

# OUTREACH

UNIMAS RESEARCH BULLETIN | Vol 2 No. 1

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Studying Infectious Animal  
Diseases in Borneo

E-BID: Enhancement of the  
Borneo Indigenous Design

Ecological Sanitation for  
Sustainable Greywater  
Management

Bioremediation of Crude  
Oil Sludge Contamination

ISSN 1985-2053



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# FAST FACTS on UNIMAS

**Date established (incorporated)** 24th December 1992.  
**Campus Site** Kota Samarahan, Sarawak, Malaysia  
(about 25 km from the city of Kuching, the capital city of Sarawak)

**Present Vice Chancellor** Prof Datuk Dr Abdul Rashid Abdullah

**Student enrolment – 2007/2008**

Undergraduate	5,974
Post-graduate	616
Total	6,590

#### Breakdown of Postgraduate Students

Masters by Research	218
Masters by Coursework	324
Ph.D	74

**Staff Population (full-time)**  
(as of December 2007)

Academic	651
Management	98
Support	857
Total	1,606

## Faculties

Faculty of Applied and Creative Arts  
Faculty of Cognitive Sciences and Human Development  
Faculty of Economics and Business  
Faculty of Engineering  
Faculty of Computer Science and Information Technology  
Faculty of Medicine and Health Sciences  
Faculty of Resource Science and Technology  
Faculty of Social Science

## Centres

Centre for Language Studies  
Centre for Academic Information Services  
Centre for Student Development  
Centre for Technology Transfer and Consultancy  
Centre for Information and Communication Technology Services  
Research and Innovation Management Centre  
Centre for Applied Learning and Multimedia

## Institutes

Institute of Biodiversity and Environmental Conservation  
Institute of East Asian Studies  
Institute of Health and Community Medicine (IHCM)

## Centres of Excellence

Malaria Research Centre  
Centre for Water Research  
Centre for Rural Informatics  
Centre for Image Analysis and Spatial Technologies

## International Linkages

54 international partners worldwide

## Centre for Academic Information Services (CAIS)

As at April 2007, CAIS has the following:

Volume of Books	121,951
Set of Media Materials	8,036
Journal Titles (Print and Electronic)	18,458



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2008

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## Introduction to This Issue

In view of encouraging and satisfactory feedback received on the earlier (maiden) issue, the OUTREACH Editorial Committee has decided that this issue retains the bulletin format previously adopted for reporting, highlighting and illustrating current events, R&D achievements and on-going major/strategic research projects at UNIMAS.

The maiden issue showcased outstanding output of R&D efforts at UNIMAS, particularly innovations in the areas of agro-industry, ICT applications and industrial design. In this issue, special focus is given to a number of new networking, technology transfer, advisory and consultancy undertakings. On *Networking*, the focus is given to the regional collaboration network being established on research related

to zoonotic and emerging infectious diseases (EID). Through the interest and efforts of the Vice Chancellor himself, UNIMAS has successfully garnered the enthusiasm of several academic and research institutions in the Asia Pacific region to join hands and closely collaborate on studies related to potentially infective agents at the human-wildlife interface.

On *Products and Technology Transfer*, the highlight is on a number of high profile advisory and consultancy projects currently in progress. Among them is the bioremediation (of soil contaminated by hydrocarbon) project funded by a multinational petroleum company.

To reflect on the relevance of R&D endeavours at UNIMAS to the interest of stakeholders and associates, we have introduced in this issue a new column: *Stakeholders Speak*. This column offers an opportunity for UNIMAS stakeholders, in turn, to express their opinions and provide feedback on R&D and related matters at UNIMAS.

Chairperson, Editorial Committee

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# RESEARCH NEWS

## PECIPTA 2007

UNIMAS innovators showcased 10 commercialisable products at the recent PECIPTA 2007 and took home 5 medals. Associate Professor Dr Tiong Thung Sing's 3-in-1 anemysucker for ear surgery won a gold and Dr Chen Chwen Jen's Instructional Design Model for Virtual Reality-based Learning Environment won a silver. Bronze medals were awarded to 3 other innovations. PECIPTA is the International Exposition of Research and Inventions of Institutions of Higher Learning 2007 (PECIPTA 2007) organised by the Ministry of Higher Education and USM at the Kuala Lumpur Convention Centre (KLCC) on 10-12 August 2007.

## R&D briefing for Members of Parliament

Research in UNIMAS has caught the attention of state and federal ministers. During an R&D briefing conducted by the Deputy Vice Chancellor (Research & Innovation), Professor Dr Murtedza Mohamed to



selected politicians, the highlights of the research breakthroughs in Unimas were presented. Among those present were Unimas top management, selected researchers and VIPs including YB Datuk Peter Chin Fah Kui (Menteri Kementerian Perusahaan Perladangan & Komoditi Malaysia), Datu Stephen Wan (Wakil ahli Lembaga Pengarah Unimas), YB Dato Dr James Dawos Mamit, YBhg Dato' Dr Mohd Basri Wahid (Director General of MPOB), En M Nagarajan a/l N Marie (Secretary, Sago & Vegetable Oil/Fat Division, MPIC).

## Higher success rate for Cycle 2 FRGS and Science Fund

UNIMAS researchers made a quantum leap in their ability to secure Fundamental Research Grant and eScience Fund this year. For the Fundamental Research Grant Scheme, researchers succeeded in obtaining 32 grants amounting to almost RM1.9 million, a four-fold increase over 2006 in total grant amount. For eScience Fund, the increase is even more dramatic – from 2 projects in 2006 to 18 projects worth RM2,971,660 in 2007. This increase

can be attributed, in part, to the seminars and workshops conducted by UNIMAS on guidelines and criteria for these grant applications. The Fundamental Research Grant Scheme and eScience are research funds established by the Ministry of Higher Education (MOHE) and Ministry of Science, Technology and Innovation (MOSTI) respectively under the 9th Malaysia Plan (2005-2010) to promote research in Malaysia.

## UNIMAS given regional roles in rural ICT development

The Rural Informatics Group of UNIMAS headed by Professor Khairuddin Abdul Hamid is now playing a regional role in the development of knowledge network in the Asia-Pacific region. Representative of this group has recently attended a Consultative Meeting for the Establishment of Regional Knowledge Network of Telecentres in Asia-Pacific in Bangkok. Also present at the meeting were the Ministry of Rural and Regional Development, Malaysia, and other public and private organisations of member countries of UNESCAP.

## Handing over of SCS talentpower – the Mobile Psychology System

Increased diversity and complexity of needs in human resource development and management has triggered the conception of a psychological competency profile analysis for work placement, training, and formation of work groups. The team, led by Mai Sumiyati Ishak from the Faculty of Cognitive Science and Human Development and comprising researchers in psychology and health science, has developed the SCS-TalentPower-



The Mobile Psychologist System. The completed product, "iTalentSuite and iPowerSuite", was handed over by the Vice-Chancellor of UNIMAS to the Sarawak State represented by the State Secretary, Datu Wilson Baya Dandut, for use in Jabatan Perkhidmatan Awam Sarawak.

## Augmented Reality Group won Tertiary Student Awards

The Augmented Reality Group led by Dr Ng Giap Weng has been active in exploring the new technology. Recently, a 3D-Animation Model designed using Augmented Toys Technology won a merit award in the Best of Tertiary Student Project (Creative Multimedia). This is an interactive animation model which enables users to use a device to view the selected environment in 3D for learning purposes. The group has also designed another application software which allows the hand and fingers to be used directly to control the education applications instead of the conventional keyboard. The software entitled "An Intelligent Free Hand Input Device for Education" won the third place in the Best of Education & Training categories in the Asia Pacific ICT 2007 organised by Multimedia Development Corporation.

