UNIVERSITI
KEBANGSAAN
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FAKULTI TEKNOLOGI
DAN SAINS MAKLUMAT
Faculty of Information Science
and Technology

CAIT.
Center for Artificial Intelligence Technology
Universiti Kebangsaan Malaysia

RESEARCH BOOKLET

CENTER FOR ARTIFICIAL INTELLIGENCE TECHNOLOGY

www.ftsm.ukm.my/cait

computing.ftsmukm

Cait ftsm ukm

MISSION

Our mission is to become a preferred centre of excellence in research in the field of artificial intelligence, by focussing our areas of expertise in Pattern Recognition, Data Mining and Optimization, Knowledge Technology, and Industrial Computing.

VISION

CAIT is committed to becoming a leading centre that pioneers innovation in the construction of knowledge about Artificial Intelligence, and to become a hub for researchers in this field at national and international levels.

ABOUT **CAIT**

The Center for Artificial Intelligence Technology, Also known by CAIT, was proposed in 2005 for the development of research in the field of artificial intelligence, which has become active in the Faculty of Information Science and Technology (FTSM), as a catalyst to foster new expertise in this area in FTSM. The proposal for the establishment of CAIT as a center of excellence in research was made on June 24, 2005 in the Academic Enhancement Workshops, held by the Department of Systems Science and Management of FTSM, in Putrajaya. A series of consultations with external experts in the field of artificial intelligence was held to obtain feedback on the proposed establishment of this centre. Assessments were also made on the strength of the faculty in artificial intelligence, as well as reinforcement of the proposed strategy for future research center, improving the physical and conceptual structure of the organization, operation centers, human resource requirements, hardware and software, as well as the budget of the organization.

The proposal paper for CAIT was approved by the Senate of Universiti Kebangsaan Malaysia (UKM) on 20 September 2006, and also by the Board of Directors of the University (LPU) on December 14, 2006. The proposal paper for CAIT was subsequently submitted to the Ministry of Higher Education and formally approved on 10 April 2007. In line with UKM as a Research University, CAIT has been structured in accordance to the structure of the Research University, with CAIT become the anchor for three research groups, recognized by UKM, which are the; Data Mining and Optimization Research Group, the Pattern Recognition Research Group and the Knowledge Technology Research Group. In 2011, CAIT has expanded with the inclusion of the Industrial Computing Research Group. Their involvement has further strengthen the research activities in CAIT. The formation of CAIT is also in line with the establishment of the country's ICT Agenda (National ICT Roadmap), which list particular Artificial Intelligence fields, especially Data Mining, Image and Signal Processing, Forecasting Models and Semantic Technology as major research directions for the country.

The goal of the CAIT are to:

- Conduct advanced research in artificial intelligence to meet the needs of science, government and business.
- Become a center of excellence, reference and training in research and application of artificial intelligence in UKM.
- Produce competent researchers in artificial intelligence research.
- Generate intellectual property and artificial intelligence-based products that have high added value and potential for commercialization.

MIXED REALITY AND PERVASIVE COMPUTING
R E S E A R C H   L A B

MYXLab

LABORATORY OUTLINE

Mixed Reality and Pervasive Computing Lab (MyXLab) was established in August 2014. MyXLab vision is to be a center of excellence in research and development in Mixed Reality and Pervasive technologies. The objective of MyXLab is to conduct research and innovation in the areas of Mixed Reality and Pervasive Computing (Augmented Reality, Mixed Reality, Mobile Application, Mobile Cloud) by bringing together all the talented students and researchers of these fields. It provides a fully equipped multi-disciplinary project-based learning environment. MyXLab aims at serving the nation and the community by sharing the new forms of knowledge and producing high quality research and development.

Since the very beginning, MyXLab has successfully gained reputation from the society, academics and industry. Interest in research collaborations, product commercialization and knowledge transfer is shown from various entities including researchers of other disciplines, universities and companies. MyXLab's overseas collaborators include HITLab NZ, University of Queensland, Universiti Hassanuddin Makassar and Tokyo Institute of Technology. MyXLab also provides training facilities in the field of Mobile Application Development and Mobile Augmented Reality.

RESEARCH FOCUS

MyXLab offers exciting opportunities for the overwhelming number of visitors every week to have a first-hand experience with the latest technologies, products, mobile apps and gadgets including the Google Glass, Oculus Rift, Kinect, Leap Motion and Nimble 3D.

