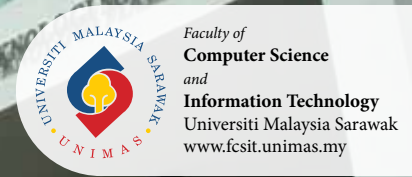


Research @FoCus-IT



TO BE A CENTRE OF EXCELLENCE, INTERNATIONALLY ACKNOWLEDGED IN THE FIELD OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

The Faculty was established in November 1993. Set in the backwoods, away from the major IT hubs. The first task of the day was to simply "get connected". The Faculty's landmark then was a projection of a little VSAT satellite antenna dish by the window of Prof. Zahran Halim's (the founding Dean) office in late 1993. That brought instant electronic globalisation right to the desktop, albeit to just a few test desk at first. Today the little dish is long gone as the campus wide fibre optic backbone is established with leased lines to the national network, JARING and the internet.

Today, the Faculty of Computer Science and Information Technology is located in the new campus, with the view of the famous UNIMAS towers and lake.



Dare to Dream, and Together We'll Make it Happen.

We have previously resolved to undertake the challenging task of expanding our research roadmap to make it inclusive of all research in the Faculty. The research roadmap, though delayed, but is now a reality with 327 pages, providing clear pathways and directions to map the collective expertise of everyone to move the Faculty ahead. We can now stay focussed and continue to plan all activities on making an impact in shaping our future world by taking advantage of transformative, collaborative inter-disciplinary research. I take this opportunity to thank everyone who have contributed to make this dream a reality.

The challenge ahead is now to see how this roadmap can be systematically applied to add value to everything that we have to do from now on. As the roadmap will remain a living document, works on keeping it up-to-date and reflective of all our development efforts then becomes crucial. The R&D taskforce recently established, will thus have a key role to play in this regard. The taskforce will be responsible for mobilizing the researchers in line with the planned research framework.

The research roadmap will then be at the heart of everything we do, including staff recruitment, grant applications, postgraduate research project planning, laboratory allocation, proposals for new teaching learning programmes, life-long learning initiatives, commercialization strategy as well as community service activities. Core groups have now been formally appointed and the alignment with departments have now been finalized. In the near future, we do expect to see some changes in departmental organisation structures to ensure a seamless mapping between all core groups and programmes of study. The roles of all administrative committees are also being aligned with a radical transformation in mind.






All developments however need to be bottom-up and as such all staffs will need to play a part in translating plans into deliverables, contributing publications, and ensuring strategies for building repositories of research documents for making a scholarly impact. This will then be supported by institutional support for automating administrative tasks and helping in document preparation. Key performance indicators are being formulated taking into consideration the need to expand the numbers of principal investigators, postgraduate students, research and commercialization projects and smoothening the transition between idea creation to productisation.

Prof. Dr. Narayanan Kulathuramaiyer
Dean of Faculty Computer Science and Information Technology

Editorial Team

Advisor: Assoc. Prof. Dr. Jane Labadin
Editor: Dr. Chiew Kang Leng

Table of Contents

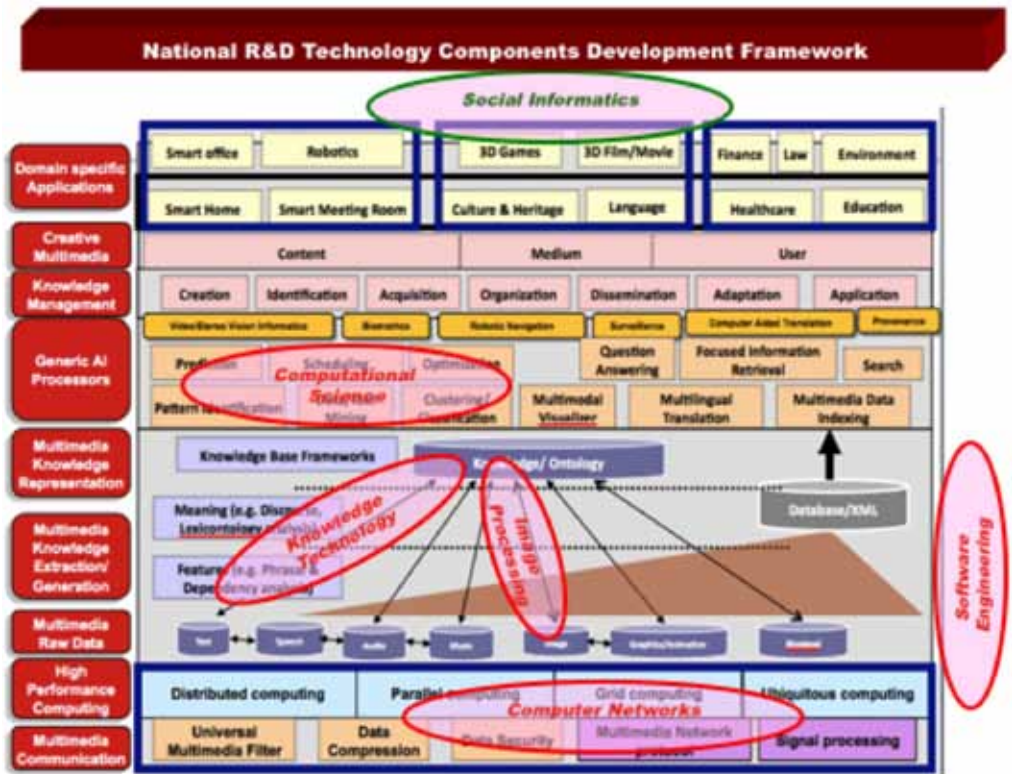
	FCSIT R & D Roadmap 2010 - 2020	2
	Research Progress	5
	Centre of Excellence	6
	Featured Research Project	11
	Research Cluster Highlight	16
	Research Projects	21
	Events	34
	International Network Linkages	41
	Memorandum of Understanding	44

FCSIT R&D Roadmap 2012—2020: Strengthening R&D Culture



The Vice Chancellor, Prof. Datuk Dr Kharuddin AB-Hamid, launched the Faculty of Computer Science and Information Technology (FCSIT) R&D Roadmap 2012–2020 on 28 February 2013. This culminated from collective efforts of faculty members following up from the initial introduction booklet launched in February 2012, also by the Vice Chancellor, which was reported in the Reseach @ FoCus-IT 2012. The comprehensive (but ‘living’) document, at 327 pages, is the first of its kind at UNIMAS, and will go a long way in strengthening the R&D culture at FCSIT.

The FCSIT R&D Roadmap directly aligns with the National ICT R&D Framework as established by the Ministry of Higher Education (MOHE) National ICT Human Resource Development Task Force in their 2010 document on National ICT Human Resource Development Framework, which has since been adopted by MOHE and in the process of implementation by other Ministries, agencies, universities and industry. In fact, the FCSIT R&D Roadmap is a refinement of certain areas of the National ICT R&D Framework, based on the strengths and experience of the Faculty, as shown in the diagram below.



FCSIT R&D Roadmap as a refinement of the National ICT R&D Framework based on the strengths and experience of the Faculty

FACULTY MEMBERS

PROFESSORS

- Datuk Dr. Khairuddin Ab Hamid
- Dr. Narayanan Kulathuramaiyer
- Dr. Wang Yin Chai
- Dr. Zaharin b Yusoff

ASSOCIATE PROFESSORS

- Dr. Alvin Yeo Wee
- Dr. Balisoamanandray Ranaivo-Malaçon
- Dr. Jane Labadin
- Dr. Tan Chong Eng

SENIOR LECTURERS

- Dr Azman Bujang Masli
- Dr Halikul Lenando
- Dr. Bong Chih How
- Dr. Chai Soo See
- Dr. Cheah Wai Siang
- Dr. Chiew Kang Leng
- Dr. Dayang Nurfatimah Awg Iskandar
- Dr. Edwin Mit
- Dr. Hamimah Ujir
- Dr. Jacey-Lynn Minoi
- Dr. Kartinah Zen
- Dr. Nadianatra bt Musa
- Dr. Noor Alamshah Bolhassan
- Dr. Nuha bt Loling Othman
- Dr. Shapiee Abdul Rahman
- Dr. Stephanie Chua Hui Li
- Dr. Sze San Nah
- Dr. Tiong Wei King
- Dr. Wang Hui Hui
- Hj. Syahrul Nizam Junaini
- Inson Din
- Jonathan Sidi

The Roadmap is centred around 4 main domains:

• Computer Networks

This is a major and traditional strength of the faculty. Nonetheless, given the basic needs of the surroundings, the focus has to be on affordable ubiquitous access. The work may be to some extent at the expense of commercialisation, but the social responsibility is considered paramount.

• Computational Modelling

This is another major and traditional strength of the faculty. Although the domain has major potential in consultancy projects, again given the basic needs of the surroundings, the focus also has to be on social responsibility, hence the projects in modelling local problems.

• Software Engineering

This is not a traditional strength of the faculty, but the need is there, in fact nation-wide. Although there are many institutions offering programmes as well as conducting research in this domain, the ultimate goal of a software engineering workbench as described in the roadmap has not been made the focus of the other institutions. This is a niche area that the faculty wishes to be known for, and as such many academic staff are being sent for postgraduate studies in this area. Indeed the current strengths do not exactly match the target areas, but there is a concerted effort to move in that direction.

• Knowledge Technology

This covers a very wide area that includes the domains of language technology, image processing, knowledge representation, and knowledge management technology. In Malaysia, this domain began at the School of Computer Sciences in Universiti Sains Malaysia in the mid-nineties, but the faculty has a long tradition of working with the said School, and as such the domain has expanded very fast in the faculty. As a result, the FCSIT R&D Roadmap has major positive overlaps with other roadmaps that include knowledge technology, namely:

- MIMOS Knowledge Technology R&D Roadmap for the 9th Malaysia Plan
- UNITEN R&D Roadmap (2007-2012)
- MMU R&D Roadmap (2008-2015)

The domain has expanded considerably in many universities other than those mentioned here, and it is for this reason that the National Human Resource Development Task Force (under MOHE) had adopted a similar R&D Framework, which will also soon appear in the National Strategic Technology Roadmap being prepared by MOSTI. The domain has also been earmarked to be an area where Malaysia should be able to compete on the international market as a producer nation in intelligent systems, applications, modules and knowledge.

The results (systems, applications, modules, expertise, etc.) of the work carried out within the Roadmap will be commercialised, which is another of the Faculty's major long-term targets. Nonetheless, given the Faculty's position, location and social responsibility, social impact is also a major target. This will be carried out via another of the Faculty's strong domains, namely:

• Social Informatics

This is as epitomised by the mission of the Faculty's sibling, the Institute of Social Informatics and Technological Innovation (ISITI) – To generate, disseminate, apply and preserve knowledge through an innovative and multidisciplinary approach to empower society to sustainably address their developmental needs in a wider social and economic context.

On a general note, the FCSIT R&D Roadmap has a well-defined vision, namely – Conducting research & development and commercialising next generation infra- and info-structures, content, core competencies, services and products towards affordable ubiquitous broadband platforms for mobile internet running intelligent knowledge management technology systems/applications, with generic toolkits for software architects and developers for these domains.

FACULTY MEMBERS

LECTURERS

Abdul Rahman Mat
 Ahmad Hadinata Fauzi
 Amelia Jati ak Robert Jupit
 Azlina bt Ahmadi Julaihi
 Chiu Po Chan
 Dyg Hanani Abg Ibrahim
 Eaqerzilla Phang
 Emmy Dahliana Bt Hossain
 Fatihah Rami
 Hamizan Sharbini
 Irwandi Hipni Mohamad Hipiny
 Izzatul Nabila bt Sarbini
 Jennifer Fiona ak Wilfred Busu
 Johari Abdullah
 Lau Sei Ping
 Lee Jun Choi
 Ling Yeong Tyng
 Mohamad Imran Bin Bandan
 Mohamad Johan bin Ahmad Khiri
 Mohamad Nazim Jambli
 Mohamad Nazri Khairuddin
 Muhammad Asyraf bin Khairuddin
 Noor Hazlini bt Hj Borhan
 Noralifah Annuar
 Norazian Mohd Hamdan
 Norfadzlan Bin Yusup
 Nurfauzia Jali
 Nurul Zawiyah Mohamad
 Phang Piau
 Rajan Thangaveloo
 Rosita Mohamed Othman
 Sarah Flora Ak Samson Juan
 Seleviawati Tarmizi
 Suhaila Saeed
 Suriati Khartini bt Jali
 Sze Jeeu Fong
 Tan Ping Ping
 Terrin Lim
 Wee Bui Lin
 Yanti Rosmunie Bujang

This ultimate goal will be delivered via 3 strategies, each of which will be implemented via their defined programmes, and in turn by projects:

❖ Affordable Ubiquitous Access (AUA)

(Developing a computer networks toolkit for providing affordable ubiquitous broadband platforms for mobile internet).

- Network Infrastructure
- Network Technology
- Network Services

❖ Knowledge Technology (KT)

(Developing state-of-the-art tools, modules and content for effective knowledge management, culminating in an intelligent system builder that will expedite the development of intelligent applications).

- Intelligent System Builder
 - Language Platform
 - Image Platform
 - Knowledge Platform
 - Knowledge Management Technology Platform
- Computational Modeling Workbench
 - Problem Characterisation
 - Techniques Multiplexor
 - Analysis Modules

❖ Software Engineering Workbench (SEW)

(Developing a generic software/application development system for software architects and developers)

- Analysis & Design
- Development
- Testing & Delivery (including Maintenance)

The above form the core components of the Roadmap, which will result in generic applications and tools that are modular and incremental in terms of development, and most importantly reusable in other applications. The core components have exemplar projects to assist in setting immediate targets, a total of 48, which should be readily converted into grant projects.

