges as well as to reaffirm a strong commitment to always be involved in research, development and application of frontier science and technology for the betterment of Indonesia. There are 4 research laboratories in RCNN (nano material, nano medicine, nano biotechnology, and nano device), each headed by a faculty member, with 25 faculty members and more than 100 students actively engaged in education, research and community service. Supported by state-of-the-art equipment, such as: high-resolution transmission electron microscope (HRTEM), focus ion beam (FIB), scanning electron microscope (SEM), atomic force microscope (AFM), its activities covers a wide spectrum of science and engineering disciplines. Research and educational activities within RCNN emphasize the importance of energy, health, and food related subject areas. For the next five years, RCNN activities are directed toward achieving national center of excellence status and as such key performance indicators are streamlined to the guidelines given by the Ministry of Research, Technology and Higher Education (MRTHE). These indicators include numbers of publications in well-respected international journals with a high impact factor, invited scientists and teachers (inbound and outbound), industrial collaborations, and doctorate graduates. Since the very beginning, faculty members involved in RCNN engagement come from different academic backgrounds. RCNN believes that with the increasing complexity of the problems faced by society, an interdisciplinary approach is indispensable. It is expected that RCNN will contribute to address and find optimal solutions for these problems. RCNN will make exhaustive attempts to nurture the rich blends and dynamic of diverse academic backgrounds as a powerful vehicle to deal with tomorrow's challenges and fulfill its mission. Last but not least, RCNN also believes that significant contributions to society will never be achieved in a void and hence RCNN welcomes synergetic collaborations for mutual benefit.

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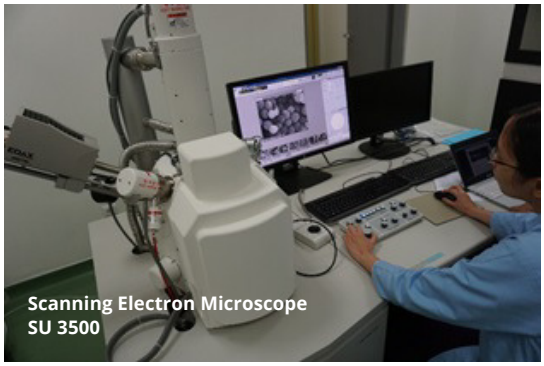
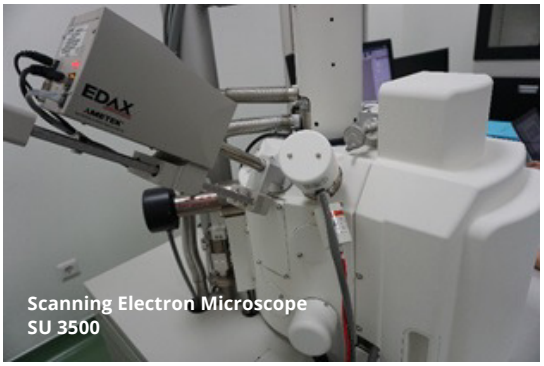
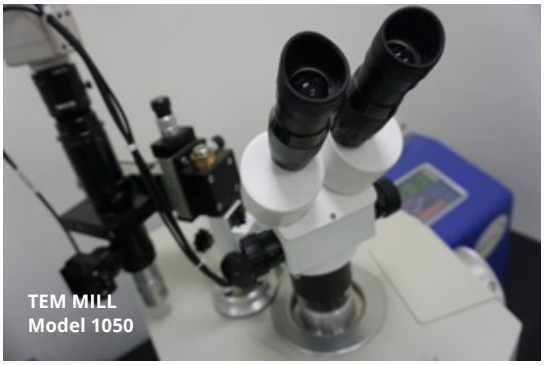

Scanning Electron Microscope
SU 3500



Scanning Electron Microscope
SU 3500


TEM MILL
Model 1050

Transmission Electron Microscope
HT7700 with EDX/EDS


High Resolution
Transmission Electron
Microscope H9500
with EDX/EDS


Focused Ion Beam
FB2200


Cryo
Ultramicrotome

"RCNN is established in response to modern complex challenges as well as to reaffirm a strong commitment in research, development and application of frontier science and technology for the betterment of Indonesia"

Research Center for Disaster Mitigation

Website : ppmb.itb.ac.id

The Research Center for Disaster Mitigation (RCDM), established in 2011, is a research center under the scheme of the Institute for Research and Community Services ITB. RCDM aims to play a significant role in the area of disaster mitigation at national, regional and international levels by conducting and promoting fundamental and applied researches on disaster management and mitigation as well as other relevant mitigation initiatives with the support of national and international organizations. The center has the obligation to respond to the national need in reducing disaster impact and to institutionalize and sustain the research activities related to disaster mitigation done by ITB over the past twenty years.

ITB's original Research Group on Disaster Mitigation was established in January 2003. In 2005, the research group was transformed into the Center for Disaster Mitigation. Due to the nationwide increase of the disaster mitigation problem, in 2011, the center was expanded into the Research Center for Disaster Mitigation with a wider authority and responsibility under the policy of ITB in response to the nationwide challenges in disaster mitigation.

RCDM is expected to conduct fundamental and applied researches in disaster mitigation and to overcome challenges in urban, rural, regional and national development by supporting the development of strategic policies and legal mechanisms, to identify and analyze disaster impacts, to disseminate and transfer knowledge and skills through trainings, workshops, seminars and community-based action research activities.

Vision

To become an excellent and highly respected research center that enhances innovation in disaster mitigation at local, national, regional and international levels, as well as contributing significantly to delivering safer communities in Indonesia by reducing disaster risks.

Mission

1. To deliver a safer community and stakeholders who are aware, responsive and able to overcome potential natural and man-made disasters.
2. To enhance fundamental and applied research activities that are able to anticipate, respond to and mitigate disaster risks.
3. To promote fundamental and applied research results that can strengthen policy development in disaster management in order to achieve sustainable development.
4. To support the formation of disaster-mitigation expert communities in Indonesia through education.

Scope of Work

1. *Education* – Enhancing the expertise of disaster mitigation through research-based post-graduate programs, collaboration with Graduate Research on Earthquake and Active Tectonics ITB, ASEAN Alliance universities, Kyoto University, and Indonesian government agencies (National Disaster Management Agency, Agency of Meteorology, Climatology and Geophysics, Ministry of Public Works, Ministry of Energy and Natural Resources, Ministry of Research and Technology, National Planning Agency, and Indonesian Research Institute).
2. *Research* – Promoting and strengthening innovative, fundamental and applied research activities in disaster mitigation.
3. *Community services* – Serving the community through stimulating, educating, and facilitating related institutions and communities at national and regional levels in order to achieve comprehensive disaster-risk mitigation, information dissemination, and transferring knowledge and technical skills.

Basic Capital

- ITB senior researchers
- Relevant track record and networks
- Research agenda of research group ITB
- In line with disaster management program
- Laboratory/software/library