## FCSIT students won top prize of the Mobile Content Challenge 2007

The Mobile Content Challenge is a contest created for students of institutes of Higher Learning (IHLS) in Malaysia to research and use new technologies to develop real world solutions for mobile telecommunications. This event is jointly organised by Maxis Communications Berhad, the Ministry of Energy, Water & Communications (KTAK) and the Malaysian Communications & Multimedia Commission (SKMM). The objectives of the competition are to encourage students development in the area of mobile content and application, to identify and cultivate an innovative and creative mindset among students, and to nurture a community of young entrepreneurs who will develop and provide Malaysian content. On 6 September 2007, the 10 teams attended a preliminary round of presentation whereby out of the 10 teams, 5 teams were then selected for the final product demo on the 22 October 2007. After a close scrutiny by the panel of judges, the team from UNIMAS, Team FoCuSIT, with their product HalalPro 1.0: Halal Product Verification Using Product Barcode on Mobile Devices emerged as the first prize winner of the competition with the prize money of RM30,000 for the team and another RM30,000 for IHL itself.



# RESEARCH HIGHLIGHTS



## Studies on Zoonoses and Emerging Infectious Diseases in Borneo

**Researchers:** Assoc Prof Dr Mohd Tajuddin Abdullah [leader], Prof Dr Murtedza Mohamed, Prof Dr Wan Sulaiman Wan Harun, Prof Dr Mary Jane Cardosa, Prof Dr Ismail Ahmad, Prof Dr Balbir Singh, Dr Peter Daszak, Dr Stephen Prowse, Dr Hume Field, Dr Ibnu Maryanto, Assoc Prof Dr Isa Ipor, Johari Abdullah, Assoc Prof Dr Nor Aliza bt Abdul Rahim, Assoc Prof Dr Andrew Alek Tuen, Assoc Prof Dr Awang Iskanderzulkarnein b P Rayari, Assoc Prof Dr Kasing Apun & Dr Zainal Zahari Zainuddin.

We propose multitaxa and multidisciplinary studies on potential zoonotic agents in selected species of wild birds and mammals in Sarawak and other parts of Borneo. The goal of this study is to improve our understanding of the complex mechanisms that have direct impact on the indigenous wildlife species (birds, small mammals and non-human primates) and humans involving bacteria, viruses and parasites. Currently, emerging infectious diseases (EID) have a major impact on the economy, human health and medical care of the general public in Malaysia as well as throughout the world. These novel multidisciplinary approaches to study EID will be divided into four disciplines, zoology, ecology, microbiology and epidemiology to be led by experts conducting well-focused investigations in order to answer major research questions.

Wildlife are free-ranging animals such as insects, fish, amphibians, reptiles, birds and mammals. Zoonoses is a study of the process of infectious disease transfer from animals to human. Zoonoses cover a wide range of diseases due to different causative organisms such as viruses, bacteria, fungi and parasites or any other communicable pathogens which have different clinical and epidemiological features and control measures. Zoonotic infections in man can occur by a variety of routes, which include foodborne, waterborne, direct contact and through arthropod vectors.



Various groups of terrestrial and aquatic small animals with contrasting characteristics, mobility and abundance, are potential vectors, as transient hosts and reservoirs of potential zoonotic diseases in Sarawak. Small animals are also very good indicators of any anthropogenic changes (e.g. deforestation, logging, land clearing, mining, agriculture or human settlement) that will directly affect the distribution, abundance, diversity or density of wildlife species and the prevalence of microbes associated with wild species.

About 75% of the EID are caused by zoonotic microbes which include HIV and AIDS viruses, influenza virus, Ebola virus, hantaviruses, Nipah virus, severe acute respiratory syndrome (SARS)-associated coronavirus that not only cause deaths

but cannot be controlled by any effective vaccine. During 1998-1999, outbreak of the Hendra-like virus or later called the Nipah virus, resulted in the deaths of 105 persons and culling of 1.1 million pigs. This has caused millions of Ringgit of economic loss in Malaysia.

Although these infectious agents and diseases are considered emergent, many people from this community have not actively embraced the concept of emerging disease and appreciate the critical impact of the outbreak. The evaluation of the relative importance of these potential pathogens is crucial for current state of understanding and for subsequent surveillance and response strategies to detect, prevent, and mitigate the impact of these potential pathogens on human health. Thus, this proposed project has five major aims: (1) To investigate avian species which include migratory and resident birds, ducks, small mammals which include bats, treeshrew, wild boars, as well as non-human primates as possible reservoirs for potentially zoonotic pathogens; (2) To assess the ecological habitat parameters of selected wildlife and the anthropogenic changes around the area; (3) To detect and characterise the major groups of potentially zoonotic pathogens (viruses, bacteria or parasites) in wildlife; (4) To characterise the biological and environmental parameters of emerging infectious diseases; and (5) To study the etiology, pathogenesis and epidemiology of certain wildlife diseases.



Through Dr. Zainal Zahari Zainuddin (Department of Wildlife and National Park, Malaysia), Dr Stephen Prowse (Australian Biosecurity CRC for Emerging Diseases, University of Queensland), Dr Hume Field (Department of Primary Industries and Fisheries Queensland, Australia) and Dr Peter Daszak (Consortium for Conservation Medicine, USA), we shall be linking with what will likely be the largest network of institutions, with access to a larger pool of worldwide experts and high-end research facilities concerned with emerging



diseases in the wildlife-human interface. We also believe that multi-approaches incorporating clinical, epidemiological, wildlife systematic,

biogeographical ranges and ecological dynamics of wildlife populations, this research will provide the fundamental basis to understand the diversity of fauna that are associated with potentially zoonotic diseases in a much more holistic perspective.

## E-BID: Enhancement of the Borneo Indigenous Design

### Universal Design Principles Towards the Enhancement of Borneo's Indigenous Design (E-BID)

**Research Leader:** Assoc Prof Dr Khairul Aidil Azlin Abd Rahman

**Co-researcher:** Dr Hjh Nazlina Shaari, Musdi Shanat, Sylvester Wielding Jussem, Ahmad Azaini Abdul Manaf, Siti Shukhaila Shaharuddin, Norhayati Suleiman, Mastika Lamat, Ringah ak Kanyan, Salmiah Abdul Hamid, Dayang Marinawati A Reduan

**Assistant Researcher:** Alvina Kunchi

**Faculty of Applied and Creative Arts,  
UNIVERSITI MALAYSIA SARAWAK**

**E-Mail:** azlin@faca.unimas.my

**Tel:** +603(K08)-598/2006(31)



**D**erivation of modern products from products of the bygone age has contributed much to the modern living. It has been generally recognized that the various ethnicities in Borneo with different backgrounds has made Borneo a place of cultural diversity. However, as time passed, most of the indigenous products are no longer in use and are not stored properly. Many of them are nearly over a century old and are still in good condition with high sentimental value.

Indigenous product is an artifact that has been designed and used by certain communities of people. They were used as tools, clothing, crafts and goods. Each design may have its own identity unique to the community. Some of the indigenous products, which are no longer in use are kept by the community as their collections.

Universal design reduces barriers between people

with and without disabilities. It is usually defined as the designing of products or environments to be usable by all without the need for adaptation or specialized design. Human need is the key concern when it comes to universal design as it will help people to do things at ease and to avoid injuries. The seven universal design principles are as follows: equal in use, flexible use, simple and easy to understand, clear information, tolerance in mistake, low physical force, ample size and space. The universal design principles will upgrade the value of the indigenous design for the commercial market.

The objective of this research is to gather vital information on the available potential indigenous products that are to be developed into new universal product design while maintaining the values of the selected indigenous products.

- to identify everyday functional artifact that are invented by the indigenous people of Borneo.
- to understand the meaning and the functions of the selected artifact.
- to analyse the potential of the selected artifact for design enhancement

- to document each of the artifact through images and dimension.