The Roadmap also contains Flagship applications, which are large projects that cut across the strategies (and domains) and are identified for immediate implementation to demonstrate the feasibility as well as relevance and usefulness of the Roadmap. These flagship applications not only reflect the main niche areas but also FCSIT's current strengths. In implementing the flagship applications, part of the core components of the roadmap will also be implemented. There are 6 flagship applications have been identified, and together they have an additional 31 exemplar projects (making a total of 79 within the Roadmap):

- i. Self-Sustainable Wireless Information Network for Rural Applications
- ii. Environmental and Biological Impact Management (EBIM4SCORE)
- iii. Social Informatics for Minority Groups
- iv. Preservation of Languages & Culture/Heritage (CHERITAR)
- v. Knowledge Management Enablers
- vi. Software Development Workbench for FCSIT

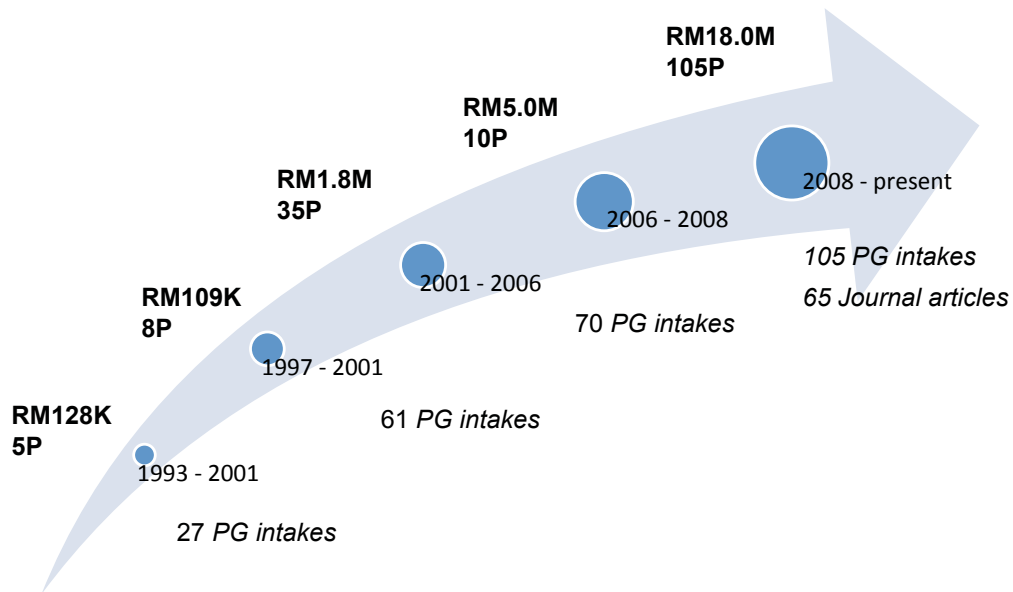
The Roadmap will be implemented via R&D Clusters, beginning with translating the Roadmap into R&D grants. Manpower development has to be very focused and hopefully accelerated, while the document itself, being a 'living' document, has to be properly managed to keep up with technological advancements, national priorities, industry needs, staff strengths, etc.



FoCuSIT Research Progress

Ever since the birth of the Faculty of Computer Science & Information Technology (FoCuSIT), research has been the main focus. The first few projects were led by the first Dean himself, Prof Zahran Halim and his Deputy Dean, Prof Zaidah Razak who was later become the next Dean. They both made sure that the research culture is instilled in the faculty. Every member of the faculty must be involved in at least one project no matter what position one hold, from tutor to professor.

Though we were small then but our dream to reach to greater heights kept us going. From a mere 5 projects totaling of just above RM100K, we secured many more grants as we progressed. Now , the total grants that we have received thus far is cumulated to be more than RM25M. And the last five years we have seen postgraduate students intake of more than 100 and we have published more than 50 journal articles. We believe that we can achieve better and we know that in the next five years we will see this doubled since the faculty has grown to be more matured and we now have the research roadmap as our research plan.





Centre of Excellence for Image Analysis and Spatial Technologies (IMAST)

Director : Prof. Dr. Wang Yin Chai

Established in 2007, the Centre of Excellence for Image Analysis and Spatial Technologies (IMAST) is one of two research centres anchored in the Faculty of Computer Science and Information Technologies, Universiti Malaysia Sarawak

OUR VISION

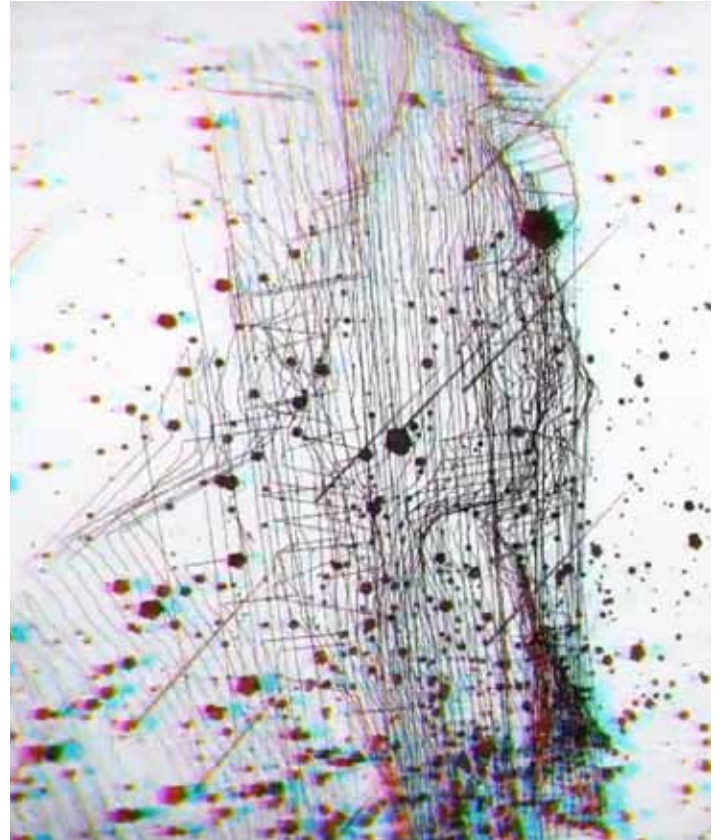
IMAST main vision is to be the leading and internationally known in Image Processing & Spatial Technologies research and consultation by providing innovative and creative solutions and services.

OUR AIM

IMAST promote research and consultation activities mainly specialise in Image Processing and Spatial Technologies fields. We also focus on development of software products with reliable and robust to provide high business values to our clients and hence meet their business objectives.

RESEARCH FOCUS

IMAST research focus is in the area of image processing, analysis and spatial technologies. The main research activities are related to Content Based Image Retrieval (CBIR), biometrics, medical images analysis, satellite images interpretation, spatial data acquisition tools, spatial visualisation, spatial modelling and analysis, spatial data mining, environmental and natural disaster, disease control and spatial related problem, and agriculture based management tools. The core expertise of IMAST is in the delivery of image processing based applications such as CBIR based search engine, satellite image interpretation for agriculture industries, spatial modelling and tools for planning, medical application related to disease control & monitoring and biometrics solutions which are of high commercial values.

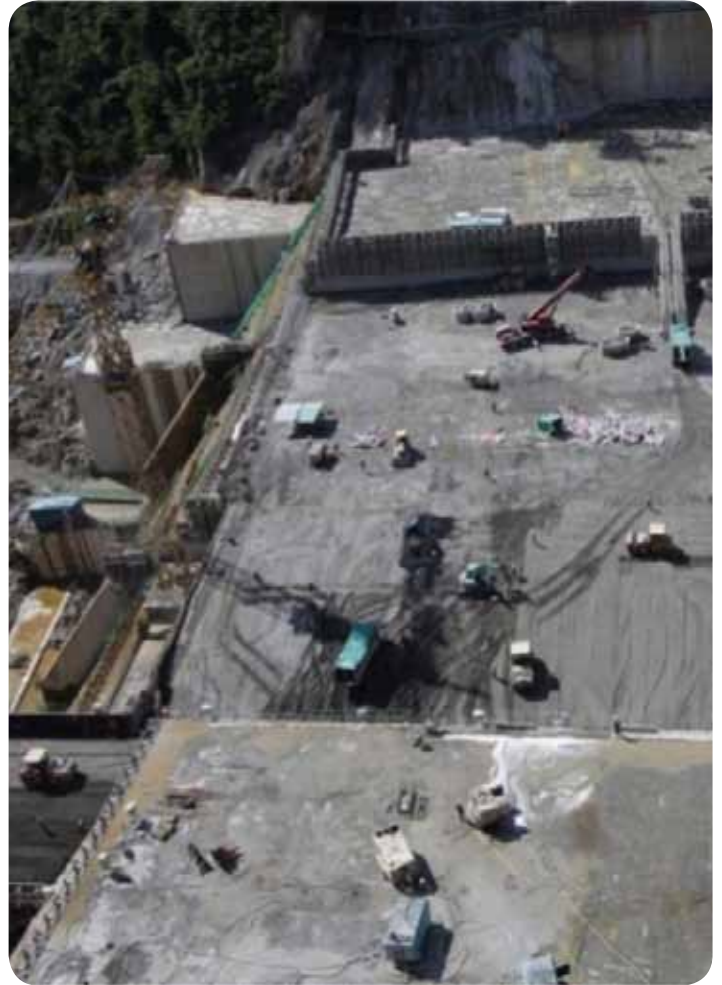
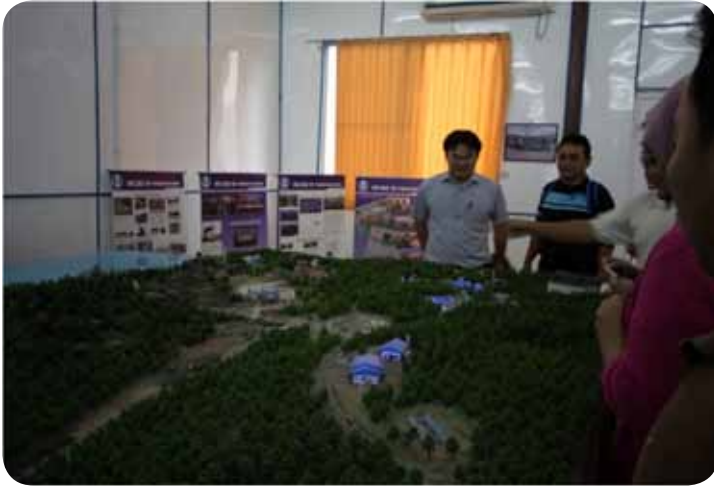


NATIONAL & INTERNATIONAL COLLABORATORS



ACTIVITY PHOTOS

Site Survey Trips



Project Meeting Scenarios



ACTIVITY PHOTOS

Software Training Sessions



Oil Palm Estates Site Surveys



Institute of Social Informatics and Technological Innovations – Centre of Excellence for Rural Informatics (ISITI-CoERI)

Director : AP. Dr. Alvin Yeo Wee

The Institute of Social Informatics and Technological Innovations - Centre of Excellence for Rural Informatics (ISITI-CoERI) was established in 2010 as part of UNIMAS' strategy to build upon its strength in Information and Communication Technologies (ICTs), particularly rural ICTs which encompasses the eBario Project. After the successful pilot of eBario, the UNIMAS has developed expertise in many focus areas, not only in Rural Informatics, but also Green Technologies, Rural Tourism, Education, ICT Development (ICTD) and ICT for Development (ICT4D).

RESEARCH ACTIVITIES AND ACHIEVEMENTS IN 2012

MoU Between UNIMAS and Polytechnic of Namibia

An exchange of MOU documents between Polytechnic of Namibia (PON) represented by Professor Dr Heike Winschiers-Theophilus, Director in School of Information Technology, PON and Universiti Malaysia Sarawak (UNIMAS) represented by Professor Datuk Dr Khairuddin Ab Hamid, Vice Chancellor of UNIMAS has taken place at Pullman Hotel, Kuching, on 30 November 2012.



