

APPLIED SCIENCES AND ENGINEERING RESEARCH CLUSTER

Head: **PROF. DR. FAKHRU'L RAZI AHMADUN**
 Leading PTJ: Faculty of Engineering, Universiti Putra Malaysia,
 43400 UPM Serdang, Selangor
 Contact: dean.eng@upm.my / Tel: 03-89466263

RESEARCH CLUSTER CODE	ASE
NO. OF PROGRAMME	9
NO. OF GROUP	19
NO. OF RESEARCH CENTRE	4
SYNOPSIS	<p><i>This research cluster covers multi and trans-disciplinary research on applied science & engineering. The cluster covers various research programs namely vehicle engineering, sustainable human settlement, disaster management and preparedness, sustainable bio-based development engineering, robotics and intelligent control system, sensor technology, telecommunication systems, electron devices and systems, photonic technology, sustainable manufacturing system, and green technology</i></p> <p>Kluster penyelidikan ini merangkumi kajian pelbagai dan merentas disiplin mengenai aplikasi kejuruteraan dan sains. Kluster ini merangkumi pelbagai program penyelidikan iaitu kejuruteraan kenderaan, penempatan manusia yang mampan, pengurusan bencana dan kesediaan, pembangunan mampan berasaskan bio-kejuruteraan, robotik dan sistem kawalan pintar, teknologi sensor, sistem telekomunikasi, alat-alat dan sistem elektron, teknologi fotonik, sistem pembuatan yang mampan, dan teknologi hijau</p>
DESCRIPTION (with NABC elements)	<p>Need</p> <ul style="list-style-type: none"> • National development requires good engineering and technological inputs • Community and societal transformation requires technological and engineering innovativeness and holistic thinking • Contributes to societal well-being and resilience • Provide sustainable solutions to recurring and emerging technological issues • Contribute indigenous technologies for economic development to the nation • Provide technologies for job and wealth creation • Cost-savings for government through social reengineering • Empowerment and mobilization of citizens for greater social and political participation <p>Approach</p> <ul style="list-style-type: none"> • Multi and trans-disciplinary research approach • Build on existing skills and expertise in R&D&C • Higher visibility (build critical mass) • Preparing and nurturing the next generation of scientist and engineers • Integrated and coordinated research groups • Multi centers of excellence (university/nation wide research teams) • International linkages and collaborations <p>Benefit to UPM and Country</p> <ul style="list-style-type: none"> • Cost savings – avoid duplication of research • Efficient use and allocation of resources and manpower • Focused programs of R&D&C activities • Build strong research teams • Better delivery of service and quality • Contribute to societal well-being and national development • Transparency and sharing of knowledge for the benefit of the nation <p>Competitor</p> <ul style="list-style-type: none"> • UTM is a strong competitor in vehicle and manufacturing engineering • UKM is strong in electronic devices and MEMS • USM is strong in natural disaster studies