The research combines quantitative and qualitative data collection methods as well as case studies. Research activities are based on field trips to the remote parts of Borneo. On-site observation and interview have been done in Betong Division known as the Rimbas area of Peligong, Sg. Kelampai (both in Saratok), Kabong (Roban) and Paku (Spaoh) and Sri Aman Division also known as the Skrang area of Nanga Kesit, Nanga Sumpa and Nanga Delok (Lubok Antu) and Lanjak of Kalimantan also known as the Kapuas region. The research group also covered most areas of Sabah such as Tambunan, Keningau, Semporna and Banggi. It focuses on three main research areas: (i) functional artifacts studies, (ii) enhancement of indigenous design development, and (iii) publishing and exhibiting the findings.

Data were collected to identify the indigenous design from different areas and to differentiate the same product from different places. In Kabong, Saratok and Paku of Betong Division, with the local population of the Ibans, Malays and Melanau, research data





of the indigenous products have shown some design similarities with the indigenous products in Sri Aman Division, upper river areas such as Nanga Delok, Nanga Sumpa and Nanga Kesit in Batang Ai which are quite remote. Based on the observations, indigenous products from the upper river areas of Batang Ai appeared to have stronger connection with the Lanjak region in Kalimantan, which is populated by the Indonesian Dayaks, particularly the Ibans. These two areas are connected by rough terrains and unsealed roads and the only gateway is to cross the border checkpoints of Malaysia – Indonesia, Lubok Antu in Sri Aman Division.

The preliminary finding shows that indigenous design is strongly influenced by the natural resources surrounding the community. The rural people are skilful craftsmen and raw materials are readily available from the forest and are fully utilised. Bamboo is the common material used for designing product by the local people. Various species of bamboo are found widely in the Borneo forest and the native people apply them to a great variety of uses. This raw material shows excellent qualities for its strength, lightness, smoothness, straightness, roundness and hollowness.

Different species of bamboo come with different sizes and serve different purposes. Most of the indigenous products were invented for everyday needs, leisure, rituals and survival purposes. These include kitchen utensils, hunting tools, woodworking tools, games and musical instruments. The indigenous people are creative. They are highly skilled and the skill is passed from one generation to the next.

(*Eusideroxylon zwageri*). Textiles are inherited from their ancestors and are made of natural cotton fiber with natural dyes. A majority of the local inhabitants are able to trace their history by the products they inherited.

The research reveals design similarities in the interests of indigenous products, the concerns and the realities of the indigenous communities from different regions.



Indigenous products are grouped into four main categories: (i) craft, (ii) utensil, (iii) textile and clothing, and (iv) furniture. Each product is further classified based on the method of making, the materials used and the functions of the products. The main materials used are bamboo, wood and natural fibre. In general, most of the authentic products found are working utensils and textiles. Many of the working utensils are still in their original conditions as they are primarily made of belian

The study suggests that learning about indigenous materials, such as hand-made products and machine-made products is necessary for the local industry to develop a product identity that is distinctly local. Most indigenous products show evidence of connections to the old traditions, yet are new to the design market. For designers and design educators, it provided ideas for design and craft solutions.

## Ecological Sanitation for Sustainable Greywater Management

**Project Leader:** Prof Dr Lau Seng

**Team Members:** Assoc Prof Dr Kasing Apun, Assoc Prof Dr Ng Chee Khoo, Assoc Prof Dr Law Puong Ling, Assoc Prof Dr Gabriel Tonga Noweg, Assoc Prof Dr Lee Nyanti, Micky Vincent, Sim Siong Fong and Devagi Kanakaraju.

Centre for Water Research, Institute of Biodiversity and Environmental Conservation,

**UNIVERSITI MALAYSIA SARAWAK**

**E-Mail:** lauseng@frst.unimas.my,

**Tel:** +6082 583025

The ecological sanitation system is an environmentally sustainable system and has been found suitable for treating greywater. The system is based on the bio-filtration to remove the organic matter and a wetland to adsorb the nutrients. The setback of such a system is that it requires approximately

2 m<sup>2</sup> of land to treat the greywater produced by one person. This makes it unsuitable for areas where land is scarce such as in highly populated urban areas. Therefore it is of great interest to the nation that the ecological sanitation system can be further developed and improved, so that it can be incorporated into the urban wastewater



Figure 1. Assessment of the biofilter under laboratory conditions.



treatment system. This project was aimed to develop a system that is constructed from locally available materials and is efficient in treating domestic greywater.

The study was conducted in two phases. Phase 1 involved laboratory scale treatment to determine the suitability of some locally available materials in treating greywater and Phase 2 involved the construction of a pilot system using the suitable local materials for treating greywater from a residential hostel at Universiti Malaysia Sarawak.

The laboratory studies on the wastewater treatment system have been completed, where two Master degree (MSc.) theses were produced. The system consists of two parts.

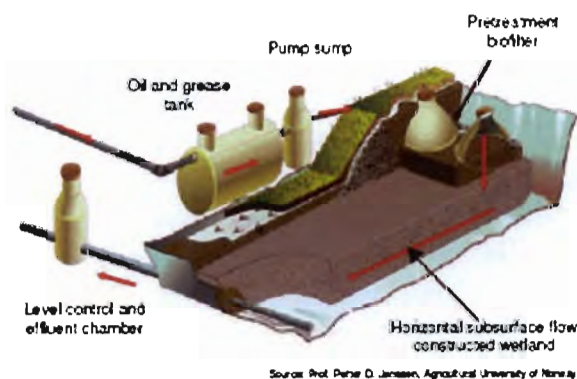


Figure 2. Schematic layout of the ECOSAN grey water treatment facility.

The first part is the biofilter where organic matter from the wastewater is degraded. The second part is the sub-surface flow wetland that removes nutrients (phosphate and nitrate) from the treated wastewater. The study found that crushed red bricks and degraded shale were suitable materials as the packing media for the aerated biofilter. The biofilters, (Figure 1), constructed from these materials were able to remove organic matter up to 70% (Tan & Lau, 2006). The system was also able to prevent anoxic conditions usually associated with foul odour, in the treated wastewater. The laboratory scale wetland was constructed using a fiberglass tank filled with limestone that efficiently adsorbed phosphate (Tiong & Lau, 2006). Nitrate was successfully removed by aquatic plants (water lettuce and water hyacinth) in the wastewater retention or polishing pond.

Domestic wastewaters can be classified as blackwater (toilet wastewater) and greywater. Greywaters are generated from washing activities such as bathing, laundry and cooking. In most countries, domestic wastewaters are discharged directly without treatment into the receiving water bodies. There are two main reasons for this:

- 1) The concentration of pollutants in greywater is relatively low and the conventional treatment system is unable to treat it economically.
- 2) The volume of greywater generated per household is huge (120 L per capita) and it is economically and environmentally (high energy consumption) unfavourable to treat it.

The consequence of this is the continuous degradation of our rivers and streams.

The construction of the pilot system was located at the Kenanga residential college at Universiti Malaysia Sarawak. This system consists of an oil/grease trap, a wastewater reservoir tank, a submersible pump, eight units of biofilters,

four units of horizontal sub-surface flow wetland and a retention pond. The schematic diagram of the biofilter with its associated wetland is shown in Figure 2. The pilot system is not commissioned for operation yet (Figures 3 & 4). The work installed for this project will include the assessment of the performance of the pilot system and the optimal capacity of the

biofilters. The construction and structural design of the system will be assessed by civil/environmental engineers from our research team.

The second part is the sub-surface flow wetland that removes nutrients (phosphate and nitrate) from the treated wastewater. The study found that crushed red bricks and

degraded shale were suitable materials as the packing media for the aerated biofilter. The biofilters (Figure 1) constructed from these materials were able to remove organic matter up to 70% (Tan & Lau, 2006). The system was also able to prevent anoxic conditions usually associated with foul odour, in the treated wastewater. The laboratory scale wetland was constructed using a fiberglass tank filled with limestone that efficiently adsorbed phosphate (Tiong & Lau, 2006). Nitrate was successfully removed by aquatic plants (water lettuce and water hyacinth) in the wastewater retention or polishing pond.