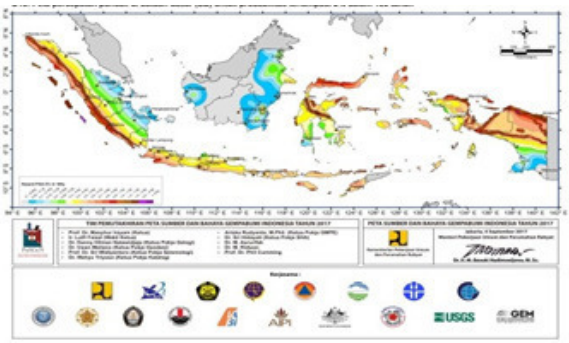


Figure 1. New Updated Earthquake Zoning Map Indonesia

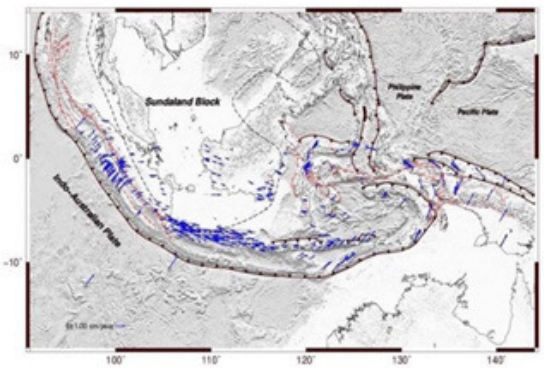
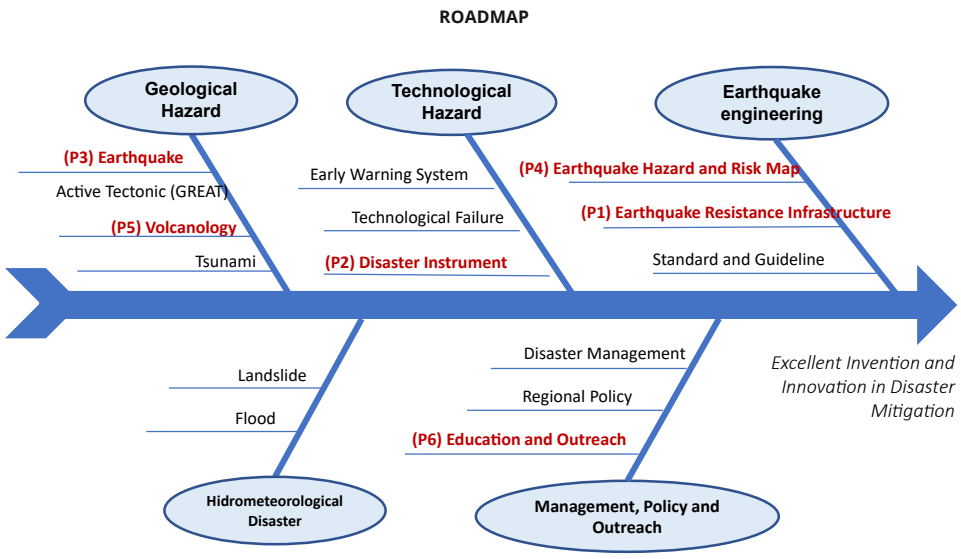


Figure 2. Indonesian tectonic map 2010 - 2017 (PUSKIM, 2017)



NETWORKING

RCDM has many networking with private and government institutions at the local, national and international level. The list of institutions is as follow :

LOCAL AND NATIONAL INSTITUTIONS

- Kementrian Riset dan Teknologi
- BNPB (Badan Nasional Penanggulangan Bencana)
- BMKG (Badan Meteorologi, Klimatologi dan Geofisika)
- BIG (Badan Informasi Geospasial)
- PVMBG (Pusat Vulkanologi dan Mitigasi Bencana Geologi-Badan Geologi)
- Puslit Geotek LIPI
- PUSGEN (Pusat Studi Gempa Nasional)
- PUSLITBANG TEKIMP (Pusat Penelitian dan Pengembangan Teknologi Pemukiman Kemen PU)
- Puslitbang Sumber Daya Air Kemen PU
- Puslitbang Jalan dan Jembatan Kemen PU
- FPT-PRB (Forum Perguruan Tinggi Pengurangan Risiko Bencana)
- BAPPEDA (Badan Perencanaan Pembangunan Daerah) Jabar dan Kota Bandung
- F-PRB (Forum Pengurangan Risiko Bencana Jabar)
- Dinas Pekerjaan Umum Provinsi DKI Jakarta
- BPBD Provinsi Jawa Barat, Jawa Timur, Sulawesi Tenggata, Maluku, Maluku Utara, Papua, Papua Barat, Jawa Tengah
- BPBD Kabupaten Bandung Barat
- Forum Perguruan Tinggi Pengurangan Risiko Bencana
- HATTI (Himpunan Ahli Teknik Tanah Indonesia)
- HAKI (Himpunan Ahli Konstruksi Indonesia)
- Dinas Kebakaran dan Penanggulangan Bencana Kota Bandung
- FKDM Kabupaten Bandung Barat
- Etc

OVERSEAS INSTITUTIONS

- Mercy Corps
- Universiti Kebangsaan Malaysia (UKM)
- U.S. Agency for International Development (USAID)
- Kyoto University
- Nagoya University
- Tohoku University
- Kagawa University
- IAEA (International Atomic Energy Agency), Vienna
- IAEE (International Association for Earthquake Engineering)
- Ministry of Youth and Sports Malaysia (KBS)
- ASEAN Secretariat
- ASEAN Coordinating Centre for Humanitarian
- Assistance on Disaster Management (AHA Center)
- ASEAN Safe School Initiative (ASSI)
- Asia Pacific Alliance for Disaster Management (APADM)
- Malaysia Embassy
- International Federation of Red Cross and Red Crescent Societies (IFRC)
- Southeast Asia Disaster Prevention Research Institute (SEADRI- UKM)
- United Nations Development Programme (UNDP)
- United Nations Volunteers (UNV)
- United Nations Educational, Scientific, and Culture Organization (UNESCO)
- Etc

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Research Center for Bioscience and Biotechnology

Website: www.biosainsbiotek.itb.ac.id

The Research Center for Bioscience and Biotechnology (BBRC) is a research center of ITB focused on strengthening research in the fields of bioscience and biotechnology on food, health, environment, energy, etc. The main strategic programs of BBRC are: conducting excellent research for the development of sciences, technologies and products that can be used for life improvement.

As research output, BBRC through its researchers publishes scientific papers in international journals, conducts presentations at international seminars, applies for patents, develops products, etc. BBRC also organizes trainings, workshops, seminars, etc. in order to share knowledge and research findings. These events have been enthusiastically attended by researchers from different institutions around Indonesia, receiving positive feedback.

BBRC facilitates and supports lecturers as well as researchers who work in research groups from ITB faculties such as the School of Pharmacy, the School of Life Sciences and Technology, the Faculty of Mathematics and Natural Sciences, the Faculty of Industrial Engineering and the Faculty of Civil and Environmental Engineering.

The funding from ITB has been a stimulation for BBRC researchers to find funding from sources within ITB and other institutions in Indonesia, for example state industries, as well as from foreign institutions. In addition, BBRC has established and/or initiated collaborations with institutions in Indonesia and other countries.

In line with the new orientation of ITB as an entrepreneurial university, BBRC looks forward to be engaged in research for the development of products that can be useful for the community or can be commercialized. We are looking forward to ITB's continuous support, especially the revitalization of laboratory facilities, to enable the center to deliver excellent research, product development and community services.

Vision

To become a center of excellence in research and a national flagship in bioscience and biotechnology, developing applications for industries and communities.

Mission

Conducting excellent research in bioscience and biotechnology in order to develop products, scientific knowledge and strategic technologies, and to facilitate research training as well as technology support for industries and communities.

BBRC research is classified into 3 clusters:

A. Research on the basis of natural sources for health, food and other valuable products. Examples of past research topics:

1. Development of standardized herbal medicines for lowering of uric acid content in blood.
2. Encapsulation of mangosteen polymer nanofiber using rotary force spinning.
3. Production of aflatoksin from *Aspergilus flavus* for quality and safety of herbal medicines.
4. Develoment of post-harvesting management system with utilization of TiO2 nanomaterial on banana fruit as a model.

B. Research on enzyme, vaccine, adjuvant and protein therapeutics.
Examples of past research topics:

1. Creating a hybrid collection preliminary to the development of humanized monoclonal antibody for therapy of hepatitis B.
2. Development of diagnostic kits for hepatitis.

C. Research on biotechnology for health, food, energy, and environment.
Examples of past research topics:

1. Production of bioethanol from *akar wangi (Vetiveria zizanioides)* as phytoremediation plant in a former bauxite mining field.
2. Transformation of key genes in artemisinin biosynthesis, farnesyl phosphate synthase (FPS) and amorphadiene synthase (ADS) in Sacharomyces serevicae for production of antimalarial artemisinin.
3. Study on degradation of colorless compounds using laccase from Marasmielus palmivorus by high-throughput screening.

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Research Center for New and Renewable Energy

Website : www.ppebt.lppm.itb.ac.id

The Research Center for New and Renewable Energy (PPEBT-ITB) is an organization under the Institute for Research and Community Services (LPPM) ITB, which aims to play an active role in complying with new and renewable energy (NRE) challenges in Indonesia. PPEBT-ITB hopes to become the leading NRE research center in Indonesia by synergizing all ITB research potential in producing NRE technology, providing direction for EBT technology development, and producing and providing real NRE technologies for the nation's benefit,

Research Focus

PPEBT-ITB research covers all NRE technology and its applications, including the utilization of water energy, wind energy, biomass energy, coal upgrading, solar photo voltaics, biofuels, geothermal energy production, organic rankine cycles, smart grids, etc.

Vision

PPEBT-ITB's vision has the ambition to become the leading new and renewable energy research center in Indonesia.

Mission

PPEBT-ITB's mission is to synergize all ITB researches in the new and renewable energy field; to prepare research directions for developing new and renewable energy technologies in Indonesia; to produce and prepare new and sustainable energy technologies that can be utilized in Indonesia.

Research Team

Research Roadmap

Various researches on alternative energy sources such as hydro, wind, solar, biomass and biofuel, have been done in the PPEBT-ITB laboratory, such as laboratory scale experiments, prototypes for fuel production, and produced energy that can enter the electrical grid.

In 2017, PPEBT intends to combine several research results to create an energy-independent place that is sourced from various renewable energy sources and has the potential to be developed into a small-grid prototype that can be connected to the national electricity grid (see figure below).