Code	Research Programme	Synopsis	Leader of Research Programme	Research Groups
ASE01	Disaster Management and Preparedness	<p>The disasters of the future be it natural or man-made may or may not be bigger. But they are more likely to be more complex and require sophistication in mitigation, preparedness, response and recovery. This suggests that the study of hazards, risk, safety and disaster management require multi-disciplinary thinking and inter-disciplinary skills so that all factors are deliberated and integrated. The Disaster Management and Preparedness Research Program therefore aims to embark on studies of both natural and man-made disasters, encompassing pre-disaster, disaster and post disaster phases. Scholars from science, engineering and social science disciplines will be engaged in order to incorporate a holistic approach to the understanding of the phenomena and provision of effective improvements in mitigation, preparedness, and response and recovery phases for creation of a safer world.</p> <p>Keywords: Disaster Management, Analysis, Prevention, Preparedness, Planning, Emergency Response, Command, Coordination and Control, Recovery, Drill and Exercise</p>	<p>Prof. Dr. Fakhru'l-Razi Ahmadun (FK)</p> <p>fakhrul@eng.upm.edu.my</p>	<ol style="list-style-type: none"> 1. Disaster Management and Preparedness - Prof. Dr. Fakhru'l-Razi Ahmadun (FK) 2. Mountainous Terrain Development – Dr. Zainuddin Md Yusoff (FK) 3. Lightning Protection and Electromagnetic Compatibility – Assoc. Prof. Dr. Chandima Gomes (RC / FK)
ASE02	Electron Devices and Systems	<p>Electron devices and systems are becoming important elements in today's technology. It is widely used in consumer product and industrial appliances. Without these devices and systems, the functions of any application of consumer products and industrial appliances are very limited and not applicable for current market. This research program focuses on fundamental and applied research at the leading edge of advances in electronic materials, nanostructures and devices for applications in photovoltaics, RF, micro and nanoelectronics, MEMS and integrated systems. Therefore the establishment of this research program is inevitable to conduct innovative researches to provide affordable enabling technology, and to coordinate the technology within UPM, with other services, agencies, industry and academia for the benefit of all collaborators.</p>	<p>Assoc. Prof. Dr. Mohd Nizar Hamidon (ITMA/FK)</p> <p>mnh@eng.upm.edu.my</p>	<ol style="list-style-type: none"> 1. Electron Device Assoc. Prof. Dr. Mohd Nizar Hamidon (ITMA) 2. Microelectronic Lab on Chip for Life Sciences and Environment - Dr. Suhaidi Shafie (FK) 3. System on Chip (SoC) – Assoc. Prof. Dr. Roslina Mohd Sidek (FK) 4. Instrumentation Sciences and Technology (IST) – Prof. Dr. Azmi Zakaria (FS)
ASE03	Photonic Technology	<p>The research program is established in-line with the advancing broadband communication era plus the growing interest in photonics-based systems and devices. It focuses on research activity within a specified scope, with activities that include fundamental research, technological and systems development, as well as providing relevant services to outside organizations. The number of equipment in the laboratory has also been added together with unique research facilities to cater to the ever expanding collaborations with local and international institutions. This enables the production of high impact researches and provision of niche, quality services that solidify the group's distinguished status over competitors in the country.</p> <p>Keywords: Optical communications, Optical networks, Photonic Devices</p>	<p>Prof. Dr. Mohd. Adzir Mahdi (FK)</p> <p>mdadzir@eng.upm.edu.my</p>	<ol style="list-style-type: none"> 1. Photonic Systems - Prof. Dr. Mohd. Adzir Mahdi (FK) 2. Wireless and Photonics Networks Research Centre (WiPNET) – Dr. Ahmad Shukri Muhammad Noor (RC / FK)
ASE04	Robotics and Intelligent Control System	<p>This research program focuses on two main research fields, i.e., robotics and intelligent systems engineering. Embedded and computer systems are basic hardware required to implement intelligent robotic. Robotic engineering research program aims to be involved in research activities such as mobile robots, swarm robots, robot module design, robot vision, robot control system, robot simulation, automation and robot application in industry, and autonomous robot navigation. Research in these fields becomes important to study and produce robot which can be applied in multiple fields in industry related to agriculture, manufacturing and medical. Intelligent and embedded systems are required to produce smart robot. Therefore, intelligent system aims to be involved on research activities such as speech understanding, computer vision, artificial intelligence, image processing,</p>	<p>Assoc. Prof. Dr. Abd. Rahman Ramli (FK)</p> <p>arr@eng.upm.edu.my</p>	<ol style="list-style-type: none"> 1. Aerospace Malaysia Innovation Research Centre (AMIC) – Dr. Rizal Zahari (RC / FK) 2. Robotics and Intelligent Systems – Assoc. Prof. Dr. Abd. Rahman Ramli (FK) 3. Control System – Assoc. Prof. Dr. Samsul Bahari Mohd Noor (FK)