RESEARCH PROJECTS

- *Program Title*: Enhancement Strategies for Zero Waste Campus, *Project Title*: Smart Garbage Bin with IoT Applications, *LRGS MRUN/F2/01/2019/1/2*

- Development of Media Technology in Documenting Tourist Attactions in Selangor for Promoting Visit Malaysia 2020, *TT-2019-006*

- Natural User Interface (NUI) Serious Game Model for Post-Stroke Rehabilitation, *FRGS/1/2019/ICT01/UKM/02/3*

- GPS-Based Bus Tracking System - BasKita V2.0, *INOVASI-2018-005*

- Tangible Interaction Technique with Authoring ability for Mobile Augmented Reality, *FRGS/1/2018/ICT04/UKM/02/4*

- RGB + HSV FREAK Binary Descriptor for Image Recognition in Mobile Devices, *FRGS/1/2018/ICT01/UKM/02/5.*

- An Efficient Cloud Based Augmented Reality SDK for Android Mobile Application, *GGPM-2018-011*

- Robotic Programming Module based on Kolb`s model for Primary and Secondary Students in Strengthening Interest in STEM Education. *FRGS/1/2017/ICT04/UKM/03/1*

- Unmanned Aerial Vehicle (UAV) Navigation using Human Gesture Recognition Interaction Technique through Visualisation. *GGP-2017-030*

- Mobile App Expert System with Machine Learning Method for Decision Making in Consultation of Snakebite Envenomation and Treatment. *GUP-2017-050*

PUBLICATIONS

- Siok Yee Tan, Haslina Arshad, Azizi Abdullah, 2019. Distinctive accuracy measurement of binary descriptors in mobile augmented reality. *Plos One*

- Norliyana Mazli, Mohd Yazid Bajuri, Azrulhizam Shapii, Mohd Rohaizat Hassan, 2019. The semi-automated software (MyAnkleTM) for preoperative templating in total ankle replacement surgery. *Journal of Clinical and Diagnostic Research*

- Siti Umaira Zakaria, Sahriah Basri, Siti Kartom Kamarudin, Nazatul Aini Abd Majid, 2019. Public awareness analysis on renewable energy in malaysia. *International Conference on Sustainable Energy and Green Technology 2018*

- Lam Meng Chun, Haslina Arshad, Anton Satria Prabuwono, Siok Yee Tan, S. M. M. Kahaki, 2018. Interaction techniques in desktop virtual environment: the study of visual feedback and precise manipulation method. *Multimedia Tools and Applications* .

- Azrulhizam Shapi'i, Haslina Arshad, Mohd Syazwan Baharuddin, Hafiz Mohd Sarim. 2018. Serious games for post-stroke rehabilitation using microsoft kinect. *International Journal on Advanced Science, Engineering and Information Technology*

RESEARCHERS

- Dr. Lam Meng Chun **(Head)**
- Prof. Dr. Haslina Arshad
- Dr. Azrulhizam Shapii
- Dr. Nazatul Aini Abd Majid
- Dr. Tan Siok Yee
- Dr. Zainal Rasyid Mahayuddin

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MC Lab
Medical Computing Lab

LABORATORY OUTLINE

The MCLab aims to develop new algorithms and discover hidden patterns for medical data analysis, be it in image form, audio, video, text or numbers. The application can be used to help medical practitioners in making decisions, educating trainees as well as sharing their expertise, in addition to quantify their observations over diseases and treatments. Seamlessly integrating the medical applications, practices and managements with the machine intelligence and performance, to better serves the community. We aims to develop new algorithms and discover hidden patterns for medical data analysis, be it in image form, audio, video, text or numbers. The application can be used to help medical practitioners in making decision, educating trainees as well as sharing their expertise, in addition to quantify their observations over diseases and treatments.

"The chosen partner for research collaboration with medical practitioners worldwide"

RESEARCH PROJECTS

• Dynamic Compression Method based on Lossless and Reversible Decoder for High Resolution Images, *FRGS/1/2019/ICT02/UKM/02/6*

• Predicting Changes in Image using Cluster Co-Occurrency Features, *GGPM-2016-074*

• Commute- Time Convolution Kernels for Graph Clustering to Represent Images, *FRGS/1/2016/ICT02/UKM/02/10*

• Development of Cancer Awareness and Radiotherapy Monitoring Apps, *GGP-2017-055,*

• Automated Medical Services Via IOT, Mobile Application and Big Data Integration, *AP-2017-007/2*

• Diagnostic Services Nexus For Breast Cancer, *ETP-2013-053*

• Overlapped Irregular Shape Descriptor Based on Non-Linear Approach, *FRGS/1/2014/ICT07/UKM/02/5*

• Machine Learning in Decision Making with Uncertainty With Application to Jawi/Arabic Manusripts, Biometric Authentication, Intelligence Robot, Medical Image Database and Security and Digital Forensic Data, *DPP-2015-012*

RESEARCHERS

• Dr. Afzan Adam **(Head)**
• Assoc. Prof. Dr. Shahnorbanun Sahran
• Assoc. Prof. Dr. Siti Norul Huda Sheikh Abdullah
• Assoc. Prof. Dr. Suhaila Zainudin