Figure 4. Biofilter compartment constructed from perforated concrete culvert. This compartment will be filled with the suitable filter media.

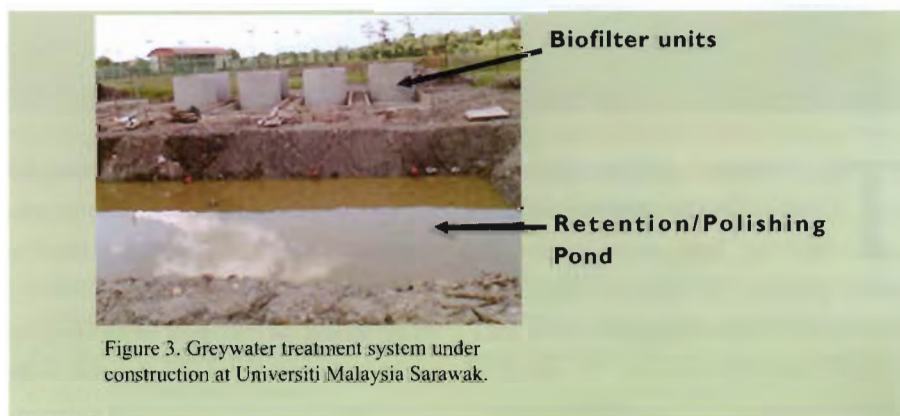


Figure 3. Greywater treatment system under construction at Universiti Malaysia Sarawak.



# Biomass-to-Fuel Conversion

Assoc Prof Dr Law Puong Ling, Assoc Prof Dr Awangku Abdul Rahman Pgn Haji Yusof, C.T.Wong and Prof Dr Kopli Bujang  
Faculty of Engineering  
UNIVERSITI MALAYSIA SARAWAK  
E-Mail: puonglaw@feng.unimas.my

A System for Conversion of Biomass-to-Fuel Gases (B2F) was recently developed by Prima Natural Resources & Manufacturing Sdn Bhd in collaboration with UNIMAS, and was patented in over 120 countries world-wide (PCT/SG2004/000158). Studies by UNIMAS showed that the B2F produced extremely small or negligible amount of ash, smoke, odour and tar. The B2F has "partially" been commercialised, and several B2F commercial prototypes (Fig. 1) are currently being used for industrial drying and heating purposes.

A total of 3 biomass-to-fuel gas models of different sizes are available; 1) Micro-sized model (Fig. 2), 2) Small-sized model (Fig. 3), and 3) Medium-sized model (Fig. 4). They have been developed, constructed and tested for drying and heating purposes in commercialised industrial scale applications. These include mushroom culture industry, egg tray manufacturing facilities, coconut milk production and paper recycling facilities. At present, small- and medium-sized B2F located at 12th Mile, Old Oya Road, Sibu, have been used to produce combustible gas for in-house heating/sterilisation process for mushroom culture and cooking purposes. Wood chips (feedstock) are gasified in fixed-bed biomass-to-fuel gas converter whereby combustible gas is produced. The fuel gas is then purified by passing through a series of filters to produce low-to-medium heat value fuel gases.

Recently, SIRIM conducted an on-site grab sampling and analysis on fuel gases produced by B2F (before gases being burnt). The feedstocks used were low grade coal (nearby Balingian-Mukah coal) and wood chips. It was found that the fuel gas stream contained a high



Figure 2. Micro-Sized B2F Converter

percentage of gasoline/diesel/poly-aromatic constituents, and certain amount of CO, O<sub>2</sub>, CO<sub>2</sub>, SO, NO & H<sub>2</sub>O. Thus, the fuel gas produced by B2F contains >50% combustible gases, i.e. gasoline & diesel constituents and poly-aromatics.

In May 2006, the UNIMAS research team conducted an on-site sampling and analysis of exhaust emissions (after B<sub>2</sub>F fuel gases were being burnt). It was found that the exhaust emissions contained approximately 25-40 ppm CO, 6-10 ppm H<sub>2</sub>S, 80-110 µg/m<sup>3</sup> total suspended particulates, and <30 µg/m<sup>3</sup> PM<sub>10</sub>. On-site preliminary studies also showed that B<sub>2</sub>F conversion system produced negligible amount of ash, 10-13% H<sub>2</sub>O, and 1-2% tar.

Ongoing re-design/modification work on existing B<sub>2</sub>F focuses on its electrification potential for rural communities. Thus, the revolutionised B<sub>2</sub>F has been transformed to "A 3-Stage Biomass-to-Energy Conservation System (B<sub>2</sub>E)" (Fig. 5). Recent ongoing research activities focus on the following:

- Construction of a small-scale B<sub>2</sub>E unit at UNIMAS's Energy Park as a one-stop showcase or demonstration centre for potential users (Fig. 5);
- Optimization of B<sub>2</sub>E; and
- Installation of a small sized

steam engine @ 5 - 15 KW on B<sub>2</sub>E, an ideal electrification machine for rural communities that requires minimal maintenance and operates at negligible cost.



Figure 3. Small-Sized B2F Converter



Figure 4. Medium-Sized B2F Converter

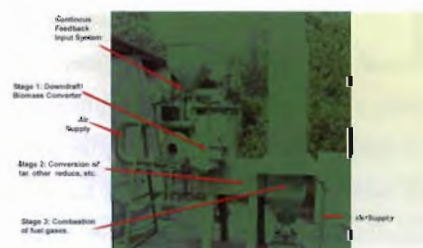


Figure 5. A 3-Stage Biomass-to-Energy Conversion System (B<sub>2</sub>E)



# PRODUCTS AND TECHNOLOGY TRANSFER

## UNIMAS-ESPSB: Bioremediation of Crude Oil Sludge Contamination

**Researchers:** Dr Awg Ahmad Sallehin Awg Hussaini, Assoc Prof Dr Kasing Apun, Mohd Hasnain Md Hussain, Micky Vincent  
**Faculty of Resource Science and Technology**  
**E-mail:** haahmad@frst.unimas.my

One of the major challenges faced by oil refineries is safe disposal of oil sludge generated during the processing of crude oil, as improper disposal would lead to environmental pollution, particularly soil and groundwater contamination. In addition, most of oil sludge constituents are cancer causing agents and potent toxicants of the immune system.

Among the techniques employed to decontaminate affected sites is bioremediation, which is the use of living organism (such as bacteria) to

naturally degrade the pollutants. Bioremediation technique has been proven to be able to reclaim contaminated land, reduce the threat of pollution to groundwater and enhance the degradation rate of oil's constituents.

As there are different types of oil sludge to be dealt with, the bioremediation process needs to be customised in order to achieve an optimum level of efficiency and effectiveness. To achieve this, ESP International (an established company in bioremediation of crude oil waste) has

sought the expertise of UNIMAS scientists to conduct the study.

The main aim is to identify and characterise the existing bacterial inoculum (including enzymes) involved in the biodegradation of oil sludge, and to evaluate their effectiveness in the bioremediation process. The group's preliminary findings revealed the presence of active TPH-degrading bacteria, commonly found in soil, yet safe to human and animals; and they were proven to be promising species for effective biodegradation of oil sludge.