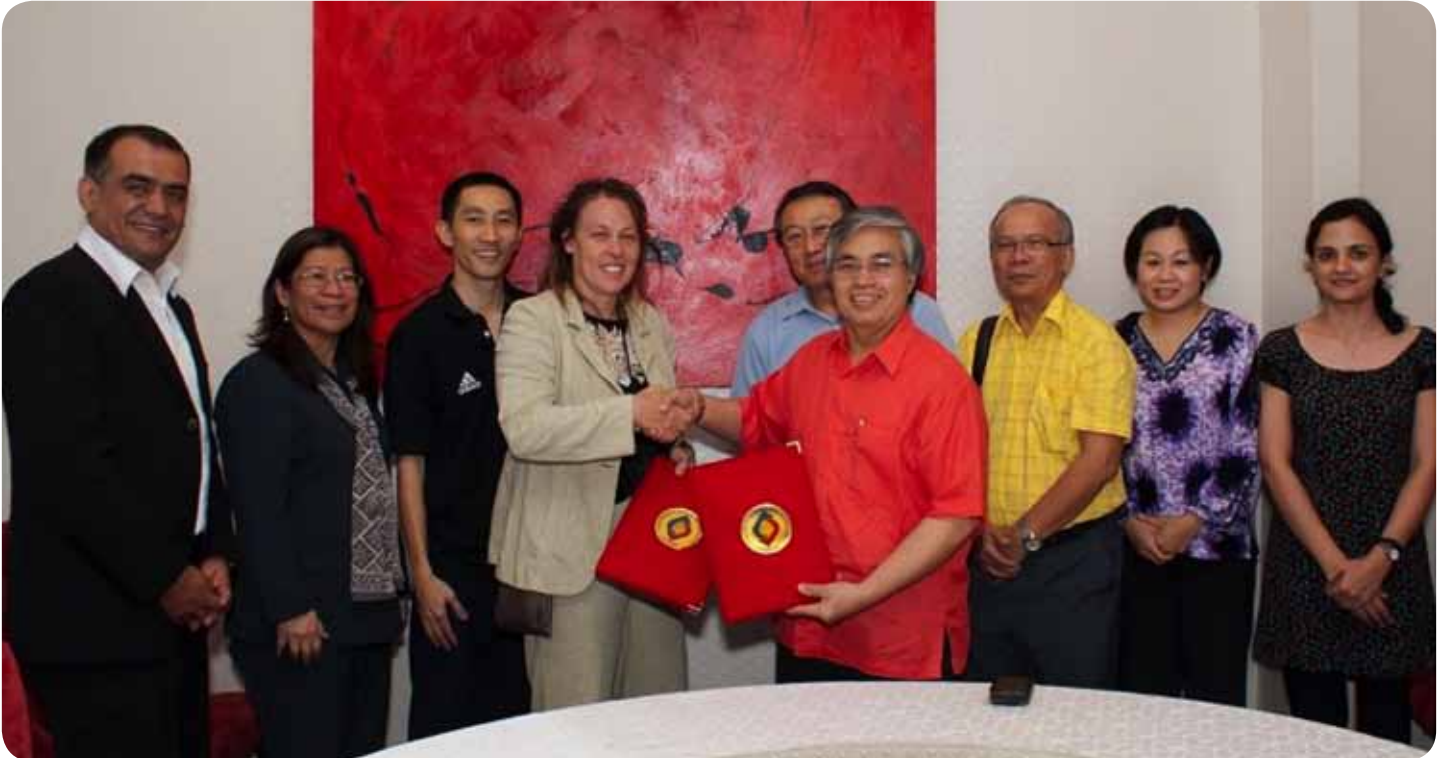
AWARDS

The ISITI-CoERI's project Ngerabit eLamai received Merit Award at MSC Malaysia APICTA Awards 2012.

Dr Alvin W. Yeo - Director of ISITI (left), Ezra Uda - Long Lamai community representative (centre), and Dr John Phoa - Lead Researcher (right)

VISITORS

In 2012, 45 national and international academicians, researchers and partners from industries visited ISITI-CoERI and the research sites of the Institute. The visiting scholars conducted 10 workshops and talks for the UNIMAS staff and Post Graduate students.



MoU exchange between Professor Dr Heike Winschiers-Theophilus (PON) and Professor Datuk Dr Khairuddin Ab Hamid (UNIMAS)



Professor Michael Cuthill from the University of Southern Queensland, Australia delivering his lecture to staff and students in ISITI-CoERI at FCSIT, UNIMAS.

PROJECTS

The Institute secured total grant of one million from the funding organizations and industries during 2012. The funding sources include Ministry of Higher Education for KTP and ERGS, ODA-Japan, and UNIMAS CoE grants.



Cheque handover ceremony by the Embassy of Japan (represented by Mr. Koichi Ito, Minister and Deputy Chief of Mission, Japan) to UNIMAS (represented by Professor Datuk Dr Khairuddin Ab Hamid, Vice Chancellor UNIMAS) for the Micro Hydro Electrification Project of the Remote Rural Area Penan Community at Long Lamai, Ulu Baram, Sarawak under the Grant Assistance for Grassroots Human Security Projects, Government of Japan at the University House on 8 Mac 2012



eTORO: Tools and Strategies for managing Penans' Indigenous Botanical Knowledge.



Today, the Penan of Long Lamai are living from farming, but still depend on the forest for hunting and for collecting various forest products.

They have a detailed classification system for wild plants and recognize many useful wild plants, but their use of knowledge is relatively simple and differs from that of other ethnic groups of Borneo. According to Sarawak Biodiversity Center (SBC) after performing the bioassays on the plants, that have been collected with the help of local communities, more than 35% have shown good activity against cancer cell lines when tested which is quite higher than the normal 10%.



RESEARCHERS

Tariq Zaman, AP Dr. Alvin Yeo Wee, Prof. Dr. Narayanan Kulathuramaiyer.

FUNDING

Universiti Malaysia Sarawak

REFERENCE NO.

02 (DPI06)/822/2011 (06)



TITLE

eTORO: Tools and Strategies for managing Penans' Indigenous Botanical Knowledge.

RESEARCHERS

Tariq Zaman, AP Dr. Alvin
Yeo Wee, Prof. Dr. Narayanan
Kulathuramaiyer.

FUNDING

Universiti Malaysia Sarawak

REFERENCE NO.

02 (DPI06)/822/2011 (06)

Like other indigenous communities the rapid change in the way of Penans' life has largely accounted for the loss of their Indigenous Knowledge (IK). Among other causes the reluctance of elders to transmit IK to uninitiated youth, and disenchanting youth seeking solutions to their needs from modern science in place of IK are significant.





IK is increasingly seen as positive way for problem solving and the digitisation of IK as a means of preservation and improving access to the knowledge is gaining increasing currency across the globe. However, databases alone do not provide adequate management system for IK. Database management and technology should only be seen as supportive elements or mechanisms in a wider system of IK governance. The IK governance includes observance and application of customary laws, the institutional authority and structures and collaborative activity mechanism of the community where technology can be embedded.

The eTORO project is a collaborative effort of Institute of Social Informatics and Technological Innovations (ISIT-CoERI), Universiti Malaysia Sarawak and local community of Long Lamai, Baram region, Sarawak. The concept of eTORO project is based on TORO, an activity based knowledge sharing and mentoring journey that links community elders to members of the younger generations in grooming future guardians of the rainforest. Mentoring includes lessons on livelihood combined with a notion of stewardship, incorporating conservation ethics and ownership. The eTORO project provides an activity based platform where the Long Lamai community is gathering and documenting the indigenous botanical knowledge with the help of modern ICT tools.



TITLE

eTORO: Tools and Strategies for managing Penans' Indigenous Botanical Knowledge.

RESEARCHERS

Tariq Zaman, AP Dr. Alvin Yeo Wee, Prof. Dr. Narayanan Kulathuramaiyer.

FUNDING

Universiti Malaysia Sarawak

REFERENCE NO.

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REFERENCE NO.

02 (DPI06)/822/2011 (06)

“The concept of eTORO project is based on TORO, an activity based knowledge sharing and mentoring journey that links community elders to members of the younger generations in grooming future guardians of the rainforest.”



The main objective of the project is to facilitate the community in preserving and transferring their indigenous botanical knowledge through proper documentation processes. The researchers from ISITI-CoERI worked with the community to explore specific needs of the community, to design the cultural protocols and develop ICT tools for Indigenous Botanical Knowledge Management (IBKM). To clarify the roles and responsibilities of the stakeholders, process flow diagrams for the project have been developed with active participation of community. Local facilitators are actively involved in data instrument design, collection, and analysis. The project argues that information technology professionals need better understanding of why and how community manages their IK, and then use this understanding as a basis for technology based IK management systems development. The methodology that is developed for eTORO project is of value to others who work with IK domain in indigenous communities whose literacy, social, cultural, spiritual logic and values profoundly differ from others.

TITLE

eTORO: Tools and Strategies for managing Penans' Indigenous Botanical Knowledge.

RESEARCHERS

Tariq Zaman, AP Dr. Alvin Yeo Wee, Prof. Dr. Narayanan Kulathuramaiyer.

FUNDING

Universiti Malaysia Sarawak

REFERENCE NO.

02 (DPI06)/822/2011 (06)

CoMo@UNIMAS

The Department of Computational Science and Mathematics at the Faculty of Computer Science & Information Technology, UNIMAS, was established in 2007. That year marked the year where the faculty had undergone departmentalization upon directive from UNIMAS top management. Every department should offer at least one undergraduate programme and must work on at least one research niche area. Based on the strength then, the department main research contribution falls into the mathematical modeling area. To date, the department has completed four projects with five sources of research grants producing one PhD and four Masters Graduates. Now, with the department getting stronger with one associate professor, five senior lecturers and five lecturers, the department has ten active funded research projects, seven PhDs and five MScs on-going students. As most of the research works done are essentially modeling involving in the construction of mathematical models, then during the faculty's research roadmapping exercise, it was decided that this research group is re-named as the Computational Modeling (CoMo) group forming an integral part of the department. Researches by the CoMo group involve the constructing of models that represent complex real life problems, the application of qualitative and quantitative analysis techniques to study such problems, the use of computers to solve the problems, as well as ensuring that the problem solving strategies are validated.

The projects that are completed and near completions are highlighted here.

PROJECTS HIGHLIGHTS

1.0 MATHEMATICAL MODELING OF THE TRANSMISSION DYNAMICS OF MALARIA

RESEARCHERS

Cynthia Kon Mui Lan and
AP Dr. Jane Labadin

GRANT

UNIMAS Small Grant Scheme
02(S34)/691/2009 (07)

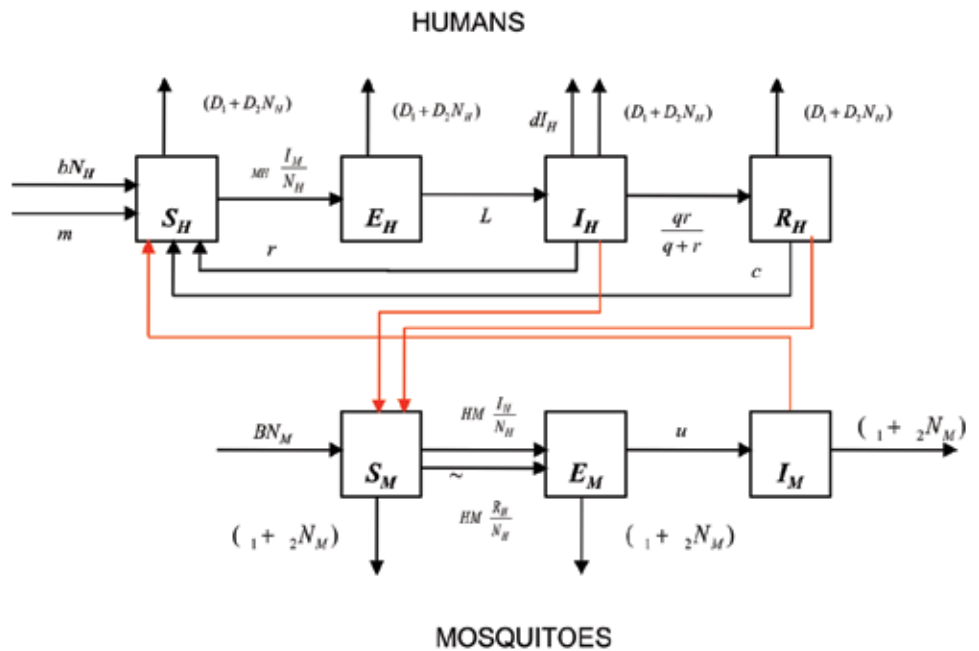


Fig. 1: Malaria Compartmental Model: Malaria with acquired immunity

This research focuses on the development of appropriate compartmental models to describe the transmission dynamics of malaria. The model incorporates recovery with and without immunity. One of the findings of this research is that if the duration of recovery is short enough, malaria can be eradicated from the population. Thus, early detection and prompt treatment of patients are essential to combat malaria.

2.0 PREDICTION OF OIL AND GAS RESERVOIR PROPERTIES USING HYBRIDS AND ENSEMBLES OF ARTIFICIAL INTELLIGENCE TECHNIQUES

Petroleum reservoir characterization, the prediction of petroleum reservoir properties, is a process for quantitatively describing various reservoir properties in spatial variability using available field data. It plays a crucial role in modern reservoir management by helping to make sound reservoir decisions and improving the asset value of the oil and gas companies. Among all the properties of petroleum reservoirs, porosity and permeability are most important as they relate to the amount of fluid contained in a reservoir and its ability to flow. These properties have a significant impact on petroleum field operations and reservoir management. The Artificial Intelligence (AI) techniques that have been used to predict these properties include Radial Basis Function, Functional Networks, Support Vector Machines, Artificial Neural Networks and Adaptive-Neuro-Fuzzy Systems. Following the No-Free-Lunch theorem, none of these techniques could be identified as the best since they exhibit their respective strengths and weaknesses in different data and operational conditions. In order to improve the performance of these techniques, hybridization and ensemble of these techniques have been proposed.

Hybridization is the combination of two or more AI techniques to produce a new single technique with improved capability. This research seeks to investigate the integration of Functional Networks and Decision Trees into hybrid techniques that will improve the overall performance accuracy and explore how the existing hybrid and ensemble models in literature can be improved further through more efficiently-tuned parameters and better integration strategy. To achieve these aims, a number of core, log and seismic datasets have been used to train, test and evaluate these models using standard evaluation criteria: Correlation Coefficient and Error Measures. Execution Times have also been used for further and extended evaluation in terms of speed of execution. The general framework of feature selection based hybrid models is shown in Fig. 2.