The small-grid scheme for various renewable energy sources (sun, wind, biomass, gasification, hydro) is expected to increase energy resistance and has low CO2 emissions. This model needs to be further developed considering Indonesia has various renewable energy potentials.

Figure 1 Small grid from various new and renewable energy sources with on/off grid system

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Research Center for Infrastructure and Regional Development

Website : ppiw.itb.ac.id

"PPIK is a catalyst for Indonesia's development, especially in celebrating the centenary of Indonesia's independence in 2045."

The Research Center for Infrastructure and Regional Development (PPIK) is coordinated by the Institute for Research and Community Services ITB. PPIK was established to address national challenges related to infrastructure and regional development and to contribute to knowledge-building by integrating infrastructure and regional development in order to meet the challenges of Indonesia's centennial independence celebration in 2045.

As a research center, PPIK attempts to bring together research institutes, communities and other institutions by eliminating institutional barriers to enable cross-institutional and interdisciplinary collaboration in the fields of infrastructure and regional development. PPIK is home to nearly 30 lecturers and researchers with diverse skills, interests, and experience. The members come from various backgrounds related to the built environment, such as civil and environmental engineering, regional and city planning, and architecture. In 2018, the members are involved in integrated research and projects on smart river management in the Citarum watershed. Other ongoing research projects include large-scale land development, megaproject planning, transit-oriented development, smart cities, and creative cities.

There are three research clusters in PPIK. The first cluster, Mega-urban Infrastructure, focuses on mega-urbanization and infrastructure development, integrated urban transportation management, metropolitan management, and new-town development. The second cluster, Rural and Coastal Development, concentrates on creative groups, agrarian reform, local capacity and productivity, and basic services. The third cluster, Watershed management, focuses on water engineering, physical change, spatial restructuring, and institutional development.

PPIK consistently produces and disseminates knowledge through various media such as journals and seminars both at national and global level. PPIK is also involved in formulating regional and infrastructure development policies for both central and local governments. PPIK has established collaborations with a number of selected international and local institutions, including University College London, the National Development Planning Agency, the Ministry of Public Works and Housing, and several local governments in Indonesia. PPIK is also committed to strengthening the capacity of practitioners and government officers by conducting trainings on subjects such as zoning regulations, metropolitan management and environmental planning.

Vision

To become a leading national research institute that produces and disseminates high-quality knowledge and actively participates in guiding policy-making and promotes integrated and sustainable regional and infrastructure development.

Missions

1. To conduct basic, applied and action research on infrastructure and regional development, and to communicate the results to various interested parties.
2. To contribute to addressing national and regional issues through research-based infrastructure and regional development technology and policies.
3. To strengthen the capacity of governments and communities in infrastructure and regional development planning.

Programs

1. To develop innovative and synergetic research on the interface of infrastructure and regional development.
2. To create informative reference, data and information on infrastructure and regional development.
3. To expand national and international networks and collaborations through community services, professional forums and joint research.
4. To provide trainings for practitioners, local governments and wider society on infrastructure and regional development .

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Research Center for Information and Communication Technology

Website : pptik.itb.ac.idt

The Research Center for Information and Communication Technology (PPTIK ITB) has a mission to build a world-class research reputation. This requires the alignment of topics, research competencies, decent facilities, high activity and widespread global partnerships in the field of ICT research. In addition, PPTIK has a mission to encourage the development of commercial products, entrepreneurship and industries in the field of ICT.

Vision

Every Indonesian citizen must be able to utilize ICT for the advancement of his/her life. Every citizen can participate in the knowledge society and the knowledge economy, either benefiting from it or building it.

Answering to the new challenges from ITB's entrepreneurial university era, PPTIK's activities in the period from 2015 to 2020 are focused on:

1. Strengthening the organizational capacity of PPTIK to collaborate with as many parties as possible from various sectors by utilizing its technology portfolio and solutions developed by all stakeholders of PPTIK.

2. Strengthening the role of PPTIK as a pioneer and consultant in the development and utilization of digital-learning technologies and solutions by deploying these to more and more diverse stakeholders, ensuring the emergence of technological-learning innovations and digital-learning start-ups and digital-learning solutions in the form of business models.

3. Increasing the role of PPTIK as a pioneer and consultant in ICT development and utilization and ICT-based solutions for application in various sectors by ensuring the emergence of related technological innovations that can be demonstrated in three forms: scientific publications, functional prototypes, pre-start-ups.

The technology and technological solutions developed by PPTIK will be modern interactive digital-media service systems.

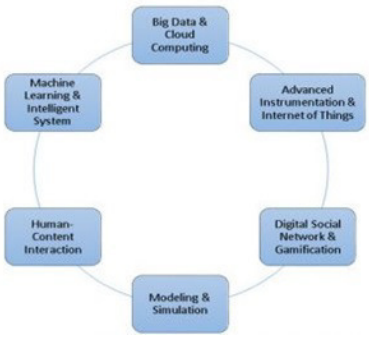

Figure 1 Components of modern interactive digital media services

To support this roadmap, the research developed by PPTIK will focus on the development of a smart community framework that will become the standard for realizing the smart city concept. The components of this smart community framework are:

1. *Smart Mobility* through the application of intelligent transportation system (ITS) research.
2. *Smart Health Care* through the development and implementation of the Detection of Patient Condition Data by Health Monitoring System (Detta Care).
3. *Smart Government* through the development of a project-based research called Indonesia United (Idun).
4. *Smart Education* from the development of e-learning research and educational game VidyaNusa, Final Project in the Network (TADJ), Open Online Data Course (OODC) to the development of an artificial-intelligence robot for human social education and interaction, called Lumen Social Robot.

Partnerships

In the process of developing its research, PPTIK has established collaborations with several parties, such as the Indonesian General Election Commission (KPU), Regional Election Commission (KPUD) West Java, Election Supervisory Board (Bawaslu) West Java, Zamrud Technology, Indonesian National Private Radio Broadcast Association (PRSSNI) in Bandung, Indonesian Telematics Research and Development Foundation (YPPTI), Microsoft Indonesia, NTT Data, Sampoerna Telekomunikasi Indonesia, PALU Central Sulawesi Health Agency, Meteorology, Climatology and Geophysics Agency (BMKG), Eon Reality Group, LIPI Geotechnology Research Center, MIT USA, Keio University, Telkom University and Universiti Teknologi Malaysia (UTM), Japan Smart Community Alliance, Indonesia Biodiversity Foundation (KEHATI), International Rhino Foundation (IRF), Anargya Technology, PT. Westpoint Security Indonesia, Bandung Regional Planning Agency (Bapeda), Department of Transportation Bandar Lampung, Bstart-up and others.

Services

1. Research in the application of ICT
2. Industrial Cooperation
3. Consultation
4. Startup Incubation

Coaching Experience

The past few years PPTIK has gained experience in nurturing several start-up candidates, such as Lentera Nusantara, PT. Anargya, etc.

Achievement

The start-up candidates coached by PPTIK ITB received several awards at national and international level, such as INAICTA, APICTA, Indonesia Innovations and Innovators Expo (I3E), Kemenristekdikti, and others.

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Research Center for Cultural and Environmental Products

Website : pbl.lppm.itb.ac.id

The Research Center for Cultural and Environmental Products (PP PBL) has a vision to create culture-based creativity for livelihood improvement.

Its mission is to develop knowledge and expertise on art and design based on natural, human and cultural resources; to increase the competitiveness of creative products and services by using national natural, human and cultural resources sustainably; to encourage the nurturing of the creative industry through the development of cultural activities; and to connect and develop research and development collaborations, both at national and international level.

The goals of PP PBL are to be inspirational, creative, high-quality and competitive; to make cultural links, to organize cultural activities, to raise social awareness, to nurture research culture, and conduct cultural knowledge management.

The research areas of PP PBL are: *Art and Artistic, Art and Aesthetic, Art and Curatorial, Design and Artifacts, Design and Materials, Design and Systems, Design and Visual Culture, Design and Environment, Design and Behaviour, and Design and Information.* The research is focused on: local materials such as bamboo, ratan, grasses, and others; appropriate technology; the cultural creative industry; public and cultural awareness as part of character building.