SELECTED PUBLICATIONS

• Shahnorbanun Sahran, Dheeb Albashishb, Azizi Abdullaha, Nordashima Abd Shukorc, Suria Hayati Md Pauzi, 2018. Absolute cosine-based SVM-RFE feature selection method for prostate histopathological grading. *Artificial Intelligence in Medicine*

• Shahnorbanun Sahran, Ashwaq Qasem, Khairuddin Omar, Dheeb Albashih, Afzan Adam, Siti Norul Huda Sheikh Abdullah, Azizi Abdullah, Rizuana Iqbal Hussain, Fuad Ismail, Norlia Abdullah, Suria Hayati Md Pauzi, Nurdashima Abd Shukor, 2018. Machine learning methods for breast cancer diagnostic. *In Breast Cancer and Surgery.* London: IntechOpen

• Dheeb Albashish, Shahnorbanun Sahran, Azizi Abdullah, Mohammed Alwesha, Afzan Adam, 2018. A hierarchical classifier for multiclass prostate histopathology image gleason grading. *Journal of Information and Communication Technology*

• Afzan Adam, Thong Wing Yin, Raja Zahratul Azma Raja Sabudin & Masri Ayub, 2018. Automatic Detection and Counter for Lymphoblast Cell. *Regional Conference onf Non-communicable Diseases*

• Afzan Adam, Kho Pei Ee, Noraidah Sahari, Angela Tida, Chen Yi Shang, Kevin Muyang Tawie, Shafinah Kamarudin, Hazura Mohamad, 2018. Dr.LADA: diagnosing black pepper pest and diseases with decision tree. *International Journal on Advanced Science, Engineering and Information Technology*

• Suhaila Zainudin, Nevy Rahmi Nurjana, 2018. Comparison of similarity method to improve retrieval performance for chemical data. *Asia-Pacific Journal of Information Technology and Multimedia*

• Nor Ashikin Mohamad Kamal, Azuraliza Abu Bakar & Suhaila Zainudin, 2018. Classification of human membrane protein types using optimal local discriminant bases feature extraction method. *Journal of Theoretical and Applied Information Technology*

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SENTIMENT ANALYSIS
RESEARCH LAB

LABORATORY OUTLINE

Sentiment Analysis (opinion mining) refers to the use of natural language processing, text analysis and computational linguistics to identify and extract subjective information in source materials.

RESEARCH FOCUS

- Sentiment Analysis
- Feature Extraction
- Feature Selection
- Sentiment Polarity
- CRM for Product Extraction
- Opinion Mining

RESEARCH TOPICS

- Sentiment Analysis With Limited Training Data : Case Study In Persian Language
- Hybrid Sentiment Analysis Approach To Identify Customer Satisfaction In Product Reviews
- Cross Domain Adoption For Arabic Sentiment Analysis
- Cross Language Sentiment Analysis From English To Arabic
- Teachers' Perception Toward Ict Use In Early Childhood Education
- New Online Social Networks Model For Community Detection Based On Minimum Spanning Tree
- Feature Selection Method For Hotel Reviews
- Twitter Sentiment Analysis For Political Background
- Sentiment Analysis For Movie Reviews

RESEARCH PROJECTS

- Malay Language Sentiment Lexicon Generation using a Hybrid of Dictionary and Corpus Based Approach, *GUP-2019-058*
- New Online Social Networks (OSNs) Model for Community Detection based on Minimum Spanning Tree (MST), *FRGS/1/2017/ICT02/UKM/02/4*
- Teacher's Perception Towards ICT Usage in Pre School Class, *RCRP-2016-002*
- Sentiment Analysis: Improvement of Feature Extraction based on Ontology and Synonym Words, *GGPM-2016-006*
- Knowledge-Based Recommender System to Promote Healthy Lifestyle and Activities for Cognitive Pre-Frail Older Adult with Diabetes, *DCP-2017-002/3*
- Unsupervised Ensemble of Active Learning and Sentiment Thesaurus Model for Cross-Domain Sentiment Classification, *FRGS/1/2016/ICT02/UKM/02/11*
- Contextual Sense Sentiment Similarity Incorporating Emotional Vector, *FRGS/2/2013/ICT02/UKM/02/1*
- Sentiment-Based Model for Recommender Systems, *FRGS/1/2014/ICT02/UKM/01/1*