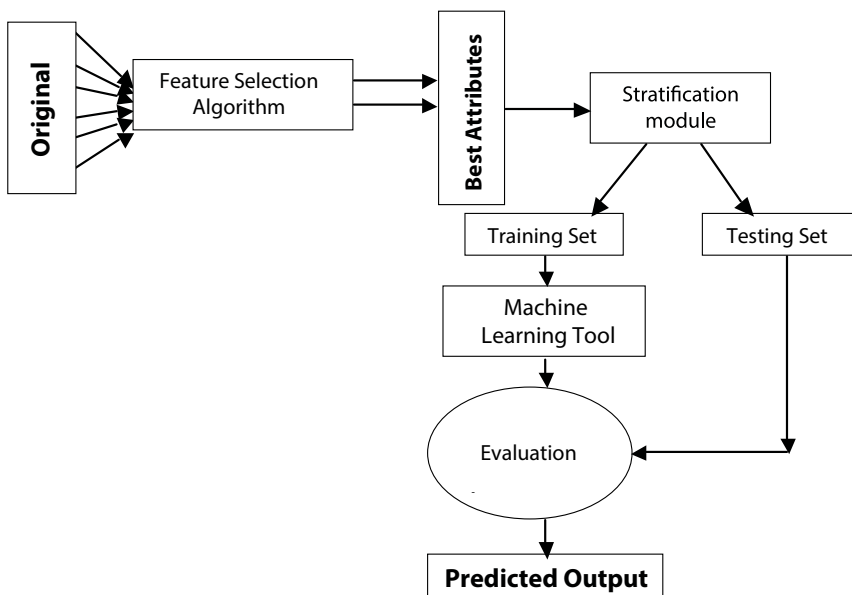


Fig. 2: The general framework of feature selection based hybrid models

RESEARCHERS

Fatai Anifowose and
AP Dr. Jane Labadin

3.0 WEB ALGORITHM SEARCH ENGINE BASED NETWORK MODELING OF MALARIA TRANSMISSION

RESEARCHERS

Monday Eze Okpoto, AP Dr. Jane Labadin and Terrin Lim

This research involves the application of contact network modeling to tackle the problem of malaria transmission, from the angle of vector detection. A number of conventional approaches to disease modeling make some unrealistic assumptions. One of such is the assumption that there is always a uniformity of contacts in a transmission environment (or population). It has however been established that there is usually differential level of contacts or affinity between the infection agents in a disease transmission environment. Contact network modeling captures this variation in degree of contacts, unlike the conventional approaches.

This research builds a contact network using the disease transmission determining factors, which are important attributes of the public places, the human beings, and the malaria vectors. Fig. 1.3F shows a diagram of a simplified contact network. In the diagram, {P1, P2...} is the set of the public places, while {H1, H2,...} is the set of the human beings, while {e1, e2,...} is the set of edges.

As shown in the diagram, the resulting contact network formalized in this research is heterogeneous bipartite network, with node types as the public places and the human beings. These human beings are those who have suffered from malaria in the past. In the annotated diagram, the malaria vectors are represented as a series of asterisks, while their role as the disease vectors is taken care of in the actual model.

A web search algorithm was equally developed, and the contact network was used as the input (search space). The research hence, detects and ranks the public places in terms of their estimated level of vector density. This is the measure of population of infected malaria vectors.

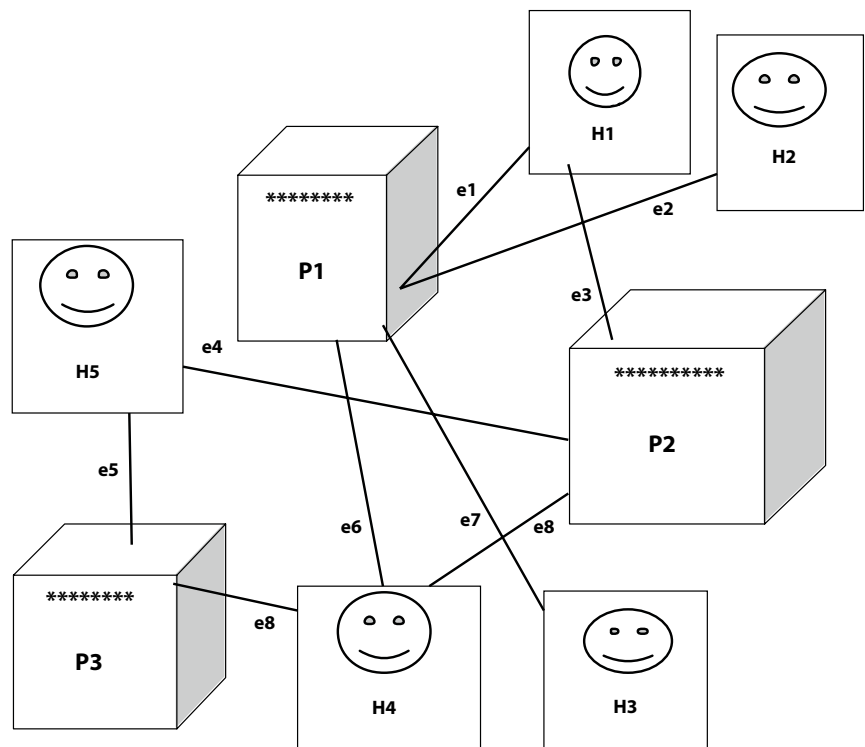


Fig. 3: Simplified Contact Network for Malaria Transmission Modeling

GRANT

MOHE FRGS/2/10/SG/
UNIMAS/02/04

4.0 COMPUTATIONAL MODELING AND SIMULATION OF EHD ION-DRAG MICROPUMP FOR OPTIMUM PERFORMANCE

The electrohydrodynamics (EHD) ion-drag micropumps are based on the interaction of electric and hydrodynamic fields with electric charges injected into a dielectric fluid. This kind of pumps is the active components of many microelectromechanical systems (MEMS) used to deliver and manage small quantities of fluids in a precise manner. As the size of such electronic devices is shrinking, the performance of micropumps in terms of achieving maximum pressure output and flow rate is required. However, the development of complex designs involves difficult fabrication process and expenses. The numerical simulation of ion-drag micropump provides insight into the behavior of the different phenomena which can be difficult to achieve from experimental results.

The overall aim of this research is to do a flow simulation study using computational models and to investigate a design of ion-drag micropump with improved performance. To achieve this goal a simplified numerical algorithm was modeled as a set of EHD governing equations derived from Maxwell's general quasi-static electromagnetism equations and fluid flow conservative equations with proper boundary conditions. To obtain the numerical solution a commercial finite element method based software COMSOL Multiphysics was used and the electrostatics and fluid flow equations were coupled. A three-dimensional segment of the microchannel of a prototype design of ion-drag micropump with planar emitter and micropillar collector was simulated. The pressure and velocity distribution at the outlet and in the entire domain of the micropump was obtained numerically (Fig. 4).

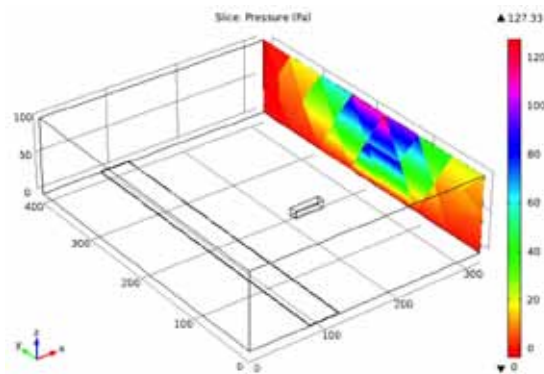


Fig. 4a: Local pressure field distribution at the outlet

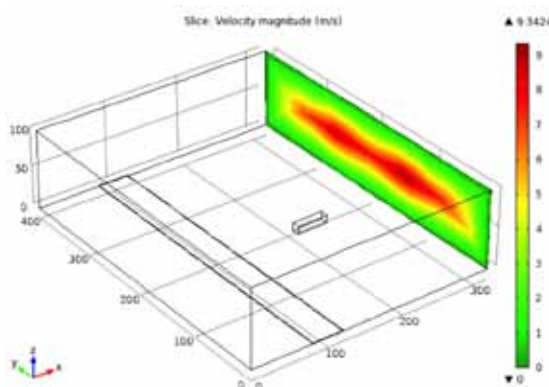


Fig. 4b: Local velocity field distribution at the outlet

Then the performance of micropump was analyzed by varying the various design parameters such as, the effect of the gap between the emitter and the collector electrode, width and the height of micropillar and flow channel height. It was found that the performance of micropump could be improved by decreasing the height of micropillar and the gap between both electrodes. The numerical results also show that a maximum pressure head of about 2350 Pa and maximum mass flow rate 0.4 g/min at an applied voltage 1000V is achievable with the proposed design of micropump. These values of pressure and flow rate can meet the cryogenic cooling requirements for some specific electronic devices. Finally, the optimized design was compared with existing experimental results and found that output pressure showed fairly good agreement with experimental data.

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5.0 MODELING OF DIELECTRIC BARRIER DISCHARGE PLASMA ACTUATOR

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Dielectric Barrier Discharge (DBD) is a plasma actuator. Plasma is an ionized fluid, where the amount of the charged particles or ions is sufficient enough to alter the physical properties of a fluid. A plasma actuator is a system or mechanism which produces plasma artificially. It was originated as a method for ozone production. DBD configuration is where two or more electrodes are arranged and insulated by a dielectric material, and a high voltage of alternating current (mainly 5 to 20 kV) is applied to at least one of the electrodes. This configuration will produce a plasma discharge. One of a DBD configuration is as shown in Fig. 5.

This study focuses on modeling mathematically surface plasma discharge layer. There are two models needed in order to simulate the plasma discharge of DBD; the electrostatics and fluid flow models. The Suzen and Huang's electrostatics model is adopted where the model were derived from Maxwell's equations. As for fluid flow model, it is derived from the Navier-Stokes equations. Using both of these models, the plasma discharge of the DBD can be simulated and analyzed.

In this study, it was noticed that the Suzen and Huang (2006) is time-independent. One of the characteristics of the DBD is it performs under the alternating current, which is time-dependent. Hence, modification of the existing model is required, resulting in the development of the two systems: the spatial system and the spatial-temporal system. Both numerical results of the systems are implemented and analyzed. It is noticed that both system produce similar results which indicates that the earlier formulated time-independent models actually is sufficient to model the problem. Then, the sensitivity analysis is conducted to certain DBD parameters in order to study the performance of the DBD as a plasma actuator. This study concluded that some parameters do affect the DBD plasma actuator.

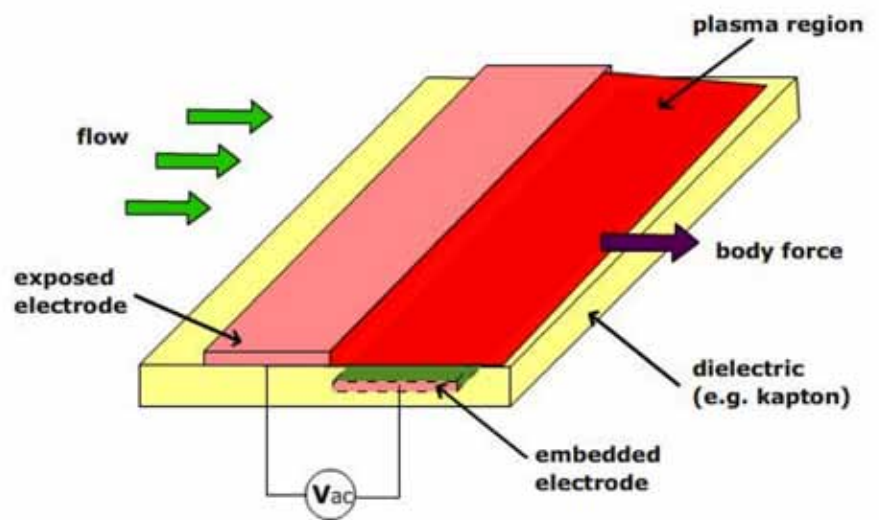


Fig. 5: Surface DBD configuration

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6.0 SIMULATION OF PLANT SUCCESSION SUBJECT TO SALINITY AND CLIMATE CHANGES

Succession is a change in the type of plant species that occupies a certain area over time. It involves the processes of colonization, establishment, and extinction that act on the participating plant species. This study focused on the simulation and understanding of plant succession subject to salinity and climate change. The simulations are performed by means of the MANHAM model developed in a previous study. The objective of this study is to understand the effects of diffusion and precipitation on the distribution of mangroves and hardwood hammocks. This allows us to understand the characteristics of the vegetation and its relationship with neighboring vegetations.

Sensitivity analyses are performed to investigate the diffusion and precipitation rates that would cause the vegetation to shift. Higher diffusion rate would allow strong lateral movement of salinity among cells due to water uptake by plants in the neighboring cells, resulting in reduced clusters of mangrove at higher elevation cells (Figure 1).