Figure 1 Recycling Plastic

Figure 2 Processing of salak rod

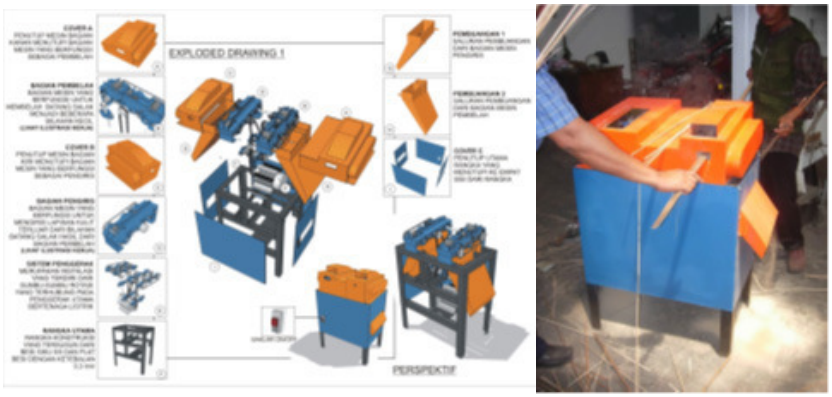

Figure 3 Processing of salak rod

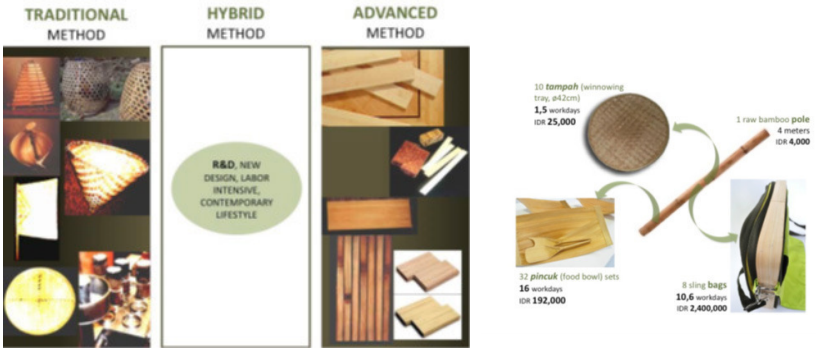

Figure 4 Bamboo research

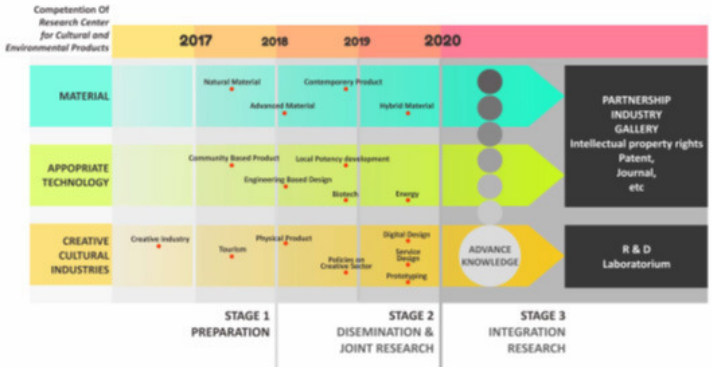

Figure 5 Roadmap of PP PBL

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National Center for Sustainable Transportation Technology

Website : ncstt.itb.ac.id

Executive Summary

Transportation industry in Indonesia offers both opportunities and challenges. The transportation issues have shown un-sustainable signs for the economic development, which are a high level of traffic congestion, dependence on non-renewable energy resources (fossil fuel), and high level of pollution. To address these issues, Indonesian transportation industries need to develop a sustainable transportation system such as zero emission electric vehicle and mass transport for urban application. From the economic standpoint, transportation and mobility are very critical, since it is one of the backbones of the national economic advancement, with very high economic multiplier effect (up to 10 times). This is due to the fact that the transportation industry is supported by many layers of tier suppliers, which develop different components and sub-assemblies for the vehicle systems.

Major issues in the Indonesian transportation are traffic congestion, pollution, and dependence on the fossil fuel. The traffic congestion in the metropolitan cities, such as Jakarta, Bandung, and Surabaya, needs to be addressed so that it can support sustainable economic growth. The study on integrated transportation master plan Phase II (SITRAMP II) indicates that the yearly economic losses due to traffic congestion in Jakarta alone will reach IDR 65 Trillion by 2020. Therefore, it will need significant transportation strategy and planning breakthrough to resolve the Indonesian transport issues.

The Indonesian government has committed for developing transportation to alleviate the problem of national energy and pollution through the national electric vehicle (MOLINA) program, while the problem of traffic congestion through the development of public mass transport with Light Rail Transit (LRT) and Mass Rapid Transit (MRT) programs. ITB was appointed as the lead university in the Molina Program to develop components, sub-system, and electric vehicle systems. The development of the mass public transport is outlined in the National Master Plan for the Railway System (RIPNAS), in which the railway track will be expanded from current length of 4500 km to 12.100 km by 2030. This railway expansion will require the procurement of 2.800 units of locomotive, and 28.000 units of passenger coach. The movement of the goods in Indonesia is currently dominated by the road transportation. The RIPNAS also plans for the expansion of the freight transportation through the railway system. By 2030, there will be an additional 2000 units of locomotive and 40.000 units of freight car for transporting goods.

The National Center for Sustainable Transportation Technology (NCSTT), or Pusat Pengembangan Teknologi Transportasi Berkelanjutan, is a unique multidisciplinary research center focused on conducting, supporting and encouraging applied engineering and technology for transportation systems in Indonesia.

The goal of NCSTT is to develop technology for integrated and sustainable transportation systems that can support economic growth in Indonesia. NCSTT also supports the national transportation roadmap, i.e. improving the competitiveness of Indonesian human resources and local industries.

Network and Collaboration

NCSTT has been recognized globally as the research center which aims to foster the national transportation industry in developing national economics and welfare. NCSTT has built network linkages and research collaborations with national transportation stakeholders such as automotive, railway and aircraft industries, as well as research institutions and universities, both domestic and foreign, see Fig. 1.

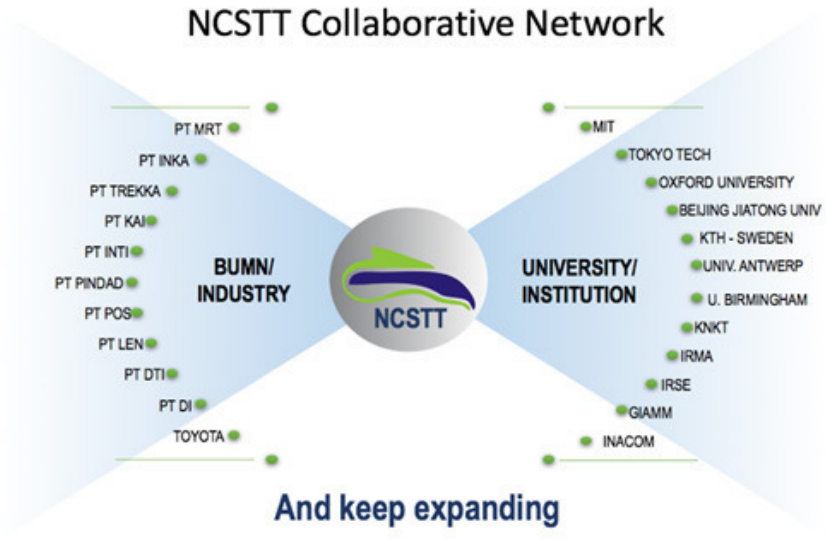

Figure 1 NCSTT Network research collaborations with industries and universities.

Selected joint research collaborations are:

1. Joint research with the Impact & Crashworthiness Laboratory, Massachusetts Institute of Technology (MIT), USA entitled 'Mechanical Integrity of Electric Vehicle Battery Packs'. The aim of this research is to develop and implement a robust battery system for application in electric vehicles (See Fig. 2). Prof. Tomasz Wierzbicki and Dr. Elham Sahraei of MIT are pioneers in the characterization of lithium-ion battery cells and their components under mechanical abuse conditions. They have published several papers in this area in high impact factor publications such as Journal of Power Sources and Nature: Scientific Reports. Their research at MIT covers a wide spectrum of problems. It includes an extensive experimental and computational modeling program. The scope of their research extends from micro scale testing and modeling of components to macro level testing and modeling of battery cells, and development of models of modules and battery packs for EVs.

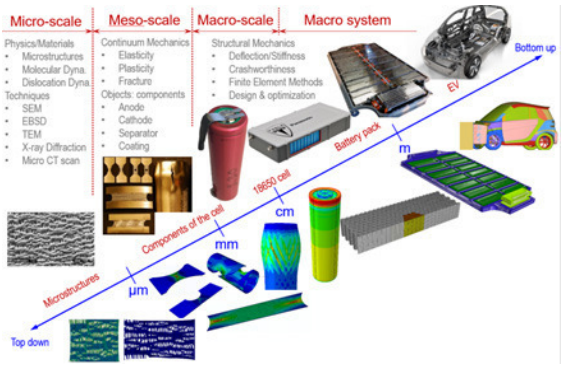

Figure 2 Scope of MIT research on lithium-ion batteries.