SELECTED PUBLICATIONS

- Amin Mahmoudi, Mohd Ridzwan Yaakub, Azuraliza Abu Bakar, 2019. The relationship between online social network ties and user attributes. *ACM Transactions on Knowledge Discovery from Data*
- Mohd Ridzwan Bin Yaakub, Muhammad Iqbal Abu Latiffi & Liyana Safra Zaabar, 2019. A review on sentiment analysis techniques and applications. *International Conference On Green Engineering & Technology (IConGETech) & International Conference On Applied Computing (ICAC2019)*
- Siti Rohaidah Ahmad, Azuraliza Abu Bakar, Mohd Ridzwan Yaakub, 2019. A review of feature selection in sentiment analysis. *Intelligent Data Analysis.*
- Siti Rohaidah Ahmad, Azuraliza Abu Bakar, Mohd Ridzwan Yaakub, 2019. Ant colony optimization for text feature selection in sentiment analysis. *Intelligent Data Analysis*
- Tareq Al-Moslmi,Mohammed Albared Adel Al-Shabi, Nazlia Omar,Salwani Abdullah, 2018. Arabic senti-lexicon: Constructing publicly available language resources for Arabic sentiment analysis. *Journal of Information Science*
- Ahmed Al-Saffar, Suryanti Awang, Hai Tao, Nazlia Omar, Wafaa Al-Saiagh, Mohammed Al-Bared, 2018. Malay sentiment analysis based on combined classification approaches and Senti-lexicon algorithm. *PLOS ONE*

RESEARCHERS

- Dr. Mohd Ridzwan Yaakub **(Head)**
- Prof. Dr. Azuraliza Abu Bakar
- Assoc. Prof. Dr. Nazlia Omar

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LABORATORY OUTLINE

The Data Mining and Optimization Lab (DMO Lab) at the Centre for Artificial Intelligence Technology, Universiti Kebangsaan Malaysia is focused on the analysis of very large data sets, especially those that arise in the application areas of text mining and bioinformatics. The emphasis is on finding artificial intelligence based algorithms for the tasks in data mining, such as classification, association rules mining, clustering, and deviation detection.

The current focus of the group is on exploring new algorithms to deal with the optimization, feature selection, and pattern detection in big data. In current years we focus on several specific applications such as disease outbreak detection, climate change informatics, text mining in finance, and health informatics. With the above goals in mind, the lab has recently been exploring the application of various nature inspired computing methods to accomplish data mining tasks.

RESEARCH FOCUS

Interdisciplinary research in data mining and related areas :

- Healthcare
- Big Data
- Climate Change
- Finance

RESEARCH PROJECTS

- Combinatorial Testing Strategies based on Swarm Intelligence for Internet of Things, *FRGS/1/2019/ICT02/UKM/01/1*
- A Deep Learning Prune based Algorithm with Compression to Optimise IoT Capability and Communication, *FRGS/1/2019/ICT02/UKM/02/7*
- Discrete Differential Evolution Algorithm Enhancement using Self-Adaptive Learning Mechanism for Solving Surgery Scheduling Problems, *FRGS/1/2018/ICT02/UKM/01/1*
- The Development of Analytics Model and Business Intelligence Tool for Managing UKM Staff, *KRA-2018-014*
- The Develement of Research Productivity Predictive Model using Machine Learning Approach, *KRA-2018-015*
- Meta-evolutionary approach for Solving Combinatorial Optimization Problems in Healthcare, *DIP-2019-013*
- A Sustainable Cyber Usage Model for B40, *DCP-2017-015/4*
- Ensemble Machine Learning Approach for Multidimensional Poverty Classification, *DCP-2017-015/1*
- Automated Medical Services via IoT, Mobile Application and Big Data Integration, *AP-2017-007/2*
- Uncertain Time Series Data Analytics in solving Monitoring Systems Errors, *GGP-2017-025*
- Development of novel computational optimisation algorithms and their application in industries, *DIP-2016-024*

SELECTED PUBLICATIONS

- Hossam M. J. Mustafa, Masri Ayob, Mohd Zakree Ahmad Nazri,Graham Kendall, 2019. An improved adaptive memetic differential evolution optimization algorithms for data clustering problems. *PLoS ONE*
- Zulaiha Ali Othman, Noraini Ismail, Mohd Zakree Ahmad Nazri, Hamidah Jantan, 2019. Development of talent model based on publication performance using Apriori technique. *International Journal of Advanced Computer Science and Applications*
- Najmeh Sadat Jaddi, Salwani Abdullah, 2019. Kidney-inspired algorithm with reduced functionality treatment for classification and time series prediction. *Plos One*
- Abdul Razak Hamdan, Azuraliza Abu Bakar & Mohd Zakree Ahmad Nazri, 2018. Sains Data Penerokaan Pengetahuan dari Data Raya. *Bangi Selangor: Penerbit UKM*
- Nor Ashikin Mohamad Kamal, Azuraliza Abu Bakar & Suhaila Zainudin. 2018. Classification of human membrane protein types using optimal local discriminant bases feature extraction method. *Journal of Theoretical and Applied Information Technology*
- Zalinda Othman, Soo Wui Shan, Ishak Yusoff , Chang Peng Kee, 2018. Classification techniques for predicting graduate employability. *International Journal on Advanced Science, Engineering and Information Technology.*
- Malek Alzaqebah, Sana Jawarneh, Hafiz Mohd Sarim, Salwani Abdullah, 2018. Bees algorithm for vehicle routing problems with time windows. *International Journal of Machine Learning and Computing*