		<p>security and imaging and knowledge engineering. These research activities are required to study about computer science and engineering and electronic to develop new techniques or algorithms which can be applied in robot systems, smart machine, agriculture and other industrial sector.</p> <p>Keywords: Mobile Robot, Swarm Robot, artificial intelligence, embedded systems, smart machine, automation</p>		
ASE05	Sensor Technology	<p>Sensor Technology focuses on the design and development of sensors to meet the need of the growth in products and services that utilize information from different types of sensors. Study of characteristics and properties of advanced and nano materials and transducer system, design and development of sensors which concentrate in sensor interface, signal processing and sensor networks are currently being explored. Research carried out also includes study on static, dynamic, electronic, electrochemical, optical, chemical and dielectric properties that shall produce new innovative advanced material for development of new sensors.</p> <p>Keywords: Sensor material and technology, electronic sensor, bio and chemical sensor</p>	<p>Assoc. Prof. Dr. Nor Azah Yusof (FS/ITMA)</p> <p>azah@science.upm.edu.my</p>	<p>1. Sensor Technology – Assoc. Prof. Dr. Nor Azah Yusof (FS/ITMA)</p>
ASE06	Sustainable Bio-based Development Engineering	<p>The need to live within constraints and to ensure more fairness in access to limited resources lies at the core of sustainable development. Sustainable development engineering is a subsystem of Sustainable Development (SD) which governs the main framework of this research programme (RP). This RP focuses on the utilization of renewable resources materials, with special emphasis on those which are abundant in Malaysia such as the lignocellulosic waste from Palm oil mills that covers 90% of the total mass. The research work will concentrate on the production of biorefinery products like Bio-Fuels (BFs), Bio-based products (BPs) and bio-energy through various technologies. Among other it will utilize the sugar platform and the syngas platform as well as the algae platform to produce bio-diesel. The group is multidisciplinary and will utilize both experimental as well as mathematical/computer modelling techniques in an integrated manner to achieve sustainable development. The output of the researches could eventually provide a more viable solution to human and earth sustainability.</p>	<p>Prof. Dr. Said El-Nashaie (FK)</p> <p>elnashaie@eng.upm.edu.my</p>	<p>1. Sustainable Bio-based Development Engineering - Prof. Dr. Said El-Nashaie (FK)</p>
ASE07	Sustainable Built Environment	<p>HRC a research centre established in 1996 is known to have introduced the concept of affordable quality housing (AQH) and industrialised building systems (IBS) in the country from its early research effort. It is government policy to use IBS in government projects today. HRC is currently embarking on a more integrated and multidisciplinary approach to housing research through a research programme called sustainable human settlement. Research work in this area starts from housing planning and architectural design to materials, structural engineering design, construction and costing, while emphasising on sustainable materials and design approach.</p> <p>Keywords: Housing, Industrial Building System, Sustainable Materials and Design.</p>	<p>Prof. Dr. Hajah Rahinah Ibrahim (FRSB)</p> <p>rahinah@upm.edu.my</p>	<p>1. Sustainable Design Informatics – Prof. Dr. Hajah Rahinah Ibrahim (FRSB)</p> <p>2. Sustainable Human Settlement – Prof. Dato Dr. Abang Abdullah Abang Ali (FK)</p> <p>3. Housing Research Centre (HRC) – Prof. Dato’ Ir. Abang Abdullah Abang Ali (RC / FK)</p>
ASE08	Sustainable Manufacturing Systems	<p>Sustainable manufacturing has to be defined, developed and implemented by manufacturing companies and their networks of suppliers and customers. New processes, materials, operations and technologies have to be developed to address the global issues with the least degradation to the environment. Companies targeting economic growth have to assess and mitigate the negative impacts not only within the companies but outside. Thus, the research programme aims at establishing an effective and efficient integration and synthesis of new technologies, human resources, and decision-making models for design, planning, scheduling, and control</p>	<p>Prof. Dr. Rosnah Mohd. Yusuff (FK)</p> <p>rosnah@eng.upm.edu.my</p>	<p>1. Sustainable Manufacturing Systems - Prof. Dr. Rosnah binti Mohd. Yusuff (FK)</p>

		<p>of production of goods and delivery of services. Various tools and methodologies will be applied and tested across the enterprise to continuously improve value creating processes in manufacturing systems.</p> <p>Keywords: sustainable, optimization, manufacturing systems</p>		
ASE09	Vehicle Engineering	<p>Vehicle is a necessity in modern society. It also forms one of the contributors to environmental pollution and accidental deaths. Hence, safer and environmentally friendly vehicles need to be developed. Vehicle engineering forms the main area in mechanical engineering. It has also become a multi-disciplinary field covering electrical, electronics, materials, bio-mechanics, fuel, environmental, biological and chemical engineering. Vehicle engineering continues advancing in line with the stringent safety requirement, stricter environmental regulation, and advances in related technologies such as electronics, motor fuel, and materials. The vehicle engineering research program focuses on the development of new vehicle and new technology for vehicle. It includes design, development, fabrication and testing of vehicles including, but not limited to, natural gas vehicle, bio-fuel vehicle, petrol/electric hybrid, CNGDI/electric hybrid, unmanned vehicle, vehicle for special person, aerial vehicle, land vehicle, electric vehicle, bi-fuel vehicle, roadless vehicle, and direct injection engine vehicle. The program addresses issues related to the occupants, child and passenger safety, environment, cost, and fuel consumption.</p> <p>Keywords: Automotive engineering, vehicle engineering.</p>	<p>Prof. Ir. Dr. Barkawi Sahari (FK)</p> <p>barkawi@eng.upm.edu.my</p>	<p>1. Automotive Engineering - Prof. Ir. Dr. Barkawi Sahari (FK)</p>

Tarikh Kemaskini: 26 Ogos 2013