RESEARCH AND COMMUNITY SERVICES @ FACULTY OF ENGINEERING UNIVERSITAS INDONESIA
CENTRAL MOTIVATION OF RESEARCH at UNIVERSITAS INDONESIA:

URBAN ISSUES

JAKARTA CITY

DEPOK CITY
EXISTING CHALLENGES

Pollution

Declination of Fossil Fuels

Transportation

Waste

Clean water and health
INTEGRATED DESIGN IN URBAN ECO-TECHNOLOGY FOR QUALITY HUMAN LIFE AND ENVIRONMENT

RESEARCH CENTRAL FOCUS

STRATEGIC AND PRIORITY AREAS:
• New & Renewable Energy
• Urban Planning & Transportation
• Clean Water and & Food Resilience
• Waste treatment & Environment Conservation
• Health and Biomedical Applications
• Maritime

MAIN OBJECTIVES:
• INNOVATIVE PRODUCTS FOR SOCIETY
• HIGHLY INTERNATIONAL RECOGNITION WITH REPUTABLE PUBLICATION
Environmental Engineering:
Water supply and management;
Liquid and solid waste; pollution control and prevention;
Hazardous waste management; and soil surface quality.
Water Engineering: focuses on rainwater management;
Water related green infrastructure;
Integrated and ground and surface water management;
Water related disaster management;
Water resources management; and
Sediment contaminant and transport.

Transportation Engineering:
Public transportation planning and development;
Traffic impact, management, and safety;
Master plan and policy.

Geotechnical Engineering:
Peat soil;
Pavement geotechnical;
Geosynthetic-reinforced earthwork;
Earthquake;
Landslide;
Unsaturated soil behavior; and
Bio-grouting of sandy soils.

Structural Engineering:
Concrete technology and engineering;
Fiber-reinforced concrete;
Polymer concrete;
Waste and recycled concrete;
Public building,
Structural studies and design;
Advanced structural analysis; and
Masonry structures and materials.

Project Management and Value Engineering:
The application of project management in construction and transportation industry.

“Green Infrastructure by Design”

More Information:
Phone: +62-21-727-0029
Email: sipil@eng.ui.ac.id
Web: http://www.civil.eng.ui.ac.id
Advanced Manufacturing Technology and Automation:
Micro-fabrication and intelligent manufacturing systems.

Thermal and Fire Safety Engineering:
Fundamental study of lifted flames; Downdraft biomass gasification; Biofuel for automotive applications; and Fire safety engineering such as spontaneous combustion, fire calorimetry, smoke detection, flame spread and development of water-mist technology.

Advanced Refrigeration Systems and Technology:
Design and construction for high efficiency refrigeration and air conditioning including the works for green building, cold storage, vacuum and freeze drying, methane storage, low temperature cascade and green building technology.

High Efficiency Fluid Engineering:
Advanced turbulent control for manufacturing processes and vehicle aerodynamics, micro-bubbles application, advanced drag reduction techniques, and micro-turbo machinery.

Advanced Heat Transfer Technology:
Heat and relevant mass transfer in spray drying, forced and natural convection of nanofluids. thermophoretic force, thermal measurement techniques, thermoacoustics, evaporation in small tubes and some applications in heat exchanger, thermoelectric cooler, and cryosurgery.

Naval Architecture and Marine Engineering:
Ship resistance and power effectiveness for small ship; ship structural design; novel ship materials; and marine transportation.

“Energy Conservation through Efficient Design and Manufacturing”

More information:
Phone: +62-21-727-0032
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Web: http://mech.eng.ui.ac.id
Power and Renewable Energy:
Energy system such as solar cell, wind turbine, micro-hydro, micro-turbine, and diesel generators.

Sensor and Electronic Devices:
Micro-electro mechanical systems (MEMS), photonics, communication electronics, medical sensors, nanodevices, optical sensors, and corrosion sensors devices.

Multimedia and Network:
Design and realization of distributed multimedia system architecture to convey multimedia information over networks.
Optoelectrotechnique and Remote Sensing: focuses on optics, remote sensing, and image processing.

Digital Signal Processing:
Array processing, pattern recognition, radio software, spectral analysis, coding and modulation, and wireless applications.

Propagation and Microwave Antenna:
Novel micro strip antenna design for cellular and satellite communications and ultra wide band (UWB) components and systems.

Mobile Communication:
Telecommunication engineering, satellite constellation design and high altitude platform (HAP), integration of satellite and terrestrial networks, mobility and traffic management for cellular and maximum segment size (MSS) networks, cross layer optimization, network dimensioning, broadband wireless access (BWA) and UWB communications systems.

