



annual **report** 2022



SCHOOL OF COMPUTER SCIENCES
UNIVERSITI SAINS MALAYSIA

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editorial team

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Dr. Nur Hana Samsudin

Dr. Siti Hazyanti Mohd Hashim

Mr. Azlan Osman

about **school**



Vision

Towards holistic and sustainability-inspired computing for a better tomorrow.

Mission

Providing holistic and sustainability-inspired computing in the quest for knowledge and excellence in education and research that nurtures individuals who can contribute effectively towards the transformation of the nation.

management team



PROF. DATO' DR. BAHARI BELATON*
Dean



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AHAMED HASSAIN MALIM**
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ASSOC. PROF. DR. CHEAH YU-N
*Deputy Dean of Research, Innovation and
Industry-Community Engagement*

Programme Managers



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Undergraduate



ASSOC PROF. DR. WONG LI PEI

Postgraduate



DR. SUFRIL AZLAN MOHAMED

Industrial Training, Student Activities and Community Engagement



**ASSOC. PROF. DR. MANMEET
KAUR MAHINDERJIT SINGH**

*Research Ecosystem, Development
and Innovation*



Registrars



PUAN MAHFUZAH OTHMAN

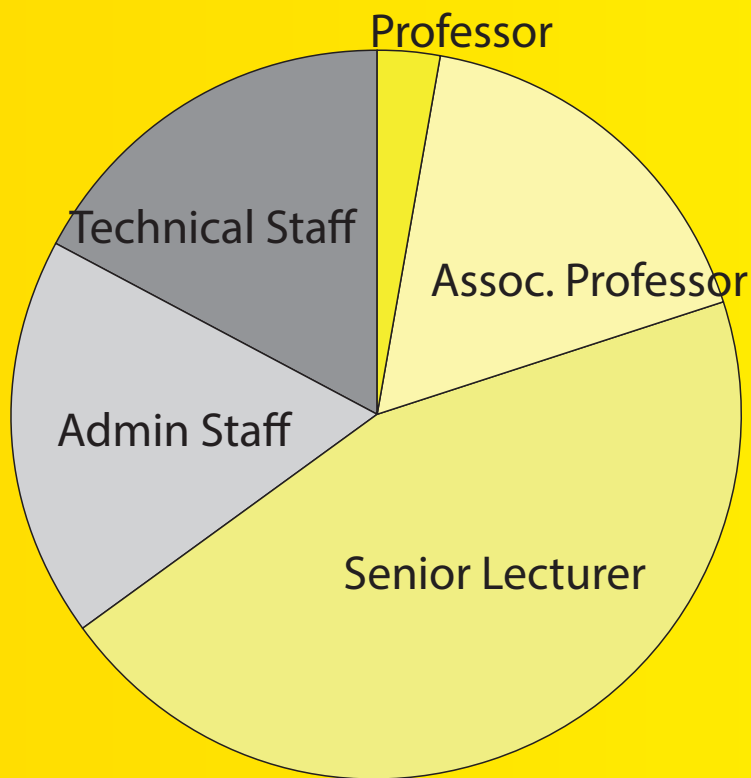
Senior Assistant Registrar



PUAN ZUHaida ARIFFIN

Assistant Registrar

staff composition



School of Computer Sciences consists of 43 academic staffs, 11 administrative staffs, and 11 technical staffs. Among the academic staff, there are two professors, 11 associate professors, and 29 senior lecturers.

academic staff

Professor	Research Cluster: Specialisation
Azman Samsudin BSc, ROCHESTER MSc, PhD, DENVER	Enabling Technologies and Infrastructures: • Cryptography • Parallel and Distributed Computing • Interconnection Switching Networks
Bahari Belaton BAppSc (Comp. Studies), SOUTH AUSTRALIA I.T. BSc (Hons), FLINDERS PhD, LEEDS Director of National Advanced IPv6 Centre (NAV6)	Data to Knowledge: • Scientific Data Visualisation • Computer Graphics • Network Security
Putra Sumari BcompSc (Hons.), USM MSc, PhD, LIVERPOOL	Service Computing: • Distributed Multimedia and Communication • Video on Demand System • Data Scheduling and Broadcasting • Multimedia Retrieval System

Associate Professor	Research Cluster: Specialisation
Aman Jantan BcompSc (Hons.), MSc, PhD, USM GIAC, GSEC	Enabling Technologies and Infrastructures: • Computer & Network Security • Cyber Security & Information Warfare • Digital Forensic & Investigations • Software Engineering
Chan Huah Yong BcompSc (Hons.), MSc, USM PhD, FRANCHE-COMTE	Enabling Technologies and Infrastructures: • Parallel and Distributed Processing • Grid Computing • Multi-Agent Systems • Resource Allocation • Cloud Computing
Cheah Yu-N BcompSc (Hons.), PhD, USM	Data to Knowledge: • Knowledge Management • Knowledge Engineering • Intelligent Systems • Health Informatics
Manmeet Kaur Mahinderjit Singh BcompSc (Hons.), MSc, USM PhD, QUEENSLAND	Enabling Technologies and Infrastructures: • Data Security • Security and Privacy • Trust Management • Sensors Network
Mohd Azam Osman BcompSc (Hons.), MSc, USM	Enabling Technologies and Infrastructures: • Distributed Shared Memory Systems • Multicore Programming • Mobile Applications • Image Processing
Nurul Hashimah Ahamed Hassain Malim BcompSc (Hons.), MSc, USM PhD, SHEFFIELD	Enabling Technologies and Infrastructures: • Chemoinformatics • Bioinformatics • Data Mining
Umi Kalsom Yusof BSc, WESTERN ILLINOIS MSc, USM PhD, UTM	Data to Knowledge: • Database Design • Artificial Intelligence • Web Engineering