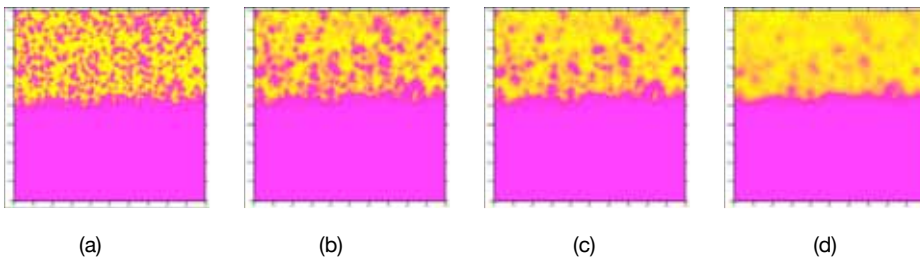


Figure 1: Distribution of hammocks (yellow) and mangroves (pink) without storm surge, with a diffusion parameter of (a) 1.5 cm²/day, (b) 7.5 cm²/day, (c) 10.5 cm²/day, and (d) 20.5 cm²/day.

Meanwhile, higher intensity of precipitation would allow the hardwood hammocks to recover from a large scale salinity disturbance induced by tsunamis or hurricanes (Figure 2). When precipitation is increasing, the effects of the storm surge are rigorously decreased. Salt deposits from the storm surge are washed away by the amount of precipitation (Figure 3).

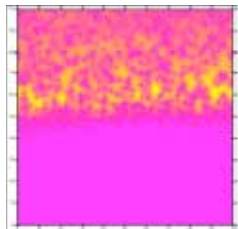


Figure 2: The distribution of hardwood hammocks (yellow) and mangroves (pink) after 19,000 days, with heavy storm surges.

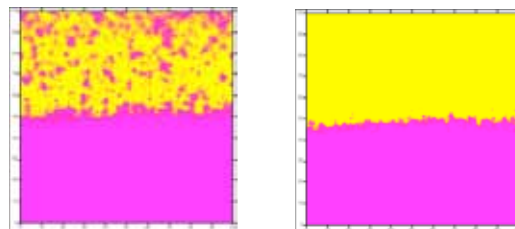


Figure 3: Distribution of hammocks (yellow) and mangroves (pink) with a storm surge (a) at 5% more precipitation mean than the original data, and (b) 10% more precipitation mean than the original data.

Simulation results indicate that diffusion rate can significantly affect the distribution of the competing vegetation. As the diffusion rate increases, the number of mangrove clusters at higher elevation cells decreases. Intensity of precipitation plays an important role in the competition between hardwood hammocks and mangroves. During unstable environment condition with storm surges induced by tsunamis or hurricanes, mangroves will take over the whole study domain. This situation becomes worst during the dry season with lower precipitation rates when there is not enough rainfall to wash out all the deposited salt from the surge. However, during the wet season with higher precipitation rates, hardwood hammocks are able to recover from the surge because the rain helps to flush out the deposited salt.

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7.0 MODELLING CARBON DIOXIDE EMISSIONS IN ASEAN COUNTRIES USING MULTIPLE REGRESSION

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Carbon dioxide (CO₂) is emitted into the atmosphere naturally through the carbon cycle and through human activities, associated primarily with the combustion of fossil fuels. Emissions of carbon dioxide are responsible for the enhanced greenhouse effect, resulting from the increasing concentrations of CO₂. The increase in global temperature is leading to a natural phenomenon called global warming. The impacts primarily related to climate change are the long-term sea level rise, higher frequency of tropical storms and alarming rate of cardiovascular and respiratory disease. If the warming continues to take place, some impacts such as hurricanes and other powerful storms are most likely to become stronger. Other extreme climatic events that will possibly become more common are floods and droughts. Several parts of the Association of South East Asian Nations (ASEAN) countries are suffering from the growing incidence of vector-borne diseases such as dengue fever and malaria due to changes in temperature.

There are two main objectives in this research. The first is to examine the interrelationship between carbon dioxide emissions and factors such as energy consumption, gross domestic product (GDP), carbon intensity, energy intensity, population, crop production index and income group in ASEAN countries. The second is to investigate the effect of interactions among the influential factors in the background. Therefore, it is necessary to build a model that is further refined to incorporate additional parameters and variables, with interactions, for examining carbon dioxide emissions.

Stepwise multiple regression models are developed using seven indicators and the generated interaction variables are also included in the entire possible models. There are four main phases involved, namely data collection and preparation phase, model identification and estimation phase, model refinement and selection phase, and model validation phase. These four main phases are summarized as an algorithm of regression model-building. The process starts with data collection and preparation phase. Data preprocessing is conducted to evaluate the quality of the data while Mahalanobis distances and plots are used to identify gross data errors as well as extreme outliers. The next step is the model identification and estimation phase. Diagnostics are employed to identify the relationships and important interactions between the dependent variable and independent variables. It is also useful to identify influential outlying observations and multicollinearity source variables. Subsequently, model refinement and selection phase is performed to investigate curvature and interaction effects more fully. Overall significance test, individual significance test, Wald test and goodness-of-fit test are conducted to obtain appropriate regression models. After thorough checking, it is important to assess the validity of the selected models through model validation phase. This phase can be used to help decide upon a final regression model based on various model selection criteria and to determine how well the model will perform in practice by using mean absolute percentage error.



Predicting Software “Quality in Use” from Software Reviews

Nowadays there are many e-commerce web sites that customers can use to review products or services. These reviews are rich in information and can be utilized by other customers to acquire new products. However these reviews are usually lengthy to be understood by customers. Opinion mining and sentiment analysis can be utilized to process such type of review text. We propose a novel approach on software reviews to predict software “quality in use” as modeled by ISO/IEC 25010:2011[1].

The Quality in use model is sub-model of the ISO 25010 Systems and Software Quality Requirements and Evaluation (SQuaRE) model which consists of five characteristics related to outcomes of interaction with a system: effectiveness, efficiency, satisfaction, freedom from risk and context coverage. In our context of opinion mining features are software properties that describe software quality in use such as “conform” to describe satisfaction characteristic and “resource” to describe software efficiency. Opinion words are phrases that describe subjectivity of users “like/dislike” software product such as the sentence “protection without worry” to indicate a positive polarity.

To our knowledge little research has been published in software reviews opinion mining. Mining software reviews can save users time and help in software selection process which is time consuming. The work of Leoppairote et al. [2] provides an approach to mine software reviews based on ontology mining and rule-based classification for ISO 9126 model. Shein et al. [3] propose to use SVM and Formal Concept Analysis (FCA) modified ontology to classify sentences but the work does not have any experiment. Although extracting features has been studied extensively in various domains many grouping and summarization approaches are domain dependent (dictionary based) or hard to cover (corpus based).

We propose a novel approach to extract and summarize software reviews in order to predict software quality in use. In the extraction phase, we employ Qiu[4] method to extract features and opinion words. Qiu method is a semi-supervised learning technique (seeded with opinion words) that extracts features and opinion words based on predefined syntactic relations. In the summarization phase, we use a semi-supervised learning approach to group software quality features presented in reviews in order to estimate software quality in use. The semi-supervised learning uses labeled data (seeds of keywords from ISO 25010) and unlabeled data (extracted features) to learn new classifiers (new feature group or cluster). We choose to use The Expectation Maximization(EM) [5] in our summarization phase.

EM is class of iterative algorithms that uses maximum a posteriori to estimate a new classifier. EM is based on two steps known as the E-Step (Expectation) and M-Step (Maximization). In our work, the initialization of the EM algorithm will be features and opinion words extracted using Qiu algorithm. Assuming features and opinion words are available from Qiu model, we propose a modified version of EM presented in [6] to group related software features and map them to software quality in use characteristics. Finally we score quality at the software level by aggregating polarity of related grouped software characteristics.

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Formal Fuzzy-Based Approach to Model the Abstract Values of Beliefs to the Consequences (FRGS)

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The idea of this research is to define the relationships between these abstract objects (beliefs) and its consequences and to define a framework used to evaluate that a particular belief is a caused to the consequences. The framework is expected to be used to preserve the knowledge or logic behind the remote communities beliefs which consists of a complex body of knowledge. This will be carried out by formally define the relationships between a set of belief and a set of consequences. In traditional propositional logic, the consequence is measured on either it is happen or not this is represented as true or false, [0,1]. However, in the real world the impact of the consequence is measured based on the “degree of truth”. This will be represented by using fuzzy logic. A fuzzy set is a pair of (B, C) where B is a set of belief, and C is set of consequences, and $C : B \rightarrow [0,1]$. For each $x \in B$, $D(x)$ is called the degree of impact of x in (B,C). For a finite set $B = \{x_1, \dots, x_n\}$, the fuzzy set (B, C) is often denoted by $\{D(x_1) / x_1, \dots, D(x_n) / x_n\}$. Let $x \in B$, then x is called not included in the fuzzy set (B,C) if $D(x) = 0$, x is called fully included if $D(x) = 1$, and x is called a fuzzy member if $0 < D(x) < 1$.

The expected outcome from this research is a new formal fuzzy logic model of beliefs and consequences of indigenous community cultures, and a prototype of the beliefs and its consequences. The research is still at its initial stage (see Figure 1), currently the researchers are in the process of data collection. The data collection is carried out in different areas in Sarawak. The samples were remote community leader or spiritual leader. They were selected based on their knowledge about community laws, cultures and beliefs.

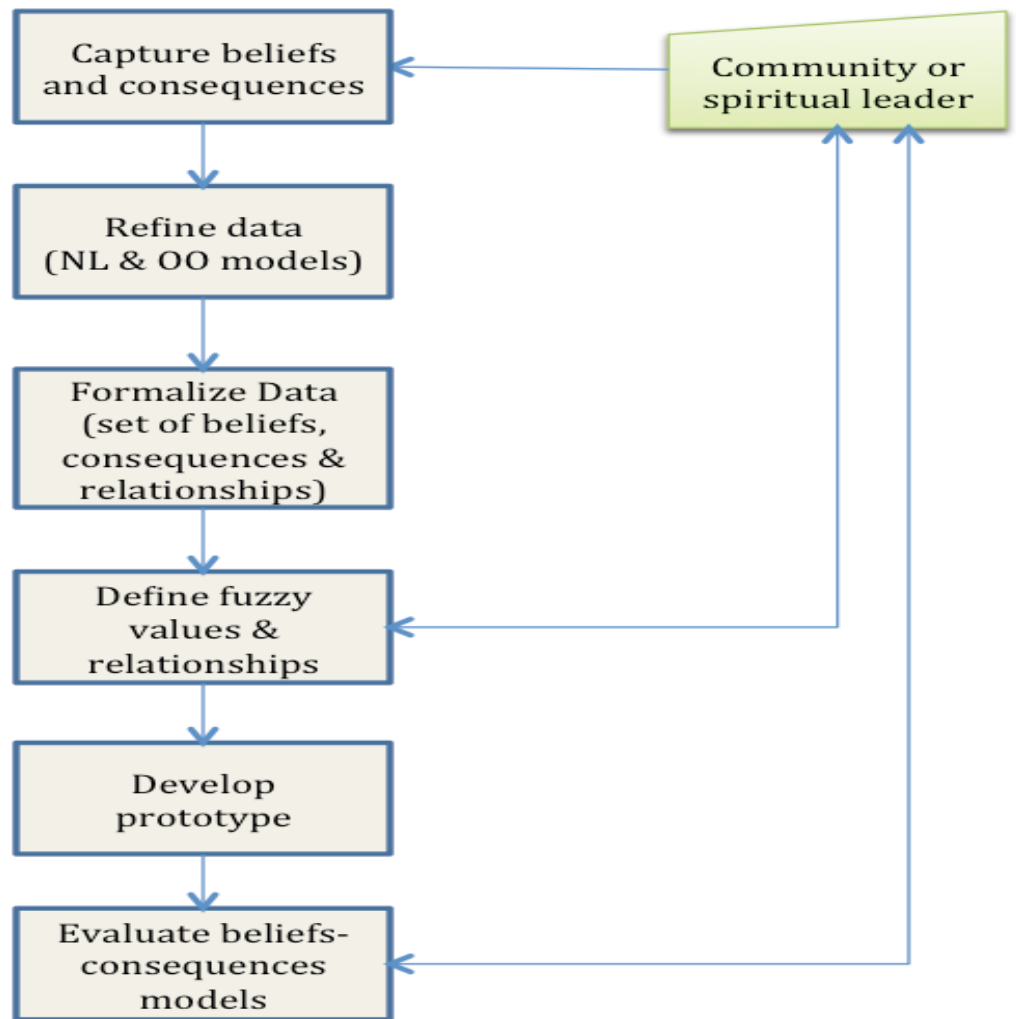


Figure 1. Research methodology

Landmark-based 3D Facial Analysis Using Statistical Methods

The aim of this research is to determine, experimentally, a set of anatomical landmarks that contains high facial information and best describe facial expressions effectively, which may be useful for facial expression analysis and recognition. The quantitative analysis of facial features will be done using a collection of 3D face surface data sets of real human. Anatomical landmarks are points that have unique identifiable place on the face for example, the corner of the eyes and the tip of the nose. Those points can be located easily regardless of the orientation of the face. The landmarks may be independent of any coordinate system or dependent of a particular orientation or a coordinate system. The choice of landmarks will be selected based on craniofacial anthropometry and Action Units in Facial Action Coding System (FACS) framework. Each of the 3D face is annotated with the same set of chosen landmarks. The spread and the variance of those landmark points on different subjects and facial expressions will be statistically studied and analysed.