## MIMOS-UNIMAS: Language Technology Productisation

**Researchers:** Assoc Prof Alvin W. Yeo, Assoc Prof Narayanan Kulathuramaiyer, Suhaila Saee, Chiew Kang Leng, Sharin Hazlin, Nurfaiza Jali, Fatimah Ramli, Sy. Fazlin Syed Fadzir, Dr Edwin Mit, Sarah Flora Juan  
**Faculty of Information Technology**  
**E-mail:** alvin@fit.unimas.my

Language is a tool to express knowledge, and knowledge is the essence of intelligence. The Faculty of Computer Science and Information Technology (UNIMAS) in collaboration with MIMOS, has embarked on a Language Technology Productisation initiatives for the foreseeable commercialisation of language-based technology. In particular, the Faculty is involved in the research and development of tools useful for knowledge discovery: through text extraction and analysis, e-Dictionaries, Computer Aided Translation, and Machine Translation.



Springing from the collaboration, the Faculty has established the Sarawak Language

Technology (SaLT) research group which attempts to revitalise and maintain Sarawak ethnic languages through the application of corpora (collection of writings or recorded remarks) in the computational analysis of Sarawak languages. Collaborators of SaLT include the Centre of Language Studies, Faculty of Cognitive Science and Human Development and Faculty of Social Science (UNIMAS), and School of Computer Science (Universiti Sains Malaysia).



## UNIMAS-FAMA: A Study on Pasar Tani in East Malaysia

Researchers: Prof Dr Shazali Abu Mansor, Assoc Prof Dr Ernest Cyril De Run, Dyg Affizah Awg Marikan, Kassim Mansor, Jenny Ignatius  
Faculty of Economics and Business, Universiti Malaysia Sarawak and Universiti Malaysia Sabah

E-mail: drernest@feb.unimas.my

**T**his study was conducted for the Federal Agricultural Marketing Authority (FAMA) through cooperation between Universiti Malaysia Sarawak (UNIMAS) and Universiti Malaysia Sabah (UMS). It seeks to understand the problems and issues related to the supply chain of Pasar Tani in Sarawak and Sabah, which is to fulfill part of FAMA's effort to step up marketing of Malaysia's agricultural produce.

The study looked into the relationship between the various players in Sarawak and Sabah Pasar Tani supply chain: from the farmer, buyers,

retailers, wholesalers, to the customer. This was conducted to determine the factors that contributed to the acceptance, involvement, satisfaction, and benefits of Pasar Tani from the perspective of the players in the supply chain. It also looked into the functions of the various marketing intermediaries at different levels of the supply chain network.

It was clear that stakeholders saw Pasar Tani as a venue for them to expand their business and developing their market, as well as improving their socioeconomic

status. The findings revealed that while FAMA's support, and quality, fresh and reasonably priced products contribute to the strengths of Pasar Tani, lack of promotion, unstrategic location, and inappropriate facilities are its weaknesses. A detailed three-pronged strategy to develop the supply chain of Pasar Tani in Sarawak and Sabah has been recommended.

## UNIMAS-Rural Community: Low Cost Hydro-Power System for the Rural Community

Researcher: Martin Anyi

Faculty of Engineering

E-mail: amartin@feng.unimas.my

**S**upplying electricity to the remote and scattered rural communities in Malaysia is almost impossible due to their remoteness and difficult terrain. On the other hand, most of these remote villages are situated near fast flowing rivers or streams, where potential energy lies untapped.

A micro hydro system can be made possible to electrify these areas (even though earlier effort on micro hydro projects has not generated the interest on the part of the government). Marred by failure to deliver, the high initial cost (RM 4 to 20 million) involving foreign expertise was not practical, especially when one is



looking at the need to serve thousands of remote villages.

Using off-the-shelf materials, and maximising,

local expertise and manpower, a micro hydro system can be built to suit local requirement. By eliminating the foreign elements (foreign exchange rate and expertise), a low cost system was built at a fraction of the normal cost. The pilot project was conducted in Kampung Abok Mawang, Sri Aman, Sarawak, where a locally-built turbine was used to run a conventional AC generator. The power generated from the test turbine was used to power common household electrical appliances. Improved future supply would see to the need of village industry, especially agricultural product processing and ICT usage.



# NETWORKING

## International Research & Education Network

### UNIMAS Spearheading an Asia Pacific Collaboration on Zoonoses & EID Research

A series of focused discussion and definitive arrangements has been made between UNIMAS and several academic and research institutions/agencies in the Asia Pacific region to initiate a major and better organised research collaboration on zoonoses and emerging infectious diseases (EID) in this part of the world. The general consensus is that there is a real threat of the repeatedly emerging zoonotic diseases such as Japanese encephalitis, Nipah viral infections, and Knowlesi malaria in this region and accordingly



there is an urgent need to identify and understand the complex epidemiological and ecological interactions (including inter-state and trans-boundary spread) of the infective agents at the wildlife-livestock and wildlife-human interfaces. Among the institutions and key researchers who have given indication of interest to participate in this regional collaboration are University of Queensland (Dr Les Hall), Department of Primary Industries and Fisheries of Queensland (Dr Hume Field), Australian Biosecurity Cooperative Research Centre for EID (Dr Stephen Prowles), Charles Darwin University (Prof Robert Wasson), Indonesian Institute of Sciences (LIPI, Dr Dedy Darnaedi), Indonesian Veterinary Science Research Institute (Dr Indrawati Sendow), Singapore Zoo (Mr Kumar Pillai), and Centre for Southeast Asian Studies of the University of



Kyoto (Professor Mitsuaki Nishibuchi). Other prominent/international researchers in the field of EID who have expressed their support for this collaboration include Dr Peter Daszak of the Consortium for Conservation Medicine (USA). The first meeting of this Zoonoses-EID network will be at the Regional Symposium on Zoonoses & EID organised by UNIMAS on 22-23 January 2008 in Kuching. Contact person: Assoc Prof Dr Mohd Tajuddin Abdullah (abdullahmt@gmail.com).

### UNIMAS-Ministry of Health Collaboration on Cancer Genetic Studies

On October 2007 a Letter of Agreement between the Malaysian Ministry of Health (MoH) and UNIMAS was signed to promote and strengthen research collaboration between the two public institutions. Under this agreement, MoH is represented by the Institute for Medical Research (IMR) and UNIMAS, by the faculties of Resource Science and Technology; and Medicine and Health Science. The main outcome is an award of research funding to UNIMAS (by MoH) amounting to RM550,000 for two projects on cancer genetics studies of nasopharyngeal



carcinoma (NPC). An associated objective is the establishment of a national cancer tissue bank for NPC, in which UNIMAS will be one of the 3 banking centres. This research programme is the first nationwide effort to establish the National NPC Study Group (coordinated by MoH via IMR) that involves 8 main research groups comprising 7 scientists and 28 clinicians selected from the whole country. At UNIMAS, the research activities will be coordinated by Assoc Prof Dr Edmund Sim Ui Hang and Assoc Prof Dr Sim Sai Peng @ Samira Abdullah. Contact persons: Assoc Prof Dr Edmund Sim (uhsim@frst.unimas.my); Assoc Prof Dr Samira Abdullah (spsim@fmhs.unimas.my)

### MoU between UNIMAS and PMB



UNIMAS and Malaysian Pepper Board (MPB) are entering into a collaborative research on Piper nigrum which is an important commodity crop in Sarawak. To initiate this collaboration, an Memorandum of Understanding (MoU) was signed by both parties on the 24th November 2007 in Miri. UNIMAS was represented by the Vice Chancellor, Prof. Dato' Abdul Rashid Abdullah and Dean of Faculty of Resource Science and Technology, Prof. Dr. Wan Sulaiman Wan Harun. Under this MoU, initial joint research activities would include isolation, purification and structure modification of potential bioactive compounds from Piper nigrum, and development and application of enzymatic retting technology for white pepper production (Contact: whwsulaiman@frst.unimas.my).



# STAKEHOLDERS SPEAK

This column offers an opportunity for UNIMAS associates and stakeholders to express their opinions and provide feedback on R&D and related matters at UNIMAS.