2. Joint research with the Dynamic and Impact Engineering Lab, Oxford University, UK is entitled 'Material Modeling and Development of Ultralight Metal Structures Applicable to Railway Vehicles'.

3. Green DRIVE Project, a consortium between University of Antwerp (Belgium), University of Deusto, Bilbao (Spain), Loughborough University (England), and University of Bordeaux (French). NCSTT ITB is a partner in the Joint Master's Degree in Sustainable Automotive Engineering.

Prominent research grants are:

a. **Center of Excellence program from Ministry of Research and Higher Education**
   NCSTT is designated as the host for the national center of excellence (PUI-PT) for transportation by the Indonesian Ministry of Research, Technology, and Higher Education. This grant has been continuously given to NCSTT from 2016 until present.

b. **Sustainable Higher Education Research Alliance (SHERA) Program from USAID**
   SHERA is a program that is funded by the United States Government through USAID and managed by the Institute of International Education (IIE). This program aims to enhance the capacity of researchers in Indonesian higher education institutes as well as creating an environment that enables quality research. The duration of this program is four years, from 2017 to 2021, with a total budget of USD 3 million. NCSTT-ITB has been awarded a SHERA Grant together with Higher Education Institution (HEI) partners from Indonesia and the United States to build a Center for Collaborative Research (CCR) together with prominent partners such as the **Massachusetts Institute of Technology (MIT)**, UNDIP, UNS, UNSRI, ULM, ITK, UNSRAT.

Figure 3 CCR NCSTT team during SHERA program launch.

c. **Royal Academy of Engineering (RAEng) IAPP Program**

The main purpose of this program is to initiate linkage between HEI in Indonesia and the United Kingdom as part of the Industry Academia Partnership Program (IAPP). The objective of the IAPP Program is to develop research collaboration on 'Material Modeling and Development of Ultralight Metal Structures Applicable for Railway Vehicles' together with the University of Oxford. NCSTT also involves Indonesian railway manufacturer PT INKA as an industrial partner. It is expected that the research product will be implemented in the design and development of railway vehicles made by INKA.

Figure 4 Award ceremony from RAEng IAPP Program.

d. **Beijing Jiaotong University**

This program aims to conduct the collaborative research on design of telecommunication system for high-speed railway with Beijing Jiaotong University (BJTU). This collaboration will keep expanding until 2018.

Figure 5 (a) the agreement signing between ITB and BJTU company,
(b) the signage which symbolized the collaborative research.

e. **Tokyo Institute of Technology**

NCSTT and Tokyo Institute of Technology has been working on the joint research and development projects in the areas of transportation engineering, technology, and policy. This collaborative research focuses on the following areas (but not limited to):

1. Design and development of railway system technology
2. Railway safety technology and risk management for urban-transport network
3. Transit Oriented Development (TOD), business and planning development for urban railway
4. Railway infrastructure planning and technology study (Monorail, LRT, MRT)
5. Social and environment impact, such as flood mitigation, climate change, and CO2 mitigation
6. Railway industrial technology and policy
7. Training and curriculum development for railway engineering

Industrial Partnership

To achieve the NCSTT's target on the integrated transportation system, the synergy between the research partnership has to be fostered with industrial partnership. NCSTT has been collaborating with the various industry, such as Bakrie & Brothers Tbk., PT. Proven Force Indonesia, PT. Jakarta MRT, and PT. Karoseri Nusantara Gemilang. This industrial collaboration will keep expanding to fully establish the continuous innovation on transportation technology.

Figure 6 The agreement ceremony of industrial partnership between NCSTT and (a) Bakrie & Brothers Tbk. (b) PT. Proven Force Indonesia, (c) PT. Karoseri Nusantara Gemilang, and (d) PT. Jakarta MRT

Product Development and Innovation

In order to achieve the integrated transportation goal, several product innovation solutions for sustainable transportation technology have been developed in five priority sectors:

a. **Product innovation technology and design**

NCSTT research and development on technology for product design focused on electric vehicles, mass transport and aircraft development in 2016 (See Fig. 7).

Figure 7 Ongoing research innovation project.

b. **Transportation infrastructure**

NCSTT research on infrastructure for rapid mass transportation and electrification/charging strategies for electric vehicles is conducted in collaboration with world-class universities and industries.

c. **Policy, planning, and business development**

NCSTT research also focuses on strengthening integrated transportation policy for the implementation of technology development, transit oriented development (TOD), and creating national Indonesian standards (SNI) for transportation industries.

d. **Education and training**

NCSTT is working on preparing resources to support technology development in transport industries. NCSTT has successfully organized a focus group discussion and workshop on mass transport/Light Rail Transport in Palembang. The national workshop was jointly organized by ITB, University Sriwijaya, Ministry of Transportation, local government and industries (see Fig. 8).

Figure 8 (a) Speakers from the first session of focus group discussion and workshop, LRT

The workshop has been continuously developed and broadly conducted for governmental sector and industrial sector. For governmental sector, NCSTT alongside with Lightweight Structure Research Group, Faculty of Mechanical and Aerospace Engineering ITB has held the workshop on land transportation safety for the staff of the ministry of transportation (See Fig. 9). For industrial sector, NCSTT has held the workshop on train signaling, control, and automation technology as the continuation of the signing of the Memorandum of Understanding between PT MRT Jakarta and ITB.

As one of the NCSTT institutional partner, Massachusetts Institute of Technology (MIT) has also committed to be involved in NCSTT capacity building. Currently, NCSTT has initiated the collaboration with MIT Professional Education regarding the future works on workshop and training for NCSTT's members. (See Fig. 10)

Figure 9 (a) Dr. Sigit P Santosa, MSME as the speaker in Workshop on Land Transportation Safety (b) Audience members and speakers.

Figure 10 NCSTT visit to MIT for discussing the future works on capacity building

e. **Research Dissemination**

The International Conference on Electric Vehicular Technology (ICEVT) is an annual event which aims to provide opportunities for the different areas delegates in the field of Electric Vehicle (EV) technology to exchange new ideas and application experiences and to establish friendly relation among peers for future global collaboration. ICEVT has been held 4 times until 2017 (See Fig. 11) and the next ICEVT will be held at Surakarta.

NCSTT has also launched International Journal of Sustainable Transportation Technology (IJSTT). This journal accepts original research paper, review paper, technical paper, and short communication paper which covers transportation technology fields such as electric vehicle technology, mass transportation, railways and rolling stock, transport socio-economic impacts, transportation infrastructures, transit-oriented development, and transportation safety. The submitted paper will be peer-reviewed with double-blind review process to assure the high standard journal quality. All published papers will be available to be accessed openly to reach a broad and wide audience.

Figure 11 4th ICEVT 2018 at Sanur, Bali

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National Center on Broadband Wireless Access

(Center for Microelectronics ITB)

Website: www.pme.itb.ac.id

"The future of integrated electronics is the future of electronics itself," stated G.E. Moore in 1965.

He then went on predicting that the number of transistors per chip will double every 18 months; a law that bears his name: Moore's Law. This law then enables expanding markets and revenues of electronics industry, which in turn enables larger research and development (R&D) and manufacturing investment, which again in turn enables the exponential trends in technology and productivity, as governed by the Moore's Law.

This productivity engine has propelled microelectronics role into a strategic level for the well being of a nation. With the spirit of "Microelectronics prospers the nation", the Microelectronics Center (formerly Inter University Center on Microelectronics (PAU)– IUC Me ITB) prepares itself to bring the engine to Indonesia. This profile describes in short the Microelectronics Center.

Originally founded at 1986 by a project of Directorate General of Higher Education (DIKTI) with the World Bank. The Microelectronics Center is a research center under ITB and Vice Rector of Research, Innovation and Partnerships, coordinated by the Research Institute of ITB, since 1997. This reflects ITB's new emphasis on research activities in the field of microelectronics, which supports education as well as public and industrial services. The Microelectronics Center aspires to take a leading role in microelectronics research and development to serve the national interest. The Microelectronics Center focuses on the development of technology, products and electronics industries in Indonesia. It is a center of excellence in Indonesia, approved by the Ministry of Research, Technology and Higher Education. The Microelectronics Center was founded in 1986 by Prof. Dr. Samaun Samadikun. Prof. Samaun once graced Google's main page (on Friday 15/4/2016) to commemorate the birth of engineers and scientists from Indonesia.

Figure 1 Google Doodle of the founding father of PME, Prof. Dr. Samaun Samadikun.

The scope of research and development at the Microelectronics Center covers the entire ecosystem of the electronics industry, from upstream to downstream, i.e. chip technology (components), electronic systems technology (ODM/OEM), and electronic equipment manufacturing technologies. The Microelectronics Center is supported by four laboratories and equipped with international standard research equipment, such as IC design and processing, electronic systems design and electronic manufacturing. In addition to conducting research activities, the Microelectronics Center also actively conducts product development activities in collaboration with domestic and foreign industries, disseminating research results through activities such as international conferences, journal publications, workshops and training. The Microelectronics Center also has intensive cooperations with universities from Indonesia and abroad.