Most of the face analysis applications have not gone through a thorough study in the process of placing landmarks and verifying the effectiveness of the landmark placements. Their landmarks are selected and placed on facial muscles based on the FACS framework. However, their work do not verified if those landmarks have correctly characterised facial muscles activities. The issues in landmarking led us to the following research questions: (i) Which landmark placements have the maximum face and facial muscle motion information? (ii) Is it adequate to only use craniofacial landmarks? (iii) How are the landmarks based on the facial muscle selected? (iv) Is the error between corresponding landmarks minimal when repeating similar landmarking processes on other faces? We propose to use variance, standard deviation, regression and Principal Component Analysis (PCA) methods.



Figure 1: 2D image



Figure 2: 3D face surface

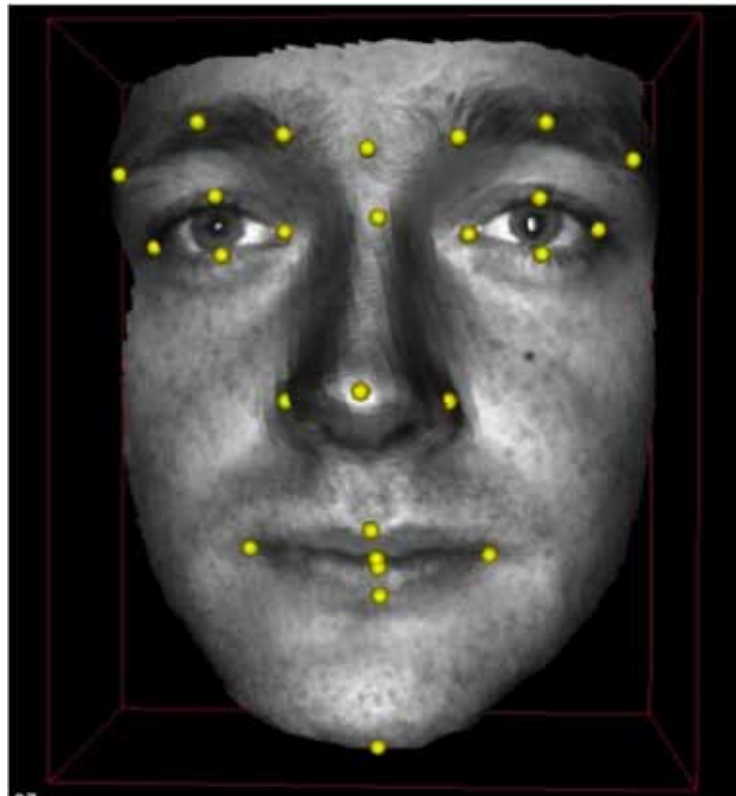


Figure 3: Sample of landmark points

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Synthesizing Neutral Facial Expression on 3D Face Surfaces

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This research looks at a new approach to synthesize neutral facial expression on 3D face surfaces of real data sets of people. Multivariate statistical analysis approach is proposed to derive a method to neutralise all facial expressions. The main challenge of this research is to neutralise facial expressions especially those with opened mouth and/or jaw dropped. The opening of mouth and dropping of jaw are generated during articulations, or while expressing extreme emotional expressions, such as laughing or surprise. These expressions not only deform the facial muscles, but also the mandible, causing the geometric shape of the face to change. The facial expression neutralisation experiment will be carried out on two 3D face data sets; (1) Imperial College London and (2) Binghamton University - 3D Facial Expression Dataset (BU-3DFED).



Figure 1: Imperial college London 3D face data preprocessing.



Figure 2: A sample of BU-3DFED data set.

The benefits of the facial expression neutralisation are: (i) To increase the performance of face recognition systems; (ii) To improve neutralisation of facial expression that would effectively decouple the identify and expression changes; (iii) To capture subtle person-genders for gender classification; (iv) To serve as an add-on to existing aging systems in identifying person of specific ages.

Expected outcome of the research is as illustrated in Figure 3.

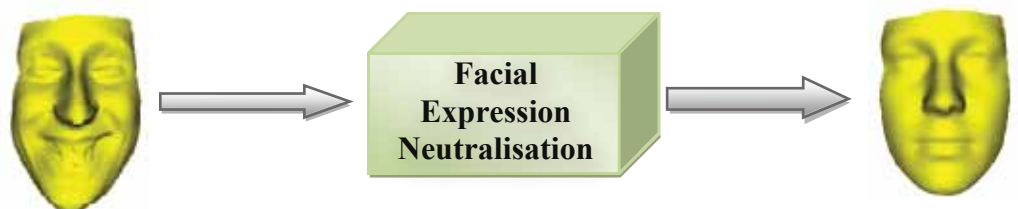


Figure 3: A sample of BU-3DFED data set.

We will also consider the evaluation of the accuracy and the computational complexity of the method.



Automatic Landmarking on Digital 2.5D Face Images Using SIFT

Finding the correct position of facial landmarks is a crucial step for many face applications. We are interested in locating precise landmark location in 2.5D face images. There are numerous algorithms proposed for facial landmark location, however most of these systems need manually annotated landmarks by human. Manually annotating landmarks is a tedious and time consuming task. Therefore, it is the aim of this research to automatically locate the facial key-points, such as the tip of the nose, corner of the eyes and corner of the mouth. We proposed to use Scale Invariant Feature Transform (SIFT) and localisation methods. Our approach starts from the consideration that just a few fiducial points of the face to be automatically identified with sufficient robustness across different individuals.

The pipeline for automatic landmarking approach follows three main stages (in Figure 1.0); feature extraction, localisation and registration. Feature extraction is known as a process of extracting features patches from the face data. The extracted feature vectors from the SIFT descriptors will be analysed and a set of generalised threshold values to exploit the local characteristic of the face will be computed. Figure 2.0 illustrates the computed SIFT descriptors of a face.

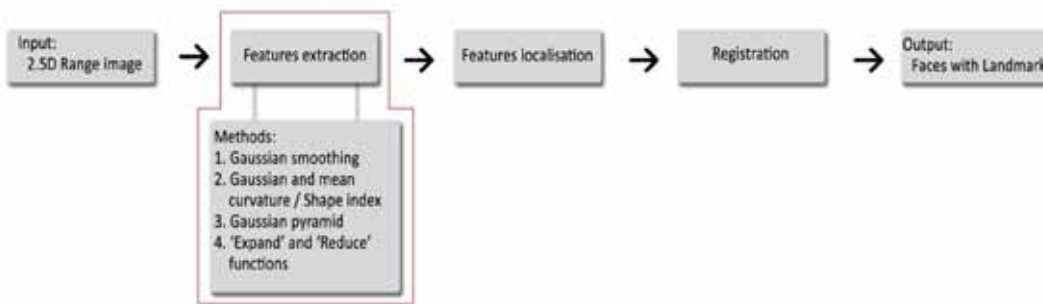


Figure 1.0: A proposed pipeline for automatic landmark process

Localisation is to calculate the precise key-points computed from the local SIFT descriptors to describe the characteristics of the face. Registration is a process to map registered images onto a template containing the requested landmark point.

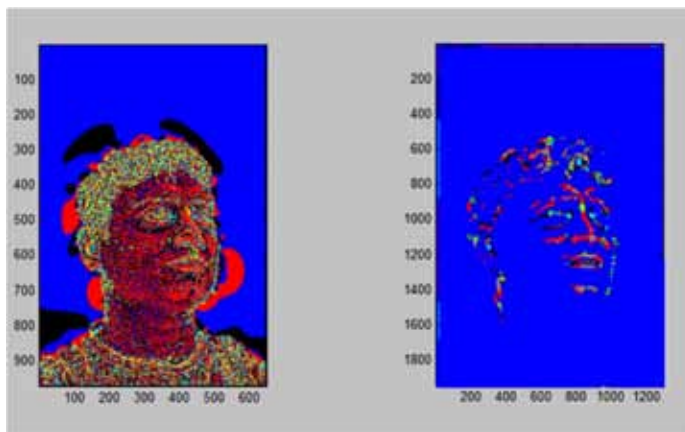


Figure 2.0: Feature extraction using SIFT approach

The approach grounds on two main contributions: (i) a solution to automatically detect facial key-points (ii) a set of generalised threshold values on local based description of the face that computes SIFT features. By using SIFT method, we would be able to accomplish implementation of an automatic facial feature extraction and landmarking from 2.5D range images.

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Improving Routing Algorithm based on Data Priority and Localization Techniques

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This research will focus on improving a Shortest Path Priority based Routing algorithm in Wireless Sensor Network with localization system. This research also designs an algorithm to monitor network performance under different environment circumstances (such as heavy rain, storm, lightening and etc) and identify the broken nodes in order to offer reliable communication platform.

Four Radio Nodes (eKo node) within 300 meter distance, which were linked with Soil Moisture and Ambient Temperature sensors were deployed in a paddy field as shown in Figure 1. These sensors were able to measure relevant reading and send it back to server or base station. Each node was deployed with diverse distance from Base Station and it was placed 5 feet above from ground surface to avoid resistance. These sensor nodes worked on solar and build in batteries, which allow long network life. They only need 1-2 hour per day of sunlight exposure to charge their batteries.

They use a 2.4GHz ISM band network and work on mesh topology to perform communication, which mean each node maintain two route towards BS as route one directly connected to BS and second route via middle nodes to avoid any communication collapse or delay. Eko node use XMesh low power network protocol to allow plug-and-play network capability.

The main purpose of this implementation was to find out communication performance and gap among various nodes under variable circumstances. Due to lack of physical infrastructure such as Weather Monitoring System, we were unable to monitor the signal strength under various weather changes. Whereas, the communication works properly within small network for small data size, and the data traffic were not congested due to less sensor nodes.

We also found out that the routing protocols are unable to detect physical hardware failure problem over networks which cause lost of huge data. The implemented infrastructure use manual system for localization, which does not provide accurate and reliable node location. The results showed that eko node use high battery consumption and the network only can stand due to solar batteries.

The design and improvement will be done by using simulator to analyze the routing protocol performance with more nodes and enhance the current protocol to offer reliable communication platform.

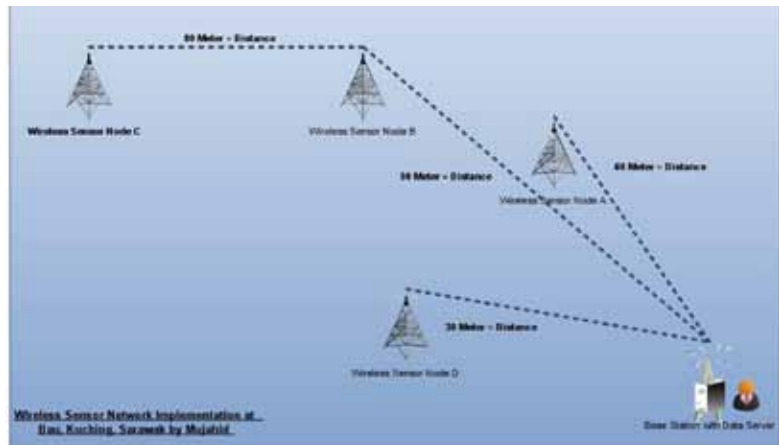


Figure 1: Wireless sensor network topology as deployed in Bau paddy field.

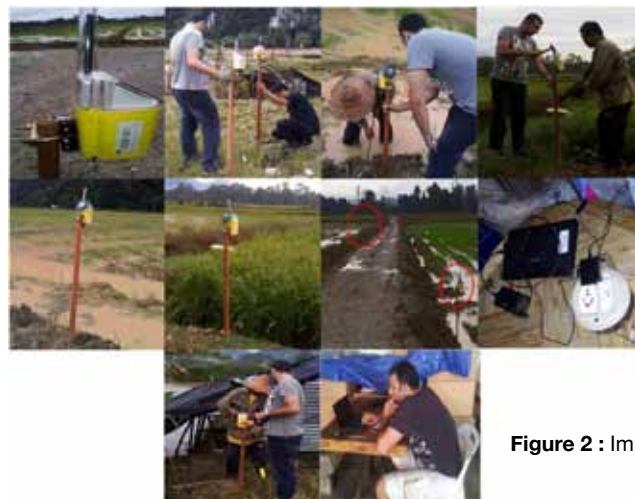


Figure 2 : Implementation Pictures



Evaluation and Protocol Design to Support High Speed Node in Mobile Wireless Sensor Network

1. Problem Statements

Mobility has an important role in different applications of Wireless Sensor Networks. Sensor nodes can be attached to the fast moving vehicles/animals/objects etc., in environments like battlefield, earthquake and floods. The current IEEE802.15.4 is normally used for static sensor nodes but can also support weak mobility nodes and the maximum coordinator coverage area is 100m. When the mobility increases the quality of the established link decreases. In strong mobility the mobile node has difficulty to start the transmission of data because MWSNs requires fast identification process but the current protocol has lack of any fast identification process. In this research proposal we focus on how to enhance the performance of IEEE802.15.4 protocol without decreasing the throughput and data delivery ratio.

2. Research Objectives

The proposed research aims to improve the performance of IEEE802.15.4 in strong mobility.

- To understand the phenomenon of wireless sensor networks regarding node mobility and evaluation of IEEE802.15.4 MAC protocol in mobility.
- Enhance the performance of IEEE802.15.4 MAC protocol to support strong mobility without decreasing the throughput and data delivery ratio.
- To design fast node identification process, synchronization and soft handoff for enhanced IEEE802.15.4 using network simulators NS2.

3. Solutions

- The IEEE802.15.4 MAC protocol will be simulated in NS2 for performance evaluation with strong mobility.
- Node association process will be enhanced with proposed techniques to support high speed mobile nodes. See Figure 1
- Node synchronization process will be enhanced with proposed technique to support strong mobility. See Figure 2
- Soft handoff scheme will be proposed to enhance IEEE802.15.4 performance to support strong mobility.