Real Time Measurement and Control:
Nonlinear systems and control, robust control for time delay systems, neural networks, fuzzy logic, control and embedded system and decision making.
Advanced Materials:
Nanostructured materials used for solar cell, cell labelling, and mesopores applications; geopolymer used as a replacement for Portland cement and for advanced high-tech composites, ceramic applications or as a form of cast stone; aluminium foams; nanocomposites; metal matrix composites; polymer matrix composites, ceramic matrix composites, materials development for high capacity battery used in electrical car; and bipolar plates for fuel cell applications.

Materials Chemistry and Corrosion Protection:
Materials selection process and corrosion prevention through materials manipulation and engineering including natural product inhibitors; ores processing by utilizing local energy resources and reducing agents such as low grade coal and charcoal.

Materials Manufacture:
Developing a more efficient method in materials processing such as casting, forming, and welding, especially to support industries in Indonesia; materials processing and simulation; development of high strength zero-defect nano-precipitates; high strength low alloys development through a processing and heat treatment; and processing-properties-microstructure relationship in metallic materials; development of light alloys used for body armour and combat vehicle as well as failure analysis of component and structures.

More information:
Phone: +62-21-786-3510
Email: info@metal.ui.ac.id
“Eco-Architecture”

Ethno Architecture:
The social, cultural, and technological aspect of hinterland indigenous building.

Housing and Settlement:
Living transformation pattern of kampong and high rise living structures as well as coastal and archipelagic settlement problems.

Building Science and Technology:
Alternative building materials and tropical sustainable building and urban space problems.

Architectural History and Theory:
Urban history and heritage conservation.
Urban Design and Plan: Spatial patterns caused by migration, tropical spatial distribution of livable space, and design activism for empowering local community.

Environmental Psychology: Crowding and sustainability of alternative utilization of space.

More Information
Phone: +62-21-786-3512
Email: ars@eng.ui.ac.id; architecture@ui.ac.id
Web: http://architecture.ui.ac.id
Chemical and Natural Product Design: Natural based product, design of various chemical reactors, and performance of various chemical reactions through experimentation as well as computer based modeling and simulation.

Sustainable Energy: The sustainability of energy supply, greenhouse effect, energy efficiency, green and renewable energy resources; development of novel materials for energy, clean combustion, hydrogen production and fuel cells, energy storage, clean fossil fuels/coal-bed methane, bioenergy; and sustainable energy systems and policy.

Industrial Bioprocess: Conversion of biological materials into other useful forms, bioenergy, environmental biotechnology, functional food, molecular modelling, bio-catalysis and biomass.

Process Intensification: Development of smaller, cleaner, and more efficient technology that leads to lower energy and materials use in the bulk chemical industry.

More information:
Phone: +62-21-786-3516
Email: dtk@che.ui.ac.id
Web: http://che.ui.ac.id
System Engineering:
The optimization of vehicle and passenger queuing in a transportation process.

Industrial Economics:
focuses on various economics model for industry and industrialization of engineering product.

Ergonomics:
Ergonomics study of engineering products.

Product Design:
Product and process development in manufacturing and service industry by using conjoint analysis.

Production System:
Production system development through manufacturing simulation laboratory.

More information:
Phone: +62-21-7888-8805
Email: tiui@ie.ui.ac.id
http://ie.ui.ac.id

INDUSTRIAL ENGINEERING

“Integrated Systems Design through Sustainable Service System”
Produk Inovatif Karya Anak Bangsa: “MENGABDI UNTUK NEGERI”
BIO NICO & Bi GOGO

Lotion Herbal Anti Nyamuk dan Pesticida Alami
Berbahan Dasar Tembakau

Prof. Dr. Ing. Ir. Misri Gozan, M.Tech.
PROPOLIS

Dr. Eng Muhamad Sahlan, S.Si, M. Eng.

Melipolis
Bayi yang lahir pada usia kehamilan kurang dari 37 minggu bisa dikatakan bayi prematur. Mahalnya biaya serta lamanya pemakaian incubator, menyebabkan beberapa kalangan masyarakat, khususnya kalangan menengah ke bawah, tidak dapat menggunakan peralatan tersebut. Oleh karena itu, Prof. Dr. Ir. Raldi Artono Koestoer, DEA (pencetus program) dan TIM INKUBATOR FTUI mempunyai program PEMINJAMAN GRATIS INKUBATOR (khusus di rumah).
MULTIGREENS,
LAMPU HIAS MULTIFUNGSI TEKNOLOGI NANO KOMPOSIT

Prof. Dr. Ir. Slamet, M.T.