Vision

The vision of the Microelectronics Center is to become a center of excellence in the global electronics ecosystem that stimulates the development of microelectronics science and technology through creative and innovative research, development and education.

Mission

The mission of the Microelectronics Center is to create synergy through research, development and education programs on electronic ecosystems that yield technological products and services involving institutions of education and research, industry, and government.

Objectives

- Promote the science and technology capability accumulated in the Microelectronics Center
- Build a global cooperation network between industries, research institutions and universities
- Elevate innovation capacity by exploiting the advancement of science and technology
- Build national capability to master the advancement of science and technology on microelectronics based on the national technology roadmap
- Promote the establishment of industrial R&D clusters for electronics technology

Organization

Director	**Trio Adiono, Ph.D.**
General Manager	**Anton Wiguna, ST., MT.**
Financial & Human Resources Manager	**Ir. Amy Hamidah Salman, M.Sc.**
Business Unit Manager	**Dr. Yoanes Bandung**
Information Technology Manager	**Dr. Waskita Adijarto**
Research & Development Program Manager	**Dr. Arif Sasongko**
Administrative Staff	**Abdhiany Rahayu**

Figure 2 Position and Concept

Strategic Concept

- Building a critical-mass of researchers and engineers.
- Establishing an ecosystem that includes universities, research institutions, industry, and government.
- Developing technologies and applications in the field of Information Technology and Microelectronics.
- Being an institution that can help certifying products developed by third parties.
- Promoting national policies that favor the researchers and developers in the country.

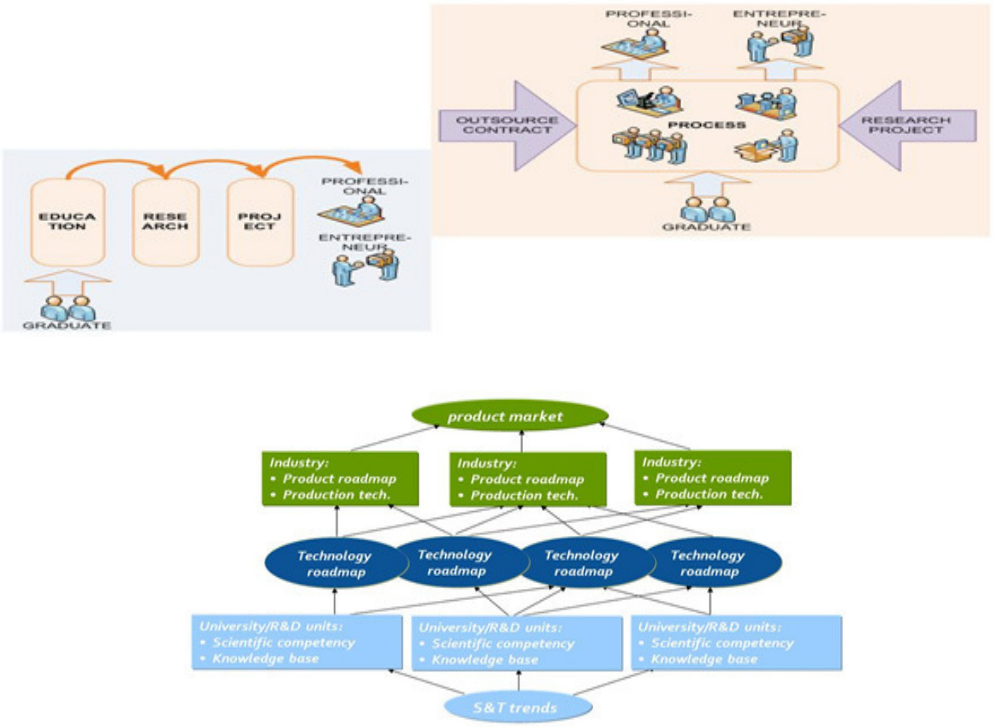

Figure 3 Strategy Concept

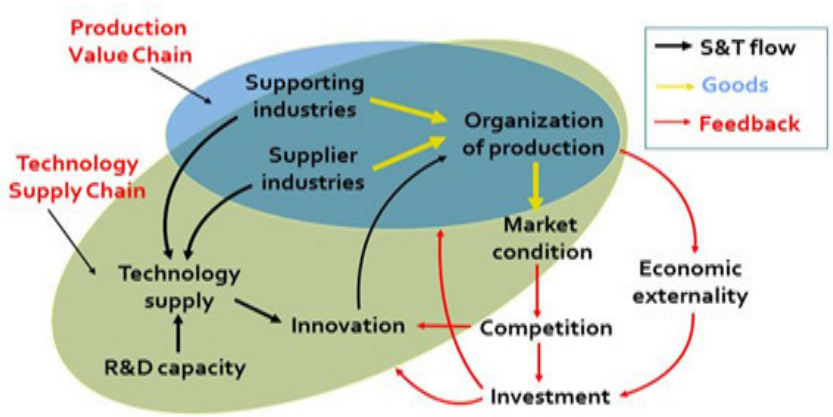

Figure 4 Programs

Programs

Expand network cooperation through global-national forums

- Yielding a more effective ecosystem/techno-industrial cluster

Provide training and accumulate expertise

- Development human resources with high quality skills and expertise in electronics
- Development of human resources with electronics industry-entrepreneurship

Electronics based product research and development

- Develop innovative microelectronics technology products and services

Perform business incubation

- Incubate electronics technology based start-up companies

Labs

The research labs in the Microelectronics Center ITB are as follows:

a. **System and Application Laboratory**, uses the ICs to develop products and applications. In many cases, microelectronics devices, products and systems are mass products.
b. **IC Design Laboratory**, develops technology for designing ICs using computer-aided design (CAD) and characterization of the component and devices.
c. **Devices and Process Laboratory**, acquires and develops technology for analysis, characterization, design, developing, and processing of microelectronics components and devices to be used in integrated circuits (IC s).
d. **Electronics Manufacture Laboratory**, studies and develops technology for electronics manufactures.

Products

The Microelectronics Center has developed electronics products as depicted below:

- Electronics Voting System (MeVote)
- Smart Panel
- WiMax Base Station
- WiMax Subscriber Station
- LTE Smallcell
- LTE Framework
- Smartphone
- WiMax Baseband Chipset
- eFisheries
- AQLite Signal Generator
- AQLite Signal Analyzer
- MINDS Smarthome System
- T-Con Tap And Connect
- BOKS Smart Locker System
- Arduino Board

In broadband wireless access (BWA) technology, the Microelectronics Center has been actively involved in the research and development of 4G devices. In 2012, a 4G modem/base transceiver station with WiMax standard IEEE 802.16 was successfully designed. The design covered the whole layer, i.e. from chip, PCB, MAC layer, network layer up to the software. The device was successful tested in a pilot project with a range of 11 km. BWA devices (up to 4G LTE) are being developed for use with base transceiver station and smart phone devices. In addition, PME also focuses on IoT related products, such as smart city devices (bike sharing, smart street lighting and smart home systems, and so forth). In IoT technology, PME starts product development at the level of the application and the user experience. In the final stage, the chip will be implemented. Some chips that have been designed are chips for MPEG codec products, WiMAX baseband processors, Smart Cards (contact and contactless), security engines, and so forth.

Figure 5 T-Con (Tap an Connect) is a product fusing NFC and wifi. Functioning as wifi access point without having to make complicated settings in your device to connect. T-Con is designed to facilitate users when trying to connect to wifi access points. Users do not need bother with SSID scanning and entering a password. Simply tap your smartphone to T-Con and you are already connected to a wifi access point in the area.

Figure 6 Meshed and Internet Networked Devices System (MINDS) is an Internet-of-Things based system, which connects, controls and monitors all of your home appliances anytime from anywhere.

Figure 7 OwnGrid enables seamless connectivity over sea. It helps fishermen find the best locations for fishing. OwnGrid provides multiple applications, such as navigation, weather prediction, fishing areas, as well as online chatting. The product is also able to report any SOS condition.

Figure 8 FUSI small cell FSC200 enables mobile service providers to deliver cost-effective capacity to urban hotspots, as well as affordable coverage to rural locations. They also enhance the user experience by enabling faster, more reliable data connections and higher data throughput on 4G networks. FSC200 provides 100 Mbps downlink and 50 Mbps uplink data connections with up to 200 users.