4. Expected Outcomes

Strong mobility is the most important issues in MWSNs but designing a mechanism for fast moving node is critical in MWSNs. In this research we focus on fast moving nodes using IEEE802.15.4 MAC protocol with proposed techniques. The expected outcome of this research is to get strong mobility and improve the performance of IEEE802.15.4 MAC protocol in MWSNs.

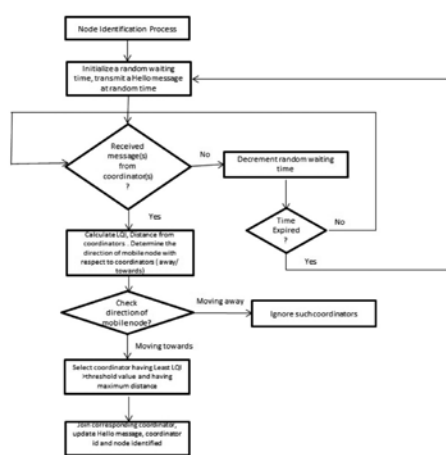


Figure 1: Proposed technique to enhance association process of IEEE802.15.4.

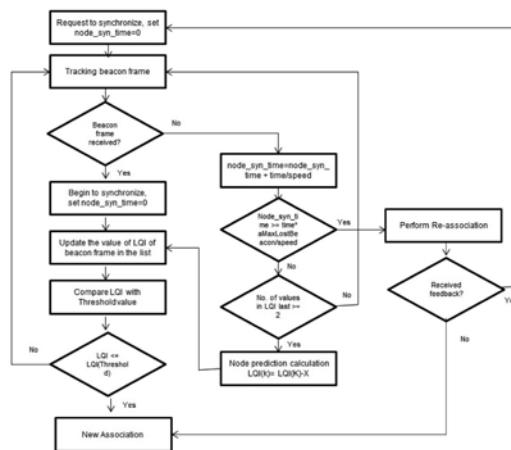


Figure 2: Proposed technique to enhance synchronization process of IEEE802.15.4

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Study on Development of ICT Curriculum Standards Coordination in Primary and Secondary Schools in Malaysia

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In preparing the nation to become a highly developed country in the next 8 years, there is a need to expand on K-worker competency with sound ICT skills. While there are a number of schools that have adopted the Smart School model with computing programmes, these efforts need to be expanded to cover the mainstream school education system. Basic computing (including problem solving and logical thinking) need to be introduced in schools and teachers need to be skilled at exciting interest amongst students in the field of computing as well as to equip them with the skills for life-long learning.

The inclusion of ICT as a foundation subject in secondary level will equip Malaysia students entering universities or other institutions of higher learning (IHLs) with the necessary knowledge and skills in problem-solving, systems analysis and computer logic/programming. These skills will enable them to learn other advanced ICT-related subjects within the 3- or 4-year programs. These foundation skills are also useful even if the students do not pursue ICT courses in their tertiary education. This policy will go a long way to widening our pool of ICT human resources.

Therefore, the ultimate goal of this study is to find solutions to secure Malaysia’s supply of world-class ICT professionals who will support the nation’s ambitions to be a net producer of competitive ICT-based solutions for the global market, and facilitate the higher adoption of ICT in private and public sectors. A taskforce has been formed to address these issues with members coming from Universities, Industries and Government sector. The HRICT Taskforce headed by Professor Datuk Khairuddin Ab Hamid will serve as the advisory forum to shape this study.

The study involves the development of a comprehensive ICT Education framework. The framework will be built based on a three-pronged strategy that has been proposed as outcomes. Next step is developing strategic intervention programmes and refinement to the framework which will be carried out with all relevant parties.



Figure 1: Proposed strategic trusts and recommended policies



Asynchronous Collaborative Orthography Development Methodology for Indigenous Languages

Language documentation is to provide a comprehensive record of the linguistic practices characteristic of a given speech community. Creating an orthography (spelling) system is the initial step used to document the language. Orthography system is important because it provides the standard guidelines to the community for reading and writing their language. Furthermore, it also lets the community to preserve their language in a proper manner.

The main problem of developing the orthography system of indigenous languages, is the large amount of time and effort needed. The linguist need to travel to the rural area (to study the endangered languages), have face-to-face interaction with the community to discuss and collect the requirements from the community members. However, many indigenous languages have a small number of speakers. To develop orthography systems of all these languages (DBP reports that Sarawak has 63 ethnic languages) is not economically and logistically feasible.

An efficient method is needed for the linguist to build the orthography system for the community. Currently, to the researcher's knowledge, there is no methodology or systems that can help the linguist to develop the orthography system efficiently. In order to solve this problem, we propose a methodology to build the orthography system using asynchronous mode. This means that the linguist and community can work on the orthography system development at different times and located at different places. To test the proposed methodology, we will build the online collaborative platform to engage the linguist work collaboratively with the community. Community can upload the language resources and give feedback for the development process. Linguist will propose the orthography system and collaborate online with the community to create an acceptable spelling system.

Figure below shows the role played by the community and linguist during the orthography system development. They are collaborate using the collaborative orthography platform to produce the orthography system.

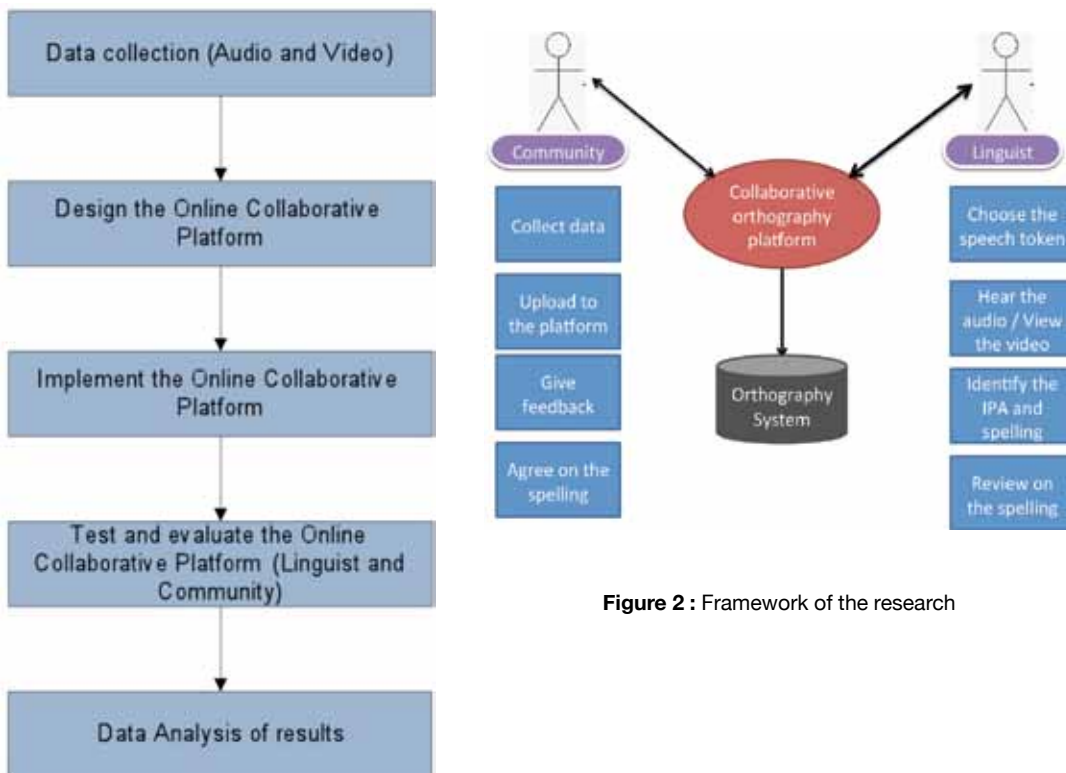


Figure 1 : Flow Chart of Research Activities

Figure 2 : Framework of the research

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MoSUIT: A Framework For Mobile Software User Interface Testing On Android Application

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The current trend has seen the rapid development of mobile software and application, especially on Google Android platform. Also, one of the most significant issues in mobile software design is Graphical User Interface (GUI) testing. Effective GUI design and testing are vital towards the success of a mobile application, since GUI is the only way for the user to interact with. However, with more concern on mobile application functionalities, GUI testing has somehow neglected. Normally testing GUI functionality and behavior involves human testers. We argue that GUI testing on conventional software may not directly applied to mobile GUI. This is because of the interaction differences such as mouse clicking versus screen touching (on mobile software). Therefore in this paper we present an approach for testing Android applications, with a focus on GUI behavior. We propose a testing framework that we called Mobile Software User Interface Testing (MoSUIT). We first ask a group of testers to become the interpreter of GUI expected functionality. To do this they have to interact with the GUI component such as screens and objects. This process is important for us to observe whether the expected results of interaction are achieved. As a proof-of-concept of our framework, we report the testing of *FingerSketch*. It is an Android-based sketching application developed by the undergraduate student at Faculty of Computer Science and Information Technology, UNIMAS. On the main menu, *FingerSketch* has 6 main GUI's: *Let's Sketch*, *Kid's Mode*, *Gallery*, *Settings*, *Help* and *Exit*. We conclude with recommendations on how to improve the capability of our framework. We believe our framework is potential to improve GUI testing, hence improving the quality of mobile applications interactions.

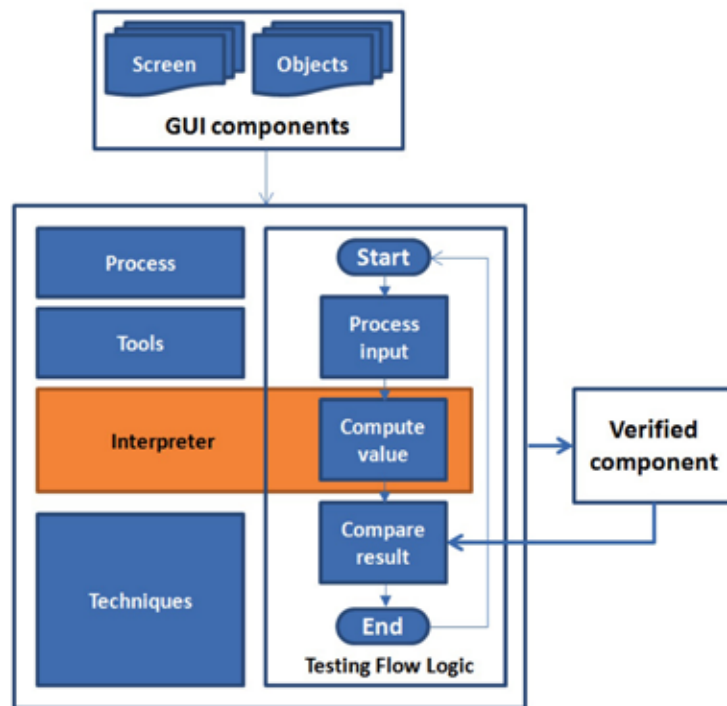


Figure 1: Framework of Mobile Software User Interface Testing (MoSUIT).



Figure 2 : FingerSketch main menu GUI



Figure 3 : FingerSketch sketching menu GUI.



FingerSketch: Development Sketch Application for Kids on Android Phones

Smart phones have become common and important in our live. Current development shows that smart phones have become popular devices especially among youngsters. However, using smart phone to draw and sketch especially among small children is not always easy. Based on theoretical and empirical evidences, this paper seeks to find best approaches to allow small children to sketch on the mobile phone screen. In this paper we report the design and development of a sketching mobile application specially designed for local kids in Bahasa Melayu. We believe this is the first attempt to create a sketching application using local language. *FingerSketch* is created for Android version 2.1 and above. The users can sketch by tapping and drawing on the screen. This application also has paint tools such as paint brush, eraser, paint colours picker and a canvas. In doing testing and usability evaluation, data was gathered through questionnaires from the users. Their comments about the applications were gathered and analyzed. We found that they viewed the application as effective and attractive. Finding also showed there was a significant level of satisfaction expressed by the users. The evaluations stage also suggests that the users are satisfied with drawing tools provided by the application.

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Figure 1: Application splash screen



Figure 2: Sketch menu

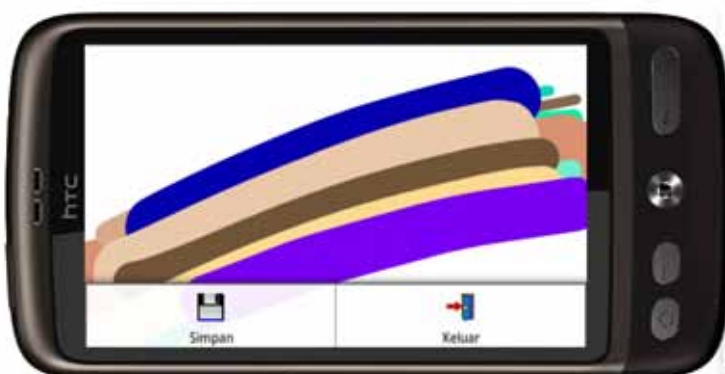


Figure 3: Kids mode

A Report on Borneo Heritage Symposium



The Borneo Heritage Symposium 2012 is a one-day symposium comprising presentations and lectures.

It will bring together international and local scholars, to share their knowledge and experiences in Digital Heritage Collection. In addition, this Symposium will highlight the importance of digital repositories for the preservation of the Borneo Heritage. The event is held in DeTAR Putra, Universiti Malaysia Sarawak on 16 February 2012.