Multigreens adalah lampu yang efektif untuk memerangkap dan membunuh nyamuk, baik di dalam maupun luar ruangan (indoor atau outdoor). Dirancang aman bagi manusia dengan teknologi proses nano-fotokatalisis/komposit yang memanfaatkan energi foton (cahaya) dan katalis semikonduktor, tidak seperti obat nyamuk lain berupa obat semprot, bakar, oles dan elektrik yang sangat berbahaya bagi kesehatan.
Coolbox ini dapat digunakan untuk menyimpan bahan-bahan material yang memerlukan kondisi dingin, seperti makanan, minuman, vaksin, darah, ASI (air susu ibu), dan lain sebagainya, disamping membantu para kurir atau pengendara yang ingin menyimpan makanan atau minuman agar tetap segar. Alat tersebut bekerja berdasarkan prinsip Coolbox ini berbasis efek termoelektrik dari elemen Peltier, sehingga sama sekali tidak menggunakan fluida freon sebagai media pendinginnya, menjadikan coolbox ini sangat ramah lingkungan. Temperatur di dalam coolbox bisa mencapai 10\(^\circ\)C
Prinsip kerja dari alat pendingin tersebut adalah panas matahari digunakan untuk memanaskan air, kemudian diolah melalui beberapa tahapan hingga menghasilkan air bersuhu sekitar 7 derajat celcius. Air dingin tersebut kemudian disalurkan pipa kepada fan coil yang terpasang pada setiap ruangan sehingga mengurangi penggunaan listrik. Jika pada pendingin biasa komponen chiller selalu berisikan Freon, maka pada SWH ini diganti dengan cairan air yang bercampur garam lithium bromida (LiBr), yang tidak perlu sering diganti karena cukup dimasukkan sekali pada absorbsion chiller dan akan terus bekerja hingga kisaran 15 tahun kemudian.
Kelebihan dari semen geopolimer adalah waktu keringnya yang sangat cepat singkat sehingga dalam waktu singkat beton dapat digunakan. Semen yang terbuat dari bahan baku abu terbang dan larutan natrium silikat ini bila digunakan untuk membeton jalan raya, maka dalam waktu 24 jam, jalan sudah mengeras sempurna, dan siap menerima beban maksimal. Padahal, semen konvensional baru bisa mencapai kekuatannya setelah 28 hari.
PEMBANGKIT LISTRIK TENAGA ANGIN (WIND TURBINE)

Prof. Dr. Ir. Adi Surjosatyo, M.Eng

Pemanfaatan energi baru terbarukan menjadi sebuah kewajiban untuk segera diterapkan. Tingginya kebutuhan energi di Indonesia dan menurunnya produksi bahan bakar fosil, menjadi masalah yang harus segera dipecahkan. Salah satu solusi yang sedang dikembangkan oleh Prof. Dr. Ir. Adi Surjosatyo, M.Eng. adalah menggunakan energi angin untuk dimanfaatkan sebagai sistem pembangkit listrik menggunakan turbin angin.
Asbuton (AspalButon) merupakan aspal alam terbesar di dunia yang depositnya terdapat di Pulau Buton Provinsi Sulawesi Tenggara. Berbeda dengan aspal minyak yang berasal dari penyulingan minyak bumi, asbuton berasal dari minyak bumi yang ter dorong muncul ke permukaan menyusup di antara batuan yang porous sehingga kadar Asbuton lebih didominasi oleh keberadaan mineral berupa $\text{CaCO}_3$. Di antara kelebihan asbuton antara lain stabilitas campuran yang lebih tinggi, mampu meningkatkan umur konstruksi jalan serta lebih tahan terhadap perubahan suhu.

Prof. Dr. Ir. Mohammad Nasikin, M.Eng
Portable vaccine carrier dikembangkan dengan menggunakan sistem thermoelectric heat pipe. Thermoelectric adalah suatu sistem pendingin yang mampu menghasilkan perbedaan suhu (panas dan dingin) di kedua sisinya sehingga tidak memerlukan energi tambahan dari luar. Alat ini di desain dengan menggunakan batterei 12 volt untuk menjalani efek thermoelectric tersebut, dan bisa juga dengan memakai modul solar sel sehingga sangat hemat energi. Untuk merakitnya hanya diperlukan 1,5 jam saja.
FAC. OF ENGINEERING UI RESEARCH CENTERS