RESEARCHERS

- Assoc. Prof. Dr. Zalinda Othman **(Head)**
- Prof. Dr. Azuraliza Abu Bakar
- Prof. Dr. Masri Ayob
- Prof. Dr. Salwani Abdullah
- Assoc. Prof. Dr. Mohd Zakree Ahmad Nazri
- Assoc. Prof. Dr. Suhaila Zainudin
- Assoc. Prof. Dr. Zulaiha Ali Othman
- Dr. Hafiz Mohd Sarim

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APPLIED ONTOLOGY & SEMANTIC SEARCH
R E S E A R C H   L A B

LABORATORY OUTLINE

The Applied Ontology and Semantic Search lab (ONTOSLab) works on research projects involving semantics, particularly at the intersection of information retrieval and computer science. The lab, which was recently set-up on December 2014, mainly focuses on applying ontology to support advanced semantic applications such as semantic search, recommender systems and decision support systems. Our work also includes trans and multidisciplinary research involving ontologies complementary to statistical approaches, machine learning approaches, and also natural language processing.

RESEARCH FOKUS

- Semantic search and contextual browsing
- Ontology-based information retrieval
- Ontology learning and population
- Semantic integration and matching
- Analytics and knowledge discovery
- Semantic knowledge representation and reasoning
- Ontology creation and application of an ontology in an actual system.
- Semantic interface and visualization

RESEARCH PROJECTS

- Semantic Reasoning using OWL DL-Axioms from Literary Document, *FRGS/1/2019/ICT02/UKM/02/2*
- Knowledge-Based Recommender System to Promote Healthy Lifestyle and Activities for Cognitive Pre-Frail Older Adult with Diabetes, *DCP-2017-002/3*
- Acoustic-Prosodic Analysis in Speech Language/Dialect Classification, *FRGS/1/2016/ICT02/UKM/02/14*
- Crowdsource Requirements Engineering with Hybrid Fuzzy Approach for Improving Legacy Systems, *GGPM-2017-025*
- The Development of Semantic Search Engine for Malaysian Business Directory, *01-01-02-SF0106*

RESEARCHERS

- Dr. Saidah Saad (**Head**)
- Prof. Dr. Shahrul Azman Mohd Noah
- Dr. Sabrina Tiun
- Ms. Junaidah Mohamed Kassim

SELECTED PUBLICATIONS

- Mohamed Lubani, Shahrul Azman Mohd Noah, Rohana Mahmud, 2019. Ontology population: approaches and design aspects. *Journal of Information Science*
- Rami Naim Mohammad Yousef, Sabrina Tiun, Nazlia Omar, 2019. Extended trigger terms for extracting adverse drug reactions in social media texts. *Journal of Computer Science*
- Saidah Saad, Ummu Kalsom Latiff, 2018. Extraction of concept and concept relation for Islamic term using syntactic pattern approach. *Asia-Pacific Journal of Information Technology and Multimedia*
- Hamed Zakeri Rad, Sabrina Tiun, Saidah Saad, 2018. Lexical scoring system of lexical chain for Quranic document retrieval. *GEMA Online Journal of Language Studies*
- Bassam Al-Salemi, Masri Ayob, Graham Kendall, Shahrul Azman Mohd Noah, 2019. Multi-label Arabic text categorization: a benchmark and baseline comparison of multi-label learning algorithms. *Information Processing and Management*
- S Hazrina, NM Sharef, H Ibrahim, MAA Murad, Shahrul Azman Mohd Noah, 2018. Linguistic-based SPARQL translation model for semantic question answering system. *Advanced Science Letters.*
- Musatafa Abbas Abbood Albadr, Sabrina Tiun, Fahad Taha Al-Dhief, 2018. Evaluation of machine translation systems and related procedures. *ARPN Journal of Engineering and Applied Sciences*
- Roza Waleed Ali, Junaidah Mohamed Kassim, Siti Norul Huda Sheikh Abdullah, 2019. Finger vein recognition using straight line approximation based on ensemble learning. *International Journal of Advanced Computer Science and Applications*

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MACHINE LEARNING
RESEARCH LAB

LABORATORY OUTLINE

Ability to learn is the most important process of human beings for understanding real world problems. Nowadays, with the advancement of science and technology, many software applications have been adapted for the real world, from simple to complex, ranging from business to scientific applications such as computer vision and surveillance systems. In the machine learning research lab, we focus on researching and exploring computer programs that contain intelligent software modules that are not constructed by conventional programming, but that are learned either from data provided by the user, or from data that the program autonomously collects in real time.

This group is a team of experts in computer science, statistics and applied mathematical science. We focus on making computers learn abstractions, patterns, conditional probability distributions, and policies from data with the goal to improve applications, such as in the recognition and prediction performance.