Infrastructure

The Microelectronics Center is equipped with facilities for designing and implementing various electronic devices:

a. CAD software tools
b. Electronic measurement devices such as signal generator, signal analyzer, network analyzer, spectrum analyzer, oscilloscope, logic analyzer, and others
c. Compliance test devices such as LTE, WiMAX, DVB and others
d. Clean room for IC processing
e. Development boards such as FPGA, DSP, GPU, software defined radio (SDR), and so forth
f. Electronic manufacturing devices (IC packaging, multi layer PCB manufacturing, assembly and testing), in collaboration with Teaching Factory (TF), Batam

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National Center for Defense and Security Technology

Website: www.pustekhan.itb.ac.id

The Center for Defense and Security Technology ITB (PUSTEKHAN) has been established with the objective to coordinate and synergize research and technology development for application in defense and security from various research and development institutions in universities and industries, either government-owned or private.

The program of defense technology development is supported by three main stakeholders, consisting of R&D institutions, users and government. The stakeholders are strategic partners in pursuing national independence in defense technology capability. Together with all stakeholders, PUSTEKHAN builds and develops the common vision and network necessary to implement its program, to be executed by national consortiums and collaborations.

As an organization, PUSTEKHAN runs its program within a framework consisting of three divisions: Program Development (PD), Project Focus (PF) and Marketing (M).

The Program Development Division defines the program to be executed by PF through a process of evaluation and compilation of a large amount of information from various resources, particularly information gathered by the M Division.

The Project Focus Division coordinates the execution of the program that has been defined by the Program Development (PD) Division.

The Marketing Division focuses on promotion and creating business contacts with the objective not only of promoting and discussing potential products, but also collecting and consolidating information from potential users. The information gathered consists of feedback and comments on proposed products and also information from users about products that are not yet available and could carry out specific functions. The information is used by the PD Division as a reference to define future programs to be executed by the PF Division.

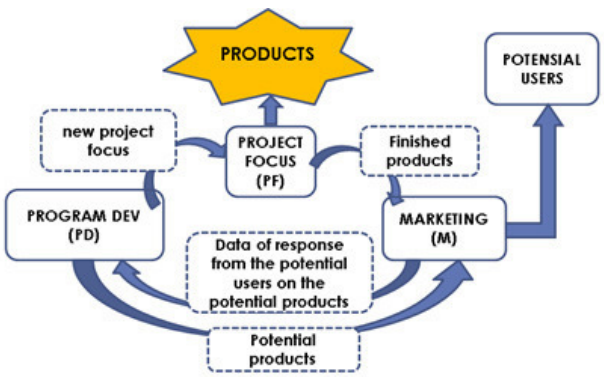

Figure 1 Work flow of the organization.

Currently, the fields accommodated by PD are Mechanical and Aerospace, Electronics and Telecommunication, Systems and Controls, and Materials, which are the main elements in the development of products for defense and security. There is a plan to also include other strategic fields in the future, such as biotechnology and nanotechnology.

Figure 2 Participation in defense product exhibition IndoDefence 2016.

Figure 3 Product development of UAV prototype for shooting operation.

Figure 4 National UAV Exhibition 2017, Rumpin Bogor

Figure 5 Participation in RITECH EXPO 2017, Makassar.

Figure 6 Alutsista Exhibition along with the 72nd birthday of TNI in Koarmatim Surabaya, 2017.

Figure 7 International visit from DGC Global dan discussion with BETA, 2017

Figure 8 Drone / UAV operation workshop with Aeroterrascan Indonesia, 2017

Figure 9 3D Printing workshop with Aeroterrascan Indonesia, 2017

Figure 10 Focus Group Discussion with partners of Pustekhan, 2017

Figure 11 Joint Lectures (Cyber Security in Defense Technology) in Bandung, 2017

Figure 12 Joint Seminar with Indonesia Defense University in Bogor, 2017

Figure 13 MoU and Cooperation Agreement signing with Indonesia Defense University, 2017

PUSTEKHAN also manages Jurnal Inovasi Pertahanan dan Keamanan (JIPK) or Journal of Defense and Security Innovation, a national journal which includes articles with varied themes related to innovation in defense and security field, the emerging security threats and scenarios , civil-military relations, higher defense planning, doctrines and concepts, organizations and structures, command and control mechanisms, logistical support and sustainability issues, budgeting procedures and practices, science, engineering and technology in defense and security, cyber security, and other topics related to defense and security.

Expert services

The expert resources pooled in PUSTEKHAN have the potential to be employed in programs of expert services in the scope of technical assistance, policy-making and program executions. Currently, PUSTEKHAN gives assistance for the running of a grant-awarding program of the Ministry of Defense for industrial prototyping and product development.

Figure 14 The cover of Jurnal Inovasi Pertahanan dan Keamanan

Figure 15 Discussion with experts to define a common vision and programs on various strategic issues between partners and stakeholders.

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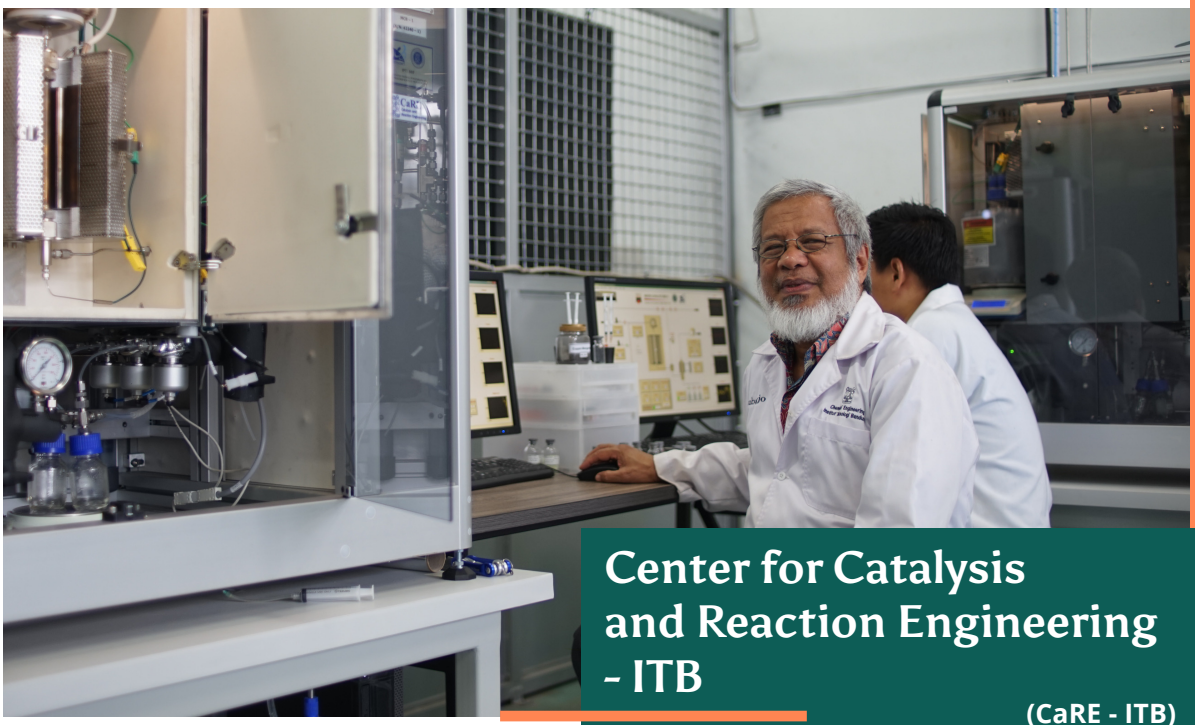
“Together with all stakeholders, PUSTEKHAN builds and develops the common vision and network necessary to implement its programs, to be executed by national consortiums and collaborations”

Selected Laboratories



Center for Catalysis and Reaction Engineering – ITB

(CaRE - ITB)

CaRE is a research centre which accommodates research and development activities in chemical reaction engineering and catalysis. Many catalysts and catalysis processes have been studied and developed in this center. Currently, several catalysts have been used in several commercial units of Chemical Industry with very satisfactory performances, such as: (1) Adsorbent to remove sulphur compounds from natural gas, manufactured by PT Pupuk Iskandar Muda (PT PIM) Aceh, and used by PT PIM and PT Medco Energi (about 90 tons); (2) Hydrotreating catalysts to saturate olefins and to remove sulphur and nitrogen compounds from naphtha and diesel, and used in almost all PT Pertamina's refineries (more than 170 tons). These achievements and track records illustrate the capabilities of CaRE in managing the results of its researches so that it can be commercialized. These outstanding attainments open further opportunities to develop other catalysts with many Chemical Industries. Now, CaRE is a grantee of Indonesia Innovation and Technology Strengthening Project (IPTI 2017 and IPTI 2018) funded by Ministry of Research and Higher Education, Republic of Indonesia (Kemenristek Dikti). The educational catalyst mini plant with capacity of 1-5 kg/batch was built in Department of Chemical Engineering - FTI – ITB. This plant is designed to accelerate the innovation, development, and production of "Katalis Merah-Putih". This catalyst plant also acts as pilot unit for research, as well as a media of education in catalysis and reaction engineering. The whole units of catalyst teaching plan is equipped with catalyst production process units, pilot-scale reaction systems for catalyst performance tests, and physico-chemical properties catalyst analysis instrumentation. Several types of catalysts are now being designed and developed in laboratory scale, produced and evaluated in pilot scale, and prepared for industrial application.