Rt Hon Datuk Dr James  
Dawos Mamit  
Member of Parliament,  
Malaysia (Mambong)  
State Government  
Environmental Advisor

Malaysia is a rapidly developing nation. In the pursuit of progress, the nation requires human capital with vast knowledge and skill to steer the nation towards a balanced development and socioeconomic prosperity. Thus, local universities (IPTA) have been empowered with the responsibility to produce the much-needed human resource within a timeframe that the Government deems reasonable.

In this regard, a move was made to reduce the period of undergraduate studies from four years

to three. In doing so, many subjects are taken out of the core curriculum, and many more subjects are superficially covered – reducing both the depth and breadth of the university education. This reduction of study duration appears to have also deprived students of adequate time needed to mature, socially and intellectually in a scholarly environment. This has given rise to low quality graduates who cannot compete in the same job market with Malaysian graduates from foreign universities.

In my mind, there is no short-cut to proper and quality education. If the timeframe needed to complete a degree is four years, so be it. The longer a person stays in a university environment, the more knowledge and skills he will garner. Only human resource that is well grounded in knowledge can bring about the desired nature and level of development and progress.

On the matter of R&D in local universities (IPTA), I also find it appalling that local universities are not given the autonomy to manage the funds for R&D by themselves. The funds are parked in the Ministry of Science, Technology and Innovation and the Ministry of Higher Education. To acquire the research funds, researchers must submit proposals based on priority areas determined by the two Ministries. Such an approach places junior lecturers in a disadvantaged position as they have to compete with their peers who may have many more years of experience. This may eventually lead to perpetual disparity among academic staff and universities as the capacity building opportunity of the younger universities are curtailed by the aforementioned funds disbursement mechanism.





# RESEARCH TOOLS AND TECHNOLOGIES

## Manufacturing Facilities at the Faculty of Engineering

**M**anufacturing is a process where materials are converted from one form to another which in turns adds value to the intended products.

Manufacturing activities are covers design, material selection, prototyping, fabrication, machining, sales, and distribution.

The manufacturing activities within the fabrication can be cutting, lathing, milling, welding and many more.

The collection of these process are called manufacturing systems. As goods are usually mass produced, the processes are highly repetitive and would require a measure of accuracy.

These manufacturing systems can be designed to meet specific requirements for particular goods. The processes can incorporate

an automated production line which would include manipulator such as robots, computer numerical control (CNC), conveyor system, assembly stations and inspection station, to name a few.

These types of systems are usually called Flexible Manufacturing Systems (FMS). The current FMS is housed at Lower Ground Floor, within the Department of Mechanical & Manufacturing Engineering, Faculty of Engineering, as shown in



FMS (Flexible Manufacturing Systems) set-up.

Figure 1. The main system consists of robots (3 articulated, 1 Scara and 1 3-axis robot), CNC Mills, CNC Turns, an Automated Guided Vehicle (AGV) and an Automated Storage and Retrieval System (ASRS). The system is also attached with links to 25 sets of computer units which hold design and machining software as shown in Figure 2.

The whole system is designed such that a mini manufacturing floor is represented. This is to reflect a manufacturing-based plant. The current FMS is set up to produce a complete chess set and a pen holder. The current set-up is ideal not only for teaching students in design and manufacturing subjects but also can be used for training purposes. The training can include automation, software, robots and machining. Apart from that, the set-up also has many potential for research which includes material, machining, control, automation, robots, image processing and manufacturing in general.



25 sets of computer for teaching and training purposes.

## Central GIS Lab at UNIMAS



State-of-the- Art Facilities for Remote Sensing & GIS Activities

The main role of the GIS Lab is to coordinate, promote, catalyse and enhance GIS activities in Unimas, particularly in the areas of teaching, research and consultation.

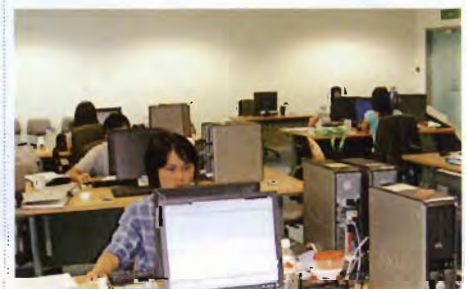
In addition, the Lab will

also support the development of innovative, inter-disciplinary applications of GIS for Unimas. The lab is equipped with state-of-the-art GIS and remote sensing facilities. It will be an invaluable resource and reference point for this region for those involved in teaching, research and consultation in GIS.

Some of the services and activities of the Lab include:

- Provision of GIS related training
- Development of GIS applications
- Promotion of GIS research
- Application of research grants
- Setting up the GIS resource centre for teaching, research and consultation

The Universiti Malaysia Sarawak GIS Lab was established on 15 of November 2004, under the direct responsibility of the Deputy Vice Chancellor (Research & Innovation). The GIS Lab aims to be the leading GIS Lab for research and consultation in this region by providing innovative and creative solutions/services for GIS clients.





# SEMINARS AND CONFERENCES

## International Conference on Natural Resources & Environmental Management and Environmental Safety & Health (NREM & ESH) 2007

The biennial NREM2007, jointly organised by Sarawak Ministry of Environment and Public Health (MEPH), Natural Resources and Environment Board (NREB), Institut Kimia Malaysia (IKM) and Universiti Malaysia Sarawak (UNIMAS), has been successfully held in Kuching from November 27 to 29, 2007. The main objective of this conference is to gather all the environmental scientists, environmental managers, legislators, municipal councilors and those in the academia to exchange views, experience and their findings related to environmental management and environmental safety and health. Keynote speakers included Dr. Vyacheslav Magmedov of Canada presenting the latest development of "constructed wetlands for water treatment and nature conservation"; Professor Dr. Ir. Christian Stevens, Director of Centre of Renewable Resources, Ghent University, on "renewables bioresources"; Professor Ralf Otterpohl from TUHH-Hamburg University of Technology, on "water and sanitation" and also local experts, Professor Dato' Dr. Abdul Latif Mohamed, Faculty of Science and Technology, Universiti Kebangsaan Malaysia (UKM) on "biodiversity: its importance and threats from economic development" and Dato' Dr. James Dawos Mamit on "global Warming and climate change". The conference was participated by about 200 participants.

## The 2<sup>nd</sup> International Conference on Applied and Creative Arts (2<sup>nd</sup> ICACA 2008)

The 2<sup>nd</sup> International Conference on Applied and Creative Arts, 16th to 17th January 2008, provides a forum for discussing issues on creative arts from a global perspective. The conference will emphasize emerging creative paradigms in all disciplines and areas of expertise in the applied and creative arts. This conference is an opportunity for creative intellectuals and professionals, practitioners, artists, designers, inventors, performing arts directors and



managers to discuss and share valuable information on new techniques, methodologies, processes, technologies, applications and issues related to creativity and globalisation. Among the highly respected invited keynote speakers at ICACA 2008 are Professor Michael Cohen, who is the Director of the Spatial Media Group and Professor of Computer Arts at the University of Aizu, Japan; Professor Chesley Skinner, who is a professor of Dramatic Arts and currently serves as the Dean of the Faculty of Fine Arts at the University of Lethbridge, Canada; and Dr. Darlie O Koshy, who is the Director of the National Institute of Design (NID) in Ahmedabad, India. He holds a PhD in Management from the Indian Institute of Technology, Delhi, India. The co-sponsor of the conference is PETRONAS and supported by Malaysian Design Council. For further information please visit <http://www.unimas.my/icaca2008/> or email: [icaca@faca.unimas.my](mailto:icaca@faca.unimas.my)

## 1<sup>st</sup> Biennial International Evidence-Based Nursing Conference

The Department of Nursing at the Faculty of Medicine and Health Sciences, Universiti Malaysia Sarawak and the School of Nursing and Midwifery, University of South Australia are jointly organising the 1<sup>st</sup> Biennial International Evidence-Based Nursing Conference, from 25-28 June, 2008 in Kuching, Sarawak, Malaysia to promote and enhance evidence-based practice. This four-day conference also includes a two day pre-conference workshop.