"to be a pioneer in the discovery of data understanding"

RESEARCH PROJECTS

- Ensemble of Convolutional Neural Networks Using Multiple Heterogeneous Filter Models for Image Classification, *FRGS/1/2019/ICT02/UKM/02/8*
- Performance and Behaviour Analysis of B40 Students in Malaysian Institutes of Higher Learning based on Ensemble Machine Learning Technique, *GUP-2019-060*
- Braille Pattern and Transliteration for Quranic with Tajweed, *DCP-2018-001/1*
- Adaptive Load Balancing Task based on Genetic Programming in MapReduce for Parallel Computing, *FRGS/1/2018/ICT02/UKM/02/6*
- IntelliRehab - Intelligent Medical System with Customised Exercises for Personalized Home Telerehabilitation, *Newton Fund TT-2017-001*
- Enhancement of Substructual Analysis (SSA) Method using Deep Learning Approach, *GGPM-2017-039*
- Geometric Image Transform and Invariant Dissimilarity Metric for Cancer Cell Identification in Medical Imagery, *DIP-2016-018*
- Ensemble of Appearance Based Visual Loop-Closure Detection for Multiple Destinations Robot navigation, *FRGS/1/2016/ICT02/UKM/02/5*
- Jawi Subword Handwritten Recognition using Multimodal Shared Representation, *FRGS/1/2016/ICT02/UKM/01/1*

RESEARCHERS

- Assoc. Prof. Dr. Azizi Abdullah **(Head)**
- Prof. Dr. Khairuddin Omar
- Assoc. Prof. Dr. Md. Jan Nordin
- Assoc. Prof. Dr. Shahnorbanun Sahran
- Dr. Nor Samsiah Sani

SELECTED PUBLICATIONS

- Zuraini Othman, Azizi Abdullah, Sharifah Sakinah Syed Ahmad and Fauziah Kasmin, 2019. Extrema points application in determining iris region of interest. *EDUCATUM Journal of Science, Mathematics and Technology*
- Rami Sihwail, Khairuddin Omar, Khairul Akram Zainol Ariffin, Sanad Al Afghani, 2019. Malware Detection Approach Based on Artifacts in Memory Image and Dynamic Analysis. *Applied Sciences Basel*
- Seyed M. M. Kahaki, Md. Jan Nordin, Nazatul S. Ahmad, Mahir Arzoky, Waidah Ismail, 2019. A deep convolutional neural network designed for age assessment based on Orthopantomography Data. *Neural Computing and Applications*
- Mohd Aliff, Nor Samsiah Sani, 2019. Robot arm analysis based on master device pneumatic actuators. *International Journal of Advanced Computer Science and Applications*
- Mohd Aliff, MI Yusof, Nor Samsiah Sani, Azavitra Zainal, 2019. Development of Fire Fighting Robot (QRob). *International Journal of Advanced Computer Science and Applications*
- Mohammed Salameh, Azizi Abdullah, Shahnorbanun Sahran, 2018. Multiple descriptors for visual odometry trajectory estimation. *International Journal on Advanced Science, Engineering and Information Technology*
- Nor Azman Mat Ariff, Azizi Abdullah, Mohammad Faidzul Nasrudin, 2018. Experimental approach based on ensemble and frequent itemset mining for image spam filtering. *Journal of Telecommunication, Electronic and Computer Engineering*
- Sitti Rachmawati Yahya, Khairuddin Omar, Siti Norul Huda Sheikh Abdullah, Ali Sophian, 2018. Image enhancement background for high damage Malay manuscripts using adaptive threshold binarization. *International Journal on Advanced Science, Engineering and Information Technology*

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AUTONOMOUS ROBOT AND VISION SYSTEM
RESEARCH LAB

ARViS

LABORATORY OUTLINE

The Autonomous Robot and Vision System Lab (ARVISLab) focuses on interdisciplinary research applied to the state of the art autonomous intelligent robotics and vision system. Our research requires cross-disciplinary investigations in several areas such as image processing, biologically inspired algorithms, natural language processing, swarm intelligence, machine learning, data mining, among others. Our Robotics Lab is dedicated both to research and education. As result we are responsible for the academic development of robotics expertise for undergraduates and a number of MSc and PhD students who work closely together with our researchers and academics.

Our vision is to create robotic and vision systems that are able to autonomously operate in robust environments and to be a referred research lab in autonomous robotics and robot soccer.