Figure 1 Student activity in catalyst synthesis at catalyst teaching factory - ITB

Figure 2 Fixed Bed Micro Activity Test Unit for cracking catalyst activity testing.

FIgure 3 Several continuous reactors for catalyst activity testing

Figure 4 Fixed Bed Micro Activity Test Unit for cracking catalyst activity testing.

Figure 5 Catalyst loading at RU VI Balongan - PT Pertamina (2014)

FIgure 6 Prof. Subagjo in the laboratory

For more information, please contact :

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Oil Palm Laboratory

Head of Laboratory:
Dr. I.G.B. Ngurah Makertiharta

Research activities in the field of bioenergy, Development of Catalytic Cracking Process of Palm Oil for Green Gasoline Production, held at Laboratory of Catalysis and Reaction Engineering (CaRE), Chemical Engineering Study Program ITB, is one of the researches funded by Badan Pengelola Dana Perkebunan Kelapa Sawit from 2016 until 2019.

One of the advanced equipment obtained from Grant Riset Sawit is a Micro Activity Test (MAT) reactor equipment. This equipment is a micro reactor unit used to examine the zeolite catalyst activity for very short life time. With this MAT equipment, the entire mass balance of the cracking process during the activity test and catalyst regeneration process can be obtained easily. This equipment enables us to perform the palm oil cracking catalyst selection precisely and quickly.

Directory of Research and Innovation

Research Groups

No.	Units
1	*Geodesy*
2	*Geodynamics and Sedimentology*
3	*Applied Geology*
4	*Oceanography*
5	*Remote Sensing & Geographical Information Sciences*
6	*Paleontology and Quaternary Geology*
7	*Petrology, Volcanology and Geochemistry*
8	*Atmospheric Sciences*
9	*Engineering of Coastal, Marine and Maritime Areas*
10	*Surveying and Cadastre*
11	*Algebra*
12	*Analysis and Geometry*
13	*Astronomy*
14	*Biochemistry*
15	*Physics of Complex System*
16	*Physics of Magneticsm and Photonics*
17	*Physics of Electronic Materials*
18	*Nuclear Physics and Biophysics*
19	*Theoretical High Energy Physics and Instrumentation*
20	*Analytical Chemistry*
21	*Physical and Inorganic Chemistry*
22	*Organic Chemistry*
23	*Industrial and Financial Mathematics*
24	*Combinatorial Mathematics*
25	*Statistics*
26	*Aesthetics and The Science of Art*
27	*Design Science and Visual Culture Sciences*
28	*Humanity Science*
29	*Visual Communication and Multimedia*
30	*Craft and Tradition*

Research Groups

No.	Units
31	*Man and Industrial Design*
32	*Human and Interior*
33	*Visual Art*
34	*Energy and Chemical Engineering Processing System*
35	*Ergonomics, Work Engineering and Work Safety*
36	*Instrumentation and Control*
37	*Industrial Management*
38	*Chemical Engineering Product Design and Development*
39	*Chemical Engineering Process Design and Development*
40	*Industrial System and Techno-Economics*
41	*Manufacturing Systems*
42	*Engineering Physics*
43	*Design, Operation and Maintenance of Aircraft*
44	*Flight Physics*
45	*Materials Science and Engineering*
46	*Energy Conversion*
47	*Mechanical Design*
48	*Lightweight Structure*
49	*Mechanical Engineering Production*
50	*Construction Engineering and Management*
51	*Air And Waste Management*
52	*Water & Wastewater Engineering*
53	*Geotechnical Engineering*
54	*Structural Engineering*
55	*Transportation Engineering*

Research Groups

No.	Units
56	*Offshore Engineering*
57	*Coastal Engineering*
58	*Water Resources Engineering*
59	*Environmental Management Technology*
60	*Earth Resources Exploration*
61	*Global Geophysical*
62	*Applied Geophysics and Exploration*
63	*Exploration and Engineering Seismology*
64	*Metallurgy Engineering*
65	*Drilling Engineering, Production, Oil & Gas Management*
66	*Mining Engineering*
67	*Reservoir Engineering*
68	*Policy Planning and Development Management*
69	*Architectural Design*
70	*Urban Planning and Design*

Research Groups

No.	Units
71	*Regional and Rural Planning*
72	*Housing and Human Settlement*
73	*Architectural History, Theory and Criticism*
74	*Economics Systems and Modeling*
75	*Regional and Urban Infrastructure System*
76	*Building Technology*
77	*Entrepreneurship and Technology Management*
78	*Human and Knowledge Management*
79	*Operations and Performance Management*
80	*Decision Making and Strategic Negotiations*
81	*Business and Financial Risks*
82	*Business and Marketing Strategies*
83	*Biology Pharmacy*
84	*Pharmacochemistry*
85	*Pharmacology-Clinical Pharmacy*
86	*Pharmaceutics*
87	*Sports Science*
88	*Agrotechnology and Bioproduct Engineering*
89	*Microbial Biotechnology*
90	*Ecology*
91	*Animal Physiology and Developmental Biology and Biomedical Sciences*
92	*Genetics and Molecular Biotechnology*
93	*Biological Resources Management*
94	*Plant Sciences and Biotechnology*
95	*Forestry Technology*
96	*Electronics Engineering*
97	*Informatics*
98	*Software and Knowledge Engineering*
99	*Control System and Computer*
100	*Biomedical Engineering*
101	*Power Engineering*
102	*Computer Engineering*
103	*Telecommunication Engineering*
104	*Information Technology*

Faculty and School

No.	Units
1	*Faculty of Earth Sciences and Technology*
2	*Faculty of Mathematics and Natural Sciences*
3	*Faculty of Art and Design*
4	*Faculty of Mechanical and Aerospace Engineering*
5	*Faculty of Mining and Petroleum Engineering*
6	*Faculty of Civil and Environmental Engineering*
7	*Faculty of Industrial Technology*
8	*School of Architecture, Planning, and Policy Development*
9	*School of Business and Management*
10	*School of Pharmacy*
11	*School of Life Sciences and Technology*
12	*School of Electrical Engineering and Informatics*
13	*Graduate School*

Center

No.	Units
1	*Center for Industrial Engineering*
2	*Center for Mathematical Modelling and Simulation*
3	*Center for Microelectronics*
4	*Center for Tourism Planning and Development*
5	*Center for Environmental Studies* (CES-ITB)
6	*Center for Coastal and Marine Develoment*
7	*Center for Research on Energy Policy* (CREP-ITB)
8	Center for Remote Sensing (CRS-ITB)
9	*Center for Instrumentation Technology & Automation* (CITA-ITB)
10	*Center for Public Policy and Governance* (CP2G-ITB)
11	*Center for Spatial Data Infrastructure* (CSDI-ITB)
12	*Center for Empowerment of Open Source Software*
13	*Center for Health and Sport Technologies*
14	*Center for Unmanned System Studies*
15	*Center for Logistics and Supply Chain Studies*
16	*Center for Water Resources Development*
17	*Center for Climate Change*
18	*Center for Rural Areas Empowerment*
19	*Center for Agrarian Studies*
20	*Center for Sustainable Transportation Technology Development*
21	*Center for Defense and Security Technology*
22	*ITB Halal Center*

Research Center

No.	Units
1	*Center for Research on New and Renewable Energy*
2	*Center for Research on Information and Communication Technology*
3	*Center for Research on Bioscience and Biotechnology*
4	*Center for Research on Infrastructure and Regional*
5	*Center for Research on Cultural and Environmental Products*
6	*Center for Research on Disaster Mitigation*
7	*Center for Research on Nanoscience and Nanotechnology*

Center of Excellence in Science and Technology

No.	Units
1	*National Center of Excellence for Broadband Wireless Access*
2	*National Center of Excellence for Defence and Security Technology*
3	*National Center of Excellence for Sustainable Transportation Technology*
4	*National Center of Excellence for Nanoscience and Nanotechnology*
5	*National Center of Excellence for Carbon Capture Storage*

WRRIM-ITB

Office of Vice Rector for Research,
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LPPM-ITB

Institute for Research and
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LPIK-ITB

Institute of Innovation and
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DKHI-ITB

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