Evidence-based nursing is the key approach to ensure quality and safe care to clients from highly diverse backgrounds and in an increasingly complex and challenging healthcare environment. The keynote speakers of this conference are prominent nurse

researchers, academics, and authors whose expertise in evidence-based nursing is well sought after by the healthcare industry. Amongst the keynote speakers are: Professor Helen H.I. McCutcheon (Head of the School of Nursing and Midwifery, University of South Australia), Professor Mary Courtney (Domain Leader, Institute of Health and Biomedical Innovation, Queensland University of Technology), Professor Adrain Esterman (Foundation Chair of Biostatistics, School of Nursing and Midwifery, University of South Australia), and Dr. Carl Thompson (Head of MSc in Evidence-Based Practice, University of York and Editor of Evidence-Based Nursing Journal, BMJ).

The conference has the support of the Evidence-Based Nursing journal, BMJ Publishing Group, Sarawak Convention Bureau, and Sarawak Tourism Board.

Further information can be obtained from the conference website – [www.fmhs.unimas.my/EBNC08](http://www.fmhs.unimas.my/EBNC08) or by contacting the Conference Secretary directly through email – [ebnc08\\_inquiry@fmhs.unimas.my](mailto:ebnc08_inquiry@fmhs.unimas.my)

## Regional Symposium on Zoonoses and Emerging Infectious Diseases

The recent emergence and re-emergence of zoonotic diseases in Malaysia emphasises the urgent need to identify infective agents in wildlife, study their transmission to humans and understand the complex epidemiological and ecological mechanisms that directly impact on the health of wildlife and humans.

In this context, a regional zoonoses and emerging infectious diseases symposium will be held at the Universiti Malaysia Sarawak Centre for Academic Information Services (CAIS) Auditorium from 21st to 22nd January 2008 with the theme "Zoonoses, Environment and Wildlife Ecological Dynamics". Among the distinguished speakers are Professor Mary Jane Cardosa (Director, ICHM, UNIMAS), Professor Balbir Singh (Director, MRC, UNIMAS), Dr Peter Daszak (Executive Director, Consortium for Conservation Medicine, USA), Dr Stephen Prowse (CEO, AR-CBC, University of Queensland), Dr. Hume Field (Queensland Department of Primary Industries and Fisheries, Australia) and Professor Nathan D. Wolfe (UCLA, USA). Information and registration at [http://www.unimas.my/images/stories/pdf/zoonoses\\_brochure.pdf](http://www.unimas.my/images/stories/pdf/zoonoses_brochure.pdf)



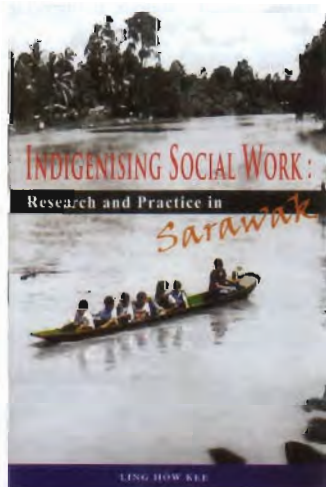
# PUBLICATIONS

The following are books and selected international journal papers (with impact factors) written by the academic staff of UNIMAS, published or released between August and November 2007.

## Books



Jeniri A. 2007. Akhbar Politik, Politik Akhbar. UNIMAS Publications. ISBN 978-983-9257-73-1; 266 pp.



Ling, H.K. 2007. Indigenising Social Work: Research and Practice in Sarawak. Strategic Information & Research Development Centre (SIRD), Selangor. 205 pp.

Rujhan M. 2007. Pembangunan Ekonomi Integrasi Asia Timur. UNIMAS Publications. ISBN 978-983-9257-77-9; 106 pp.



Syahrul Nizam J. 2007. Persembahan hebat dengan PowerPoint. PTS Professional Publishing. ISBN 978-983-3585-84-7; 144 pp.

## International Journal Papers

Abdullah, F., Ferraro, M., Rigit, A. 2007. Design Optimization of an Unmanned Underwater Vehicle. *Journal of Engineering Science and Technology*. 2 (2): 119-125.

Cohen M., Noor Alamshah B., Fernando ONN. 2007. A multiuser multiperspective stereographic QTVR browser complemented by Java3D visualizer and emulator. *Teleoperators & Virtual Environments*. 16 (4): 414-438.

Das, I., N. S. b. Yaakob & J. Sukumaran. 2007. A new species of *Microhyla* (Anura: Microhylidae) from the Malay Peninsula. *Hamadryad* 32(1): 304-314.

Das, I. & S. K. Dutta. 2007. Sources of larval identities for amphibians of India. *Hamadryad* 32(1): 330-357.

Das, A. & I. Das. 2007. Rediscovery of *Mictopholis austeniana* (Annandale, 1908) (Squamata: Agamidae). *Current Herpetology* 26(1): 45-47.

Das, I. 2007. Some forgotten descriptions of *Nasikabatrachus* (Anura: Sooglossidae). *Herpetological Review* 38(3): 291-292.

Das, I. & M. Lakim. 2007. A second specimen of *Complicitus nigrigularis* (Ota & Hikida, 1991). *Hamadryad* 32(2): 76-79.

Hasnizam AW. 2007. Electroacoustic Music Studies: Some Thoughts and Possibilities. *Organised Sound - An International Journal of Music and Technology*. 12(2): 167-169.

Sze SN., Tiong WK. 2007. A comparison between heuristic and meta-heuristic methods for solving the multiple traveling salesmen problem. *International Journal of Mathematics Sciences*. 1: 200-203.

Wishing our readers a happy,  
productive and successful 2008



# RESEARCH CONTACTS

The following are contact emails and telephone extensions (082-581000 through operator; or 082-58 followed by the extension number for direct dialing) of officers/researchers in-charge of various research disciplines at UNIMAS.

## Vice Chancellor

Prof Datuk Dr Abdul Rashid Abdullah  
ara@cans.unimas.my (ext. 1111)

## Deputy VC (Research & Innovation)

Prof Dr Murtedza Mohamed  
ted@cans.unimas.my (ext. 1122)

## Faculty of Resource Science & Technology

Prof Dr Wan Sulaiman Wan Harun  
whwsulaiman@frst.unimas.my (ext. 3180)

- 1 Molecular Biology  
Assoc Prof Dr Edmund Sim Ui Hang  
uhsim@frst.unimas.my (ext. 3185)
- 2 Plant Science and Environmental Ecology  
Assoc Prof Dr Cheksum Tawan  
cheksum@frst.unimas.my (ext. 3186)
- 3 Zoology  
Assoc Prof Dr Mohd Tajuddin Abdullah  
tabdulla@frst.unimas.my (ext. 3189)
- 4 Chemistry  
Prof Dr Lau Seng  
lauseng@frst.unimas.my (ext. 3191)
- 5 Aquatic Sciences  
Dr Siti Akmar Khadijah Ab Rahim  
arakmar@frst.unimas.my (ext. 3190)

## Institute of BioDiversity & Environmental Conservation

Assoc Prof Dr Andrew Alek Tuen  
aatuen@ibec.unimas.my (ext. 2295)

## Faculty of Computer Science & Information Technology

Johari Abdullah  
ajohari@fit.unimas.my (ext. 3767)

- 1 Computational Sciences and Mathematics  
Dr Jane Labadin  
ljane@fit.unimas.my (ext. 3775)
- 2 Computing and Software Engineering  
Dr Edwin Mit  
edwin@fit.unimas.my (ext. 3636)
- 3 Computer System & Communication Technology  
Assoc Prof Dr Tan Chong Eng  
cetan@fit.unimas.my (ext. 3776)
- 4 Information System  
Sharin Hazlin Huspi  
hshazlin@fit.unimas.my (ext. 3772)