• MOLINA-UI, MAKARA ELECTRIC VEHICLE (MEVi)
• TROPICAL RENEWABLE ENERGY CENTER (TREC)
• CENTER FOR SUSTAINABLE INFRASTRUCTURE DEVELOPMENT (CSID)
• RESEARCH CENTER FOR BIOMEDICAL ENGINEERING (RCBE)
Research Center for Electric Vehicle Development: MOLINA-UI, MAKARA ELECTRIC VEHICLE (MEVi)
SUB-CLUSTERS of MOLINA-UI:

1. Mechanical and Driving System (Code: M1)
2. Thermal Management System (Code: M2)
3. Electric Motor System (Code: E1)
4. Intelligent System (Code: E2)
5. Charging System (Code: MT1)
6. Battery System (Code: MT2)
7. Social Study (Code: K)
Research Center: TROPICAL RENEWABLE ENERGY CENTER (TREC)

SUB-CLUSTERS:

• Renewable Energy System Engineering
• Solar Thermal Cooling And Refrigeration
• Nanostructure Energy Materials
• Energy Storage Materials
• Power Electronics, Grid And Control
  Biomass And Gasification
• Environment Protection
Research Center: CENTER FOR SUSTAINABLE INFRASTRUCTURE DEVELOPMENT (CSID)

SUB-CLUSTERS:

• Finance and Asset Management
• Sustainable Mobility
• Sustainable Water Management
• Sustainable Energy
Research Center for BIOMEDICAL ENGINEERING (RCBE) FTUI

ON GOING WORKS:

• Fabrication of Degradable Materials: Fe-Mn-C for Bone Implant or Coronary Stent
• Development of Orthodontic Bracket by Using Investment Casting
• Developing and Testing Lab-o n-Chip Device for Biomedical Applications
• Engineering Multi Material Scaffolds for Hard to Soft Tissue Regeneration
• Wireless Medical System Research
• Nanoencapsulation of Indonesian Herbs Extract by Casein Micelle
• Application of Encapsulation Technology for Cosmetics Formula
Breast Cancer Early Detection

3D PLA porous scaffolds

Toxicity result for Magnesium ECAP
UI-INTERGRATED BIODIESEL TEACHING FACTORY DEVELOPMENT PROJECT
DISTRIBUTION OF ACADEMIC STAFFS

- **Professors**: 59 (27%)
- **Associate professor**: 54 (25%)
- **Assistant Professor**: 63 (29%)
- **Lecturers**: 17 (8%)
- **Junior Lecturers**: 25 (11%)

Color codes:
- Blue: Professors
- Red: Associate professor
- Green: Assistant Professor
- Purple: Lecturers
- Cyan: Junior Lecturers

Number of papers

Year

- 2008: 18
- 2009: 31
- 2010: 53
- 2011: 105
- 2012: 116
- 2013: 162
- 2014: 140
- 2015: 211

Total publication

Indexed by Scopus
Contribution of International Publication (Journal and Proceeding) by FTUI to UI
NUMBER OF RESEARCH PROPOSALS 2008-2015:

- **Submitted**
- **Granted**

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<th>Year</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
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<td>111</td>
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<td>194</td>
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</table>
YEARLY RESEARCH FUNDING:

- 2008: Rp5,294,003,000
- 2009: Rp14,605,734,538
- 2010: Rp18,282,387,260
- 2011: Rp15,164,370,840
- 2012: Rp13,390,662,725
- 2013: Rp37,748,900,794
- 2014: Rp34,919,004,389
- 2015: Rp30,023,497,814
RESEARCH FUND OBTAINED BY DEPARTMENTS IN 2015

Amount (in Million Rp)

- Civil Eng.: 2,249
- Mechanical Eng.: 6,000
- Electrical Eng.: 7,107
- Metallurgical & Materials: 3,683
- Architecture: 1,276
- Chemical Eng.: 7,534
- Industrial Eng.: 1,392
- Multi-Dept.: 782