RESEARCH PROJECTS

- Cloud Robotics Model for Multi-Robot SLAM, *GGPM-2017-040*

- Cloud-based Monitoring and Edutainment Robot, *KRA-2018-007*

- Basic Robot Design and Programming, *TT-2017-006*

- A Novel Sardine Feast Metaheuristic Optimization Algorithm for Transportation Scheduling, *FRGS/1/2016/ICT02/UKM/02/1*

- Ensemble of Appearance Based Visual Loop-Closure Detection for Multiple Destinations Robot navigation, *FRGS/1/2016/ICT02/UKM/02/5*

- Multi Sensors Model for Automatic Balancing of Darwin-OP Humanoid Robots, *GGPM-2015-004*

SELECTED PUBLICATIONS

- Abdul Hadi Abd Rahman, Rossilawati Sulaiman, Nor Samsiah Sani, Afzan Adam, Roham Amini, 2019. Evaluation of peer robot communications using CryptoROS. *International Journal of Advanced Computer Science and Applications*

- Nael Abd Alfatah Husein, Abdul Hadi Abd Rahman, Dahlila Putri Dahnil, 2019. Evaluation of LoRa-based air pollution monitoring system. *International Journal of Advanced Computer Science and Applications*

- Noor Faridatul Ainun Zainal, Rosseni Din, Nazatul Aini Abd Majid, Mohammad Faidzul Nasrudin, Abdul Hadi Abd Rahman, 2018. Primary and secondary school students perspective on kolb-based STEM module and robotic prototype. *International Journal on Advanced Science, Engineering and Information Technology*

- Noor Faridatul Ainun Zainal, Rosseni Din, Mohammad Faidzul Nasrudin, Salwani Abdullah, Abdul Hadi Abd Rahman, Siti Norul Huda Sheikh Abdullah, Khairul Akram Zainol Ariffin, Siti Murnirah Jaafar, Nazatul Aini Abd Majid, 2018. Robotic prototype and module specification for increasing the interest of malaysian students in STEM education. *International Journal of Engineering and Technology (UAE)*

- Abdul Hadi Abd Rahman, 2018. Artificial Intelligence Robot Challenge (AiRC). *Rampai Penyelidik : STEM untuk Komuniti*

RESEARCHERS

- Dr. Abdul Hadi Abd Rahman **(Head)**
- Prof. Dr. Salwani Abdullah
- Assoc. Prof. Dr. Azizi Abdullah
- Assoc. Prof. Dr. Mohammad Faidzul Nasrudin
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INNOVATIVE & COMPUTING TECHNOLOGY
RESEARCH LAB

LABORATORY OUTLINE

The IC-Tech Laboratory includes faculty members with research interests in providing innovative solutions in parallel-, grid-, cloud-, quantum-, and numerical computing, graphics and ICT in small-to-medium enterprises (SME). The laboratory focuses on developing computing solutions that require large numbers of processors, numerical and graphics techniques and algorithms, quantum computing technology, and computer simulation. We focus on solving heat transfer, communication, chemistry, fluid dynamics and quantum computing via simulation. We also develop IT solutions for SME and manufacturing related problems.

"Mathematical inspired Computing in behavior understanding"

RESEARCH PROJECTS

- An Intelligent 4IR Mobile Technology for Express Bus Safety System, *DCP-2017-020/2*
- Dynamic Predictions Model and Algorithm of Interaction between Object for Numerical Based Simulation Software, *GGP-2017-023*
- Framework to Integrate Environment Factors in Assessing Sustainability for Palm Oil Production Supply Chain. *GGP-2017-018*
- Three Dimensional Size Measurement for Irregular Shape Object using Monte Carlo Method, *ERGS/1/2013/ICT07/UKM/02/2*
- Incorporating Environmental Concern into Industrial Supply Chain, *ERGS/1/2012/TK01/UKM/02/5*
- New Algorithm in Hyriding Analytic Hierarchy Process (AHP) Data Envelopment Analysis (DEA) and Artificial Neural Network (ANN) to Determine Manufacturability, *UKM-GUP-2011-237*
- Multipartite Entanglement of Quantum Systems for Quantum Computer, *FRGS/1/2011/SG/UKM/03/5*

RESEARCHERS

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SELECTED PUBLICATIONS

- Samsul Ariffin Abdul Karim, Mohammad Khatim Hassan, Ishak Hashim, 2019. Constrained interpolation using rational cubic spline with three parameters. *Sains Malaysiana*

- Ahmed Meri, MK Hasan, Mahmoud Danaee, Mustafa Jaber, Mu'taman Jarrar, Nurhizam Safei, Mohammed Dauwed, Sura K. Abd, Mohammed Al-bsheish, 2019. Modelling the utilization of cloud health information systems in the Iraqi public healthcare sector. *Telematics and Informatics*

- Syaimak Abdul Shukor, Iman Mousa Shaheed, Salwani Abdullah. 2018. Population initialisation methods for fuzzy job-shop scheduling problems: issues and future trends. *International Journal on Advanced Science Engineering Information Technology*

- Amelia Natasya Abdul Wahab, Ang Mei Choo, Ruzzakiah Jenal, Muriati Mukhtar, Nur Fazidah Elias, Haslina Arshad, Noraidah Ashaari@Sahari, Syaimak Abdul Shukor, 2018. MOOC implementation in addressing the needs of generation z towards discrete mathematics learning. *Journal of Theoretical and Applied Information Technology*