## Faculty of Engineering

Dr Azhaili Baharun  
bazhaili@feng.unimas.my (ext. 3325)

- 1 Mechanical Engineering  
Dr Mohd Shahril Bin Osman  
omshahril@feng.unimas.my (ext. 3340)
- 2 Civil Engineering  
Dr Siti Halipah Ibrahim  
ihalipah@feng.unimas.my (ext. 3337)
- 3 Electronics Engineering  
Norhuzaimin Julai  
jnorhuza@feng.unimas.my (ext. 3339)
- 4 Chemical Engineering  
Dr Mohammad Omar Abdullah  
amomar@feng.unimas.my (ext. 3283)

## Faculty of Medicine & Health Sciences

Tan Sri Datu Prof. Dr. Mohd Taha Arif  
amtaha@fmhs@unimas.my (082-292111)

- 1 Surgery  
Assoc Prof Dr Tin Win  
wtin@fmhs@unimas.my (082-292207)
- 2 Medicine  
Dr Rohana Abdul Ghani  
grohana@fmhs.unimas.my (082-292195)
- 3 Paraclinical Sciences  
Dr Lela Su'ut  
slela@fmhs.unims.my (082-292269)
- 4 Basic Medical Sciences  
Prof Dr Vijeyaratnam Thambyrajah  
vijitham@fmhs.unimas.my (082-292303)
- 5 Orthopedics  
Prof Dr Pan Kok Long  
klpan@fmhs.unimas.my (082-292202)
- 6 Pediatrics  
Dr. Mohamed Ameenudeen B.A. Sultan Abdul Kader  
akmameenudeen@fmhs.unimas.my (Tel: 292216)
- 7 Obstetrics and Gynaecology  
Dr Mohd Haizal Mohd Nor  
mmhaizal@fmhs.unimas.my (082-292263)
- 8 Community Medicine and Public Health  
Dr Kamaluddin Bakar  
bkamaluddin@fmhs.unimas.my (082-292238)
- 9 Nursing  
Shanui Shabas  
sshanui@fmhs.unimas.my (082-292292)



- 10 Ophthalmology  
Dr Mahadhir Alhady Sulaiman  
smalhady@fmhs.unimas.my (082-292211)
- 11 Psychological Medicine  
Dr Gan Chee Kuan  
ckgan@fmhs.unimas.my (082-292281)
- 12 Family Medicine  
Dr Kamarudin @ Thomas Kana  
kkamarudin@fmhs.unimas.my  
(082-292234)
- 13 Radiology  
Dr Ahmad Faizal b. Mohammad Ali  
maafaizal@fmhs.unimas.my (082-292270)

#### Faculty of Applied & Creative Arts

Assoc Prof Mohd Fadzil Abdul Rahman  
fadzil@faca.unimas.my (ext. 1436)

- 1 Design Technology  
Musdi Hj Shanat  
smusdi@faca.unimas.my (ext. 1437)
- 2 Visual Arts and Technology  
Zulkalnain Zainal Abidin  
nine@faca.unimas.my (ext. 1342)
- 3 Performing Arts and Production Technology  
Abdul Riezal Dim  
driezal@faca.unimas.my (ext. 1344)
- 4 Liberal Arts  
Qistina Donna Juleng Lee  
ldjuleng@faca.unimas.my (ext. 1321)

#### Faculty of Cognitive Science & Human Development

Dr Shahren Ahmad Zaidi Aduce  
azshahren@fcs.unimas.my (ext. 1569)

- 1 Cognitive Science  
Kartini Abd Ghani  
gkartini@fcs.unimas.my (ext. 1560)
- 2 Human Resource Development  
Dr Azman Ismail  
iazman@fcs.unimas.my (ext. 1558)
- 3 Counselling  
Salmah bt. Mohamad Yusoff  
mysalmah@fcs.unimas.my (ext. 1531)

#### Faculty of Economics & Business

Prof Dr Shazali Abu Mansor  
mshazali@feb.unimas.my (ext. 2280)

- 1 Economics  
Assoc Prof Dr Ahmad Bin Shuib  
shahmad@feb.unimas.my (ext. 2428)
- 2 Business  
Prof Dr Abu Hassan Bin Md Isa  
miahassan@feb.unimas.my (ext. 2356)

#### Faculty of Social Sciences

Assoc Prof Dr Abd Mutalip Abdullah  
aamutalip@fss.unimas.my (ext. 2255)

- 1 Sociology and Anthropology  
Dr Ling How Kee  
ihkee@fss.unimas.my (082-679117)
- 2 Politics and International Relations  
Dr Neilson Ilan Mersat  
mnilan@fss.unimas.my (082-679135)
- 3 Development Studies  
Assoc Prof Dr Spencer Empading Sanggin  
spencer@fss.unimas.my (082-679155)

#### Institute of Community Health & Medicine

Prof Dr Mary Jane Cardoso  
jcardosa@ihcm.unimas.my (082-671730 / 082-582348)

#### Institute of East Asian Studies

Prof Dr Abdul Halim Ali  
aahalim2@ieas.unimas.my (ext. 2274)

#### Centre for Language Studies

Dr Soubakeavathi Rethinasamy  
rsouba@cls.unimas.my (ext. 1749)

#### Centre for Water Research

Prof Dr Lau Seng  
lauseng@frst.unimas.my (ext. 3191)

#### Malaria Research Centre

Prof Dr Balbir Singh  
bsingh@fmhs.unimas.my (082-292256)

#### Centre for Rural Informatics

Prof Dr Khairuddin Ab Hamid  
khair@cans.unimas.my (082-665104)

#### Centre for Image Analysis & Spatial Technologies

Prof Dr Wang Yin Chai  
ycwang@fit.unimas.my (ext. 3796)



# Award –Winning Inventions by UNIMAS Researchers

The following are products and inventions of UNIMAS researchers, which have won awards and medals at numerous exhibitions, locally and internationally, in 2005-2007. Further enquiries on these products can be directed to RIMC UNIMAS 082-581037 (Assoc Prof Dr Awangku Abdul Rahman Pgn Hj Yusof) or [pyaarahman@rimc.unimas.my](mailto:pyaarahman@rimc.unimas.my)

1. Mobile Emergency Aid Kit for Paramedic and Rescue Team
2. Compact Rescue Stretcher
3. Unmanned Underwater Search Craft
4. Magic Finger: An Intelligent Free Hand Input Device
5. A High Performance Cost – Effective Oil- Water-Solids Separator
6. AeroJac: Jackets for Motorcyclist
7. Bioresist: An alternative Masking Formula for Batik Production
8. Interactive Digital Wayfinding Application
9. Comfy Pants : Practical Pants for Children With Special Need
10. Belly Basic: Maternity Dress With Practical Opening
11. A New Method of Reconstructing the Humerus for Bone Cancer
12. Attire for Stroke Patients
13. Magic Board-Games : A New Way of Games Entertainment
14. Bio-composite Sago Bark Waste for Interior Decoration Products
15. e-Bario: ICT for Rural Community
16. Easywear: Patient Attire in Hospital Wards
17. Agriculture Support System and Field Tools: Oil Palm Tree Crown Delineation and Enumeration Using Ikonos Satellite Images
18. Image Finder: A Content Based Image Retrieval System
19. The Shell of Placuna Placenta Linnaeus: A Potential Material for Interior Products
20. The Bario Lakuh Digital Library
21. Baju Kurung for Breast Feeding
22. Informative Design on Textiles for the Visually Impaired Persons
23. Fibreboard from Sago Waste using Natural Enzyme
24. Production of Lactic Acid from Sago
25. An Assistive Device from Increasing the Rate of Union of Open Fractures of the Tibia.
26. A Circular Separator for Removal of Oil & Grease from Kitchen Wastewater.