Organising Committee

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Amongst the speakers for the Symposium are Professor Dr. Hermann Maurer from University of Graz, Austria, Professor Dr. Wolf-Tilo Balke from Technische Universität Braunschweig, Germany, Associate Professor Dr Alvin Yeo Wee from Institute of Social Informatics and Technological Innovations, UNIMAS, Associate Professor Dr Balisoamanandray Ranaivo-Malançon from Faculty of Computer Science and Information Technology, UNIMAS and Associate Professor Dr. Datu Hj. Sanib bin Hj. Said for Institute of East Asian Study, UNIMAS.

The objectives of the symposium are:

- Promote the sharing of knowledge and ideas in the field of digitization of archives and cultural heritage of the island of Borneo fellow researchers at home and abroad, the historian, museum officials, ICT experts, the government and private sectors;
- Introduction of international research forum called the Austrian Forum-Platform for Digital Heritage in the local research community in Sarawak and also the network;
- Cooperation between the institutions in order to enhance the achievement of excellence in research in the field of digitization of archives;
- Understand the latest research, and
- To establish a good relationship and network sharing information quickly while the researchers in the field of digitization of archives.

Participants comprised of researchers from universities / colleges, industries involved in ICT, the institute archives, museums and the network research community in the field of digitization of the archives from within and outside the country. The number of participants was about 120 people.



The 6th International Workshop on Malay and Indonesian Language Engineering

MALINDO is an annual and international workshop co-organised by three South East Asian universities, Universitas Indonesia, the National University of Singapore, and Universiti Malaysia Sarawak. The aim is to bring together researchers and practitioners, representing different perspectives, to share and to exchange their ideas on the processing of South East Asian languages. Thus, MALINDO is a platform for international, regional, and national researchers to strengthen their cooperation and/or to discuss new research collaborative projects.



A considerable amount of research has been done on the processing of South East Asian languages offering a variety of Computational Linguistics (CL) and Natural Language Processing (NLP) resources, tools and applications. All these valuable language resources are most of the time ignored by the public and often not known by the researchers and students working on these languages.

The Faculty of Computer Science and Information Technology (FCSIT) at UNIMAS hosted MALINDO 2012. The local organisers were composed of the lecturers and postgraduates assisted by the technicians and administrative staff from the Faculty of Computer Science and Information Technology (FCSIT).

Yang Berbahagia Professor Datuk Khairuddin Ab Hamid, Vice-Chancellor of UNIMAS, officiated at the event. Mr. Gondosoemarto Wibisono, Consul for Information and Socio-Cultural Affairs of the Consulate General of the Republic of Indonesia in Kuching, was the special guest. The opening ceremony was also attended by the two advisors, Professor Narayanan Kulathuramaiyer and Associate Professor Alvin W. Yeo.

11 papers were presented during MALINDO 2012. These papers are now available freely in the softcopy proceedings. Two papers were selected as Best Papers based on the average of the ratings giving by the reviewers: "Part of speech tagging for microblogging posts in Indonesian", a paper from National University of Singapore, and "Using dependency parse tree structure level and type information to improve Malay large vocabulary automatic speech recognition system", a paper from Universiti Sains Malaysia.

The keynote speaker, Ms Lim Lian Tze, from Multimedia University, presented her Ph.D. research and findings on building lexical knowledge for under-resourced languages, among which, Malay and Iban languages.

Assoc. Prof. Dr. B. Ranaivo-Malançon
Chair of MALINDO 2012



8th International Conference on Information Technology in Asia (CITA) 2013

Smart Devices Trend: Technologising Future Lifestyle

The International Conference on IT in Asia (CITA) is a regular series of biennial conference being planned to bring together professionals and executives to share and exchange ideas and information pertaining to the roles of ICTs within the prevailing challenges of development faced by the region. This international forum introduced and organized by the Faculty of Computer Science and Information Technology, Universiti Malaysia Sarawak aims to investigate how the technology can be adapted to improve local needs as well as to bring technology within reach of the communities.



Although CITA covers various areas such as data mining, high performance computing, image processing, distributed computing, language technology, wired and wireless technologies, it has always have a theme at every run. Researchers and industry practitioners in these fields who participated had benefitted in the sharing of ideas and collaboration in research works with experts in this conference. The CITA themes thus far are:

CITA '99 : Information Equality in the Next Millenium

CITA '01 : Advanced ICT for the New Millenium

CITA '03 : Transforming Knowledge into Insight

CITA '05 : Pervasive and Ubiquitous Computing: Computing Anytime, Anywhere for Everyone

CITA '07 : Social Computing: Engaging Communities

CITA '09 : Towards Human-Centered Computing

CITA '11 : Emerging Convergences and Singularity of Forms

The theme for its 8th run was "Smart Devices Trend: Technologising Future Lifestyle" and was held on the 1st – 4th July 2013.



Five parallel tutorials were conducted on the first day at the faculty namely:

Tutorial 1: Web Mining

Prof. Ricardo Baeza-Yates from Yahoo! Labs.

Tutorial 2: Tele-centre Sustainability

by Prof. Dr. Roger Harris from Institute of Social Informatics and Technological Innovation, Universiti Malaysia Sarawak.

Tutorial 3: Latex for Academic Publishing

by Dr Dayang NurFatimah Awang Iskandar, Dr Halikul Lenando, and Dr Johari Abdullah from the Faculty

Tutorial 4: Distributed Pattern Recognition – Algorithms, Tools and Applications

by Dr. Anang Hudaya Muhamad Amin from Multimedia University

Tutorial 5: Significance of Privacy and Security in ICT: A Case study using Secure Multi-Party Computation for Preserving Privacy

by Dr. Durgesh Kumar Mishra, from Aurobindo Institute of Technology and Research, India.

The conference proper was held on the 2nd – 4th July at the Four Points by Sheraton, Kuching. It was well attended by practitioners, academics and students, representing, United Kingdom, United States of America, Australia, Namibia, Saudi Arabia, China, India, Spain, Portugal, Indonesia and Malaysia. The honourable Dato Sri Michael Manyin officiated the conference on behalf of the Chief Minister of Sarawak.

The conference is always kept small with the aim to allow more effective networking opportunities. The total number of submissions received was close to 100 but with the diligence of 80 International panels of reviewers, the accepted papers were 44.





The papers that were presented in CITA13 are from diverse range of areas taking a number of differing perspectives in addressing CITA13 theme. The line of Keynote and Invited speakers have shared insightful talks in within their expertise: Professor Dr Ricardo Baeza-Yates, Europe Yahoo! Lab, Spain; Professor Dr Michael Wagner, University of Canberra, Australia; Dr Patrick Larvie, Google USA; Professor Dr Duncan Gillies, Imperial College, UK; Associate Professor Dr Seng Wai Loke, La Trobe University, Australia and Mr Goh Su Gim from F-Secure Labs.

These distinguished speakers were also involved in the judging for the Best Paper award which was won by David Vandyke from the University of Canberra, Australia for his paper entitled "Voice Source Waveforms for Utterance Level Speaker Identification using Support Vector Machines".

Written by

Associate Professor Dr Jane Labadin

Chair of CITA 2013



NETWORK LINKAGES

PingER Malaysia Initiative: Monitoring the Internet Performance in Malaysia and S.E Asia

Johari Abdullah (FCSIT, UNIMAS)
13th March 2013

PingER (Ping End-to-end Reporting) is the name given to the Internet End-to-end Performance Measurement (IEPM) project to monitor end-to-end performance of Internet links. It is led by SLAC (Stanford Linear Accelerator Center) and development includes NUST/SECS (formerly NIIT), FNAL, and ICTP/Trieste. Originally in 1995 it was for the High Energy Physics community, however, this century it has been more focused on measuring the Digital Divide from an Internet Performance viewpoint.

The Faculty of Computer Science & IT, UNIMAS has been invited to participate in the project in 2010 and has recently signed an MOU with SLAC. The role of UNIMAS is as a monitoring host with the objective to collect end-to-end Internet network performance for sites in Malaysia. As of February 2013, the monitoring node in UNIMAS is currently monitoring more than 20 sites in Malaysia and is planning to add more sites in the future. Apart from sites in Malaysia, the UNIMAS's node is also monitoring and collecting data for sites in the South East Asia region, in country such as Brunei, Singapore, Indonesia, Thailand, and Philippines. As of March 2013, apart from UNIMAS, other Institution of Higher Learning (IHL) such as UTM, and UM have joined this initiative and have set up their own monitoring host. These additional monitoring sites will provide better measurement accuracy and provide mesh view of the performance rather than from a single view.

The PingER project utilizes the ping utility which is ubiquitous in any operating system. It is lightweight in term of resource utilization and causes minimal impact in term of network traffic.

Ping is a network utility tool which can be used to test the reachability of a host in a network. It operates by sending Internet Control Message Protocol (ICMP) echo request packets to the target host and wait for the response. In the process, several key data is measured such as round-trip time and packets lost. The results include the previous data plus statistical summary such as minimum, maximum, and the mean round trip time. For the PingER project, the monitoring hosts send a set of ping packet (10 packets) at a set interval (currently set at every 30 minutes) and collect the return data. The data is then uploaded to the data repository at SLAC.

Over time, the data collected can provide useful information such as the performance pattern of the monitored hosts and over a longer period can show the trend of ICT adoption by country and region.

For example, before 2008, the African regions is 10 years behind in term of ICT. The policy adopted by SLAC and other parties involved in the project is to provide the data freely to any interested parties through the project website. Although the underlying objective of the project is to collect data, there are several research angles that are currently being explored under this project such as event correlation for performance changes, automated anomaly detection, and intelligent intrusion detection mechanism.

On December 2012, FCSIT, UNIMAS with the collaboration from SLAC and NUST has successfully organized a two days workshop (PingER Workshop 2012). The objectives of the workshop are to promote and disseminate the information regarding the PingER project to researchers, IHLs, and the general public. Two facilitators, one from SLAC and another one from NUST have facilitated the workshop sessions. From SLAC is Dr. Les Cotrell who is the Principle Investigator for the PingER project and Mr. Kashif Sattar who is a research student involved in the project. Dr. Anjum Naveed whom is the Principle Investigator for the PingER initiative in Pakistan also helps to facilitate the workshop sessions. The workshop involves talk sessions and also hands on practical sessions. There are 20 participants which comprises of students, lecturers, and from government agencies.

¹ Universiti Teknologi Malaysia

² Universiti Malaya

³ <http://www-iepm.slac.stanford.edu/pinger/>



NETWORK LINKAGES



Figure 1: Pictures from the PingER Workshop 2012

As the number of organization increases, there is a need for a better way to disseminate information, knowledge sharing, and coordinate various activities (research, workshop, etc). Therefore, a website has been recently developed which is available at <http://pinger.unimas.my/pinger> as shown in the figure below. The website contains information about the initiative, the organizations and people involve, information about various activities (such as the PingER workshop), and tutorials/guidelines.

As a conclusion, the PingER Malaysia Initiative is an interesting project that collects the data of Internet performance of selected hosts over a period of time.

We are looking forward to get more organization to participate in this initiative as a monitoring host. As more data being collected over time, we will see some patterns will emerge which will provide some insight on the Internet performance in Malaysia. Hopefully, this data and the subsequent research/analysis will benefit all especially the government and the industry players.



NETWORK LINKAGES

PingER Malaysia Home Data & Sites Contact Activity

PingER Malaysia

PingER (Ping End-to-end Reporting) Malaysia is an extension of the main PingER project with the objective to monitor and collect data of Internet performance specifically for sites in Malaysia, and also to cover the region of South East Asia.

The PingER Project






PingER (Ping End-to-end Reporting) is the name given to the Internet End-to-end Performance Measurement (IPEM) project to monitor end-to-end performance of Internet links. It is led by SLAC and development includes NUST/SEECS (formerly NIT), FNAL, and ICTP/Trieste. Originally in 1995 it was for the High Energy Physics community, however, this century it has been more focused on measuring the Digital Divide from an Internet Performance viewpoint. The project now involves measurements to over 700 sites in over 150 countries, and we are actively seeking new sites to monitor and monitoring sites for this project, as well as people interested in our data. It uses the ubiquitous ping facility. (Source: Main PingER Site at SLAC)

[Visit Main PingER Site at SLAC »](#) [Visit PingER Site at NUST \(Pakistan\) »](#)

PingER Malaysia

An initiative to monitor, and collect data which can be used to find problems, predict future usage, and correlate and detect performance anomaly.

PingER Malaysia Initiative is a collaboration between and

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Figure 2: PingER Malaysia Website at <http://pinger.unimas.my/pinger>

List of other Network Linkages Events

NO	EVENT	TITLE	DATE
1	Symposium	Borneo Heritage Symposium 2012	16 th February 2012
2	Workshop	International Workshop on Malay and Indonesian Language Engineering (MALINDO 2012)	21 st - 22 th June 2012
3	Workshop	Android Programming and Java	24 th July - 3 rd August 2012
4	Workshop	Window Phone Programming Training	23 rd August - 4 th September 2012
5	Conference	Knowledge Technology Week	3 rd - 7 th September 2012
6	Symposium	First Sarawak Software Quality Symposium	10 th October 2012

Memorandum of Understanding



The faculty has been maintaining linkages with different international institutions and organizations to promote greater academic and research cooperation. This collaboration will foster good relationships and in recognizing the mutual interest and benefit in attaining excellence and leadership in education as well as in research.



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