Department
WOMEN IN ENGINEERING

ACADEMIC STAFF

66.35%
33.65%

Men  Woman

UNDERGRADUATE

MASTER

DOCTORAL
<table>
<thead>
<tr>
<th>Contest</th>
<th>Date</th>
<th>Achievement</th>
<th>Name</th>
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<tbody>
<tr>
<td>SWB</td>
<td>April 2015</td>
<td>2nd Place</td>
<td>Nindra Mutu AA / Provost Pz / UDDI / Jack</td>
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<tr>
<td>BIBEX</td>
<td>12 Apr 2015</td>
<td>1st Place</td>
<td>TIM CHESSAIA / Sari Ayu Lestari / Alifah Safui P / Kristy Indrak M</td>
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<td>BIBEX</td>
<td>12 Apr 2015</td>
<td>Best Innovation</td>
<td>TIM CHESSAIA / Sari Ayu Lestari / Alifah Safui P / Kristy Indrak M</td>
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<tr>
<td>APPCHE</td>
<td>Oct 2015</td>
<td>Best Performance</td>
<td>TIM NARADA: Umar bin / Zulfan A / Paramah M</td>
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<tr>
<td>CHERNIV</td>
<td>24-25 Apr 2015</td>
<td>Best Economic Car: RHING Team</td>
<td>Timo (Muhammad M / Andi S / M. Syarna) / Firdi / CANDRIUS / Nirmala / Gifryan / Yogi R / Jenera J / Fadli S / MINNARA (Wirawan H / Fikri / H / Si Zulkarnie / Alifah A / Zulfar A)</td>
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<td>PMC</td>
<td>May 2015</td>
<td>Best Project Manager</td>
<td>Raini / Hendra / Rani / Pachmi / Teguh</td>
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<tr>
<td>BCC</td>
<td>2015</td>
<td>Best Presentation</td>
<td>VOCALISTA AKADEMIUI (Anggie) / Ros Anuar / Ros Nuri</td>
</tr>
<tr>
<td>BMB</td>
<td>2015</td>
<td>1st Place</td>
<td>MADHAN BA-ANA UI (Anggie) / Ros Anuar / Ros Nuri</td>
</tr>
<tr>
<td>ICET</td>
<td>Nov 2015</td>
<td>Best Paper</td>
<td>Sape M / Asri / Reza M / Dedi M / Nuriya M / Luthinah M</td>
</tr>
<tr>
<td>BRIDGE</td>
<td>Nov 2015</td>
<td>1st Place</td>
<td>Florencia V S / Siti / Nendri M / Nurlan S</td>
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<tr>
<td>ROBOTIC</td>
<td>23 Apr 2015</td>
<td>3rd Place</td>
<td>Budi / Yuli / Shafa / Dwi / Siti / Siti / Siti / Syafrida</td>
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<tr>
<td>WORKSHOP</td>
<td>17 May 2015</td>
<td>Best Content / Best of the Best</td>
<td>Nandu Noor M / Didu L / KHFP2 / Shara / KHFP2 / Siti / Siti / Siti</td>
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<td>NSA</td>
<td>April-June 2015</td>
<td>National Green Scientific Competition (KLTIN GSC) - UNS</td>
<td>TIM MUKKULA HORE (UI SMV) / TIM MUKKULA HORE (UI SMV) / TIM MUKKULA HORE (UI SMV) / TIM MUKKULA HORE (UI SMV) / TIM MUKKULA HORE (UI SMV) / TIM SADANA HORE (JU SMV)</td>
</tr>
</tbody>
</table>
HOW IS STUDENT INVOLVEMENT?

- RESEARCH TEAM MEMBERS
- STUDENT SCIENCE AND TECHNOLOGY COMPETITION EVENTS
- COMMUNITY SERVICES PERSONNELS
HOW IS POST-GRADUATE STUDENT CONTRIBUTION FOR RESEARCH AND PUBLICATION?

AS RESEARCH TEAM MEMBERS UNDER PROMOTOR/CO-PROMOTOR SUPERVISION:

– Comprehensive literature study and Finding the “niche” and novelty of the research
– Proposal write-up (personal, group) and submission procedure to DRPM, Kemristekdikti or others
– Execution: Experimentation (lab. modelling), Field Study
– Collecting data and analysis
– Intensive discussion with supervisors and colleagues
– Write-up the results into scientific manuscript (for international/national journal and conference proceeding).
– Submit to publishers (check the Quartile rank: Q1, Q2, Q3 and Q4).
– Present orally in open seminars (international and indexed by Scopus is preferred).
WHAT CAN BE OFFERED BY RESEARCH AND COMMUNITY SERVICES (RPM) UNIT FTUI?

– WORKSHOP AND COACHING CLINICS FOR WRITING:
  • RESEARCH PROPOSAL
  • SCIENTIFIC JOURNAL
  • PATENT DRAFTING

– LINE-EDITING PROCESS

– FTUI JOURNAL CLUB: sharing media, more intensive coaching in particular field.

– INCENTIVE FOR INTERNATIONAL PUBLICATIONS (SUBMITTED, RECEIVED, ACCEPTED/PUBLISHED)
WELCOME TO
FACULTY OF ENGINEERING
UI