- Shafinah Kamarudin, Ribka Alan, Noraidah Sahari, Amelia Natasya Abdul Wahab, Riza Sulaiman, 2018. Pembangunan dan penilaian model hasrat mengguna aplikasi mudah alih penasihatan penyakit tanaman lada hitam. *Jurnal Pengurusan*

- Bahari Idrus, Nazatul Aini Abd Majid, Amelia Natasya Abdul Wahab & Mohd Syazwan Baharuddin, 2017. *Siri Penyelidikan ICOMP : Aplikasi Mudah Alih dan Sistem dalam Industri*

- Siti Munirah Mohd, Bahari Idrus, Muriati Mukhtar, Hishamuddin Zainuddin, Kamarudin Shafinah, Amelia Natasya Abdul Waha, 2017. The Power of Quantum Computer and Its Limitations. *International Journal of Engineering Sciences & Research Technology*

- Rohana Zur, Syaimak Abdul Shukor, 2017. Computer aided design adaptation in design and manufacturing process for Malaysia SME apparel inddustry: A review. *Journal of Engineering and Applied Science*

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ASIAN NATURAL LANGUAGE PROCESSING
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LABORATORY OUTLINE

The Asian Natural Language Processing Lab (ASLANLab) was established in December 2014. It works on a wide range of topics in Computational Linguistics, Natural Language Processing and Information Retrieval.

The lab aims to grow with an increasing number of teaching staff, research students and a wide range of projects covering all areas of language processing and on a range of information management applications.

RESEARCH FOCUS

The research work ranges from basic research in computational linguistics to key applications in human language technology, and covers areas such as machine translation, probabilistic parsing and tagging, anaphora resolution, named entity recognition and automatic question answering. Basically the main research areas are as follows:

- Corpus Collection, Classification, and Annotation
- Asian Natural Language Processing such as Malay, Arabic, Pashto and Kurdish languages.
- Data driven/ Statistical learning approaches of various application

RESEARCH PROJECTS

- Malay Language Sentiment Lexicon Generation using a Hybrid of Dictionary and Corpus Based Approach, *GUP-2019-058*

- Crowdsource Requirements Engineering with Hybrid Fuzzy Approach for Improving Legacy Systems, *GGPM-2017-025*

- Acoustic-Prosodic Analysis in Speech Language/Dialect Classification, *FRGS/1/2016/ICT02/UKM/02/14*

- Unsupervised Ensemble of Active Learning and Sentiment Thesaurus Model for Cross-Domain Sentiment Classification, *FRGS/1/2016/ICT02/UKM/02/11*

- Integrating Emotions to Enhance Image Semantic Description by Using Natural Language Processing and Enhanced Naive Bayes Model, *FRGS/1/2015/ICT04/UKM/03/1*

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PUBLICATIONS

- Rami Naim Mohammad Yousef, Sabrina Tiun, Nazlia Omar, 2019. Extended trigger terms for extracting adverse drug reactions in social media texts. *Journal of Computer Science*

- Musatafa Abbas Abbood Albadr, Sabrina Tiun, Masri Ayob, Fahad Taha AL-Dhief, 2019. Spoken language identification based on optimised genetic algorithm extreme learning machine approach. *International Journal of Speech Technology*

- Nazlia Omar, Qasem Al-Tashi, 2018. Arabic nested noun compound extraction based on linguistic features and statistical measures. *GEMA Online Journal of Language Studies*

- Manal Mohammed, Nazlia Omar, 2018. Question classification based on blooms taxonomy using enhancedTF IDF. *International Journal on Advanced Science, Engineering and Information Technology*

- Ramzi Esmail Salah, Lailatul Qadri binti Zakaria, 2018. Building the classical arabic named entity recognition corpus (canercorpus). *Journal of Theoretical and Applied Information Technology*

- Muhammad Azhar Fairuzz Hiloh, Mohd Juzaiddin Ab Aziz, Lailatul Qadri Zakaria, 2018. The effectiveness of bottom up technique with probabilistic approach for a Malay parser. *GEMA Online Jurnal of Language Studies*

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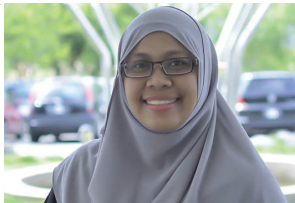
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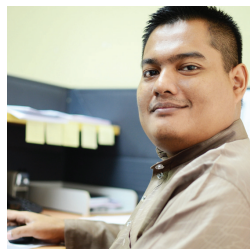
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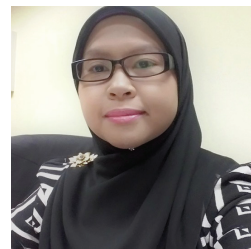
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