Wan Mohd Nazmee Wan Zainon B.CompSc. (Hon.), MSc, PhD., USM	Data to Knowledge: • Information Visualisation • Bioinformatics Visualisation • Multimedia Information Retrieval
Wan Tat Chee BSEE (CE), MSECE, MIAMI PhD, USM	Enabling Technologies and Infrastructures: • Wireless Networks • Satellite Communications • Real Time Systems
Wong Li Pei BcompSc (Hons.), MSc, USM PhD, NTU, S'PORE	Data to Knowledge: • Scheduling • Optimization • Meta-Heuristics • Soft Computing
Zurinahni Zainol BSc (Hons.), ITM-UKM MSc, USM PhD, HULL	Service Computing: • XML Database Management • Database Theory and Formal Specification Artificial Intelligence • Information Retrieval

Senior Lecturer	Research Cluster: Specialisation
Ahmad Sufril Azlan Mohamed BIT (Hons), MULTIMEDIA UNIVERSITY MSc, MANCHESTER PhD, SALFORD	Data to Knowledge: • Image Processing • Medical Image Analysis • Image Tracking • Computer Vision
Anusha Achuthan BcompSC (Hons.), USM MSc, PHD, USM	Advanced Medical and Dental Institute: • Computer Vision • Image Processing • Computational Intelligence
Azizul Rahman Mohd. Shariff Beng (Hons.), PLYMOUTH MSc, PhD, BRADFORD	Enabling Technologies and Infrastructures: • Mobile and Cellular Networks • Vehicular Networking • Mobile, Context Aware, Participating Computing • Mobile Computation & Algorithms

Azlan Osman BSc, WISCONSIN MSc, BRADLEY	Service Computing: • Office Automation • Networking • Multimedia/Animation
Azleena Mohd Kassim BcompSc (Hons.), MSc, PhD, USM	Data to Knowledge: • Evolutionary Computing • Knowledge Management • Knowledge Engineering • Artificial Intelligence
Chew XinYing BIT (Hons.), UKM PhD, USM	Data to Knowledge: • Natural Language Processing • Data/Text Mining • Machine Learning
Fadratul Hafinaz Hassan BSc (HBP) (Hons.), MSc, USM PhD, BRUNEL	Data to Knowledge: • Optimisation • Heuristic Search • Evolutionary Algorithm • Pedestrian Simulation
G. C. Sodhy BcompSc (Hons.), MSc, USM	Enabling Technologies and Infrastructures: • Parallel and Distributed Processing • Grid Computing • Natural Language Processing
Gan Keng Hoon B.IT (Hons.), UKM MSc, USM PhD, UM	Data to Knowledge: • Information Retrieval • Semantic Web Search • Query Optimization
Jasy Liew Suet Yan BcompSc (Hons.), USM MSc, PhD, SYRACUSE	Data to Knowledge: • Sentiment and Text Analysis • Natural Language Processing • Affective Computing • Information Science
Lim Chia Yean BSc (Hons.), USM M.A , HERTFORDSHIRE PhD, USM	Service Computing • Software Quality • Data Analytics • Usability Stud

Maziani Sabudin BSc, WISCONSIN MSc, BRADLEY	Data to Knowledge: • Artificial Intelligence • Logic Programing • Object Oriented Programming • e-Learning and Multimedia
Mohd. Adib Haji Omar BSc, MSc, AMERICAN UNIVERSITY PhD, USM	Service Computing: • Collaborative Computing • Distributed Computing • Information Security • Service Computing
Mohd Halim Mohd Noor Beng (Hons.), IIUM MSc, USM PhD, AUCKLAND	Data to Knowledge: • Context-aware Computing • Machine Learning • Pattern Recognition
Mohd Heikal Husin BA (Hons.), INTI IU M.e-Comm., PhD, UNISA	Service Computing: • Government 2.0 • Social Media • Web 2.0 Technologies • Policy Development • Enterprise 2.0
Mohd Nadhir Ab Wahab Beng (Hons.), MSc, UNIMAP PhD, SALFORD	Data to Knowledge: • Evolutionary Algorithms • Robotics • Embedded System • Sensors
Mohd Najwadi Yusoff B.Tech (Hons), UTP MSc, USM PhD, UPM	Enabling Technologies and Infrastructures: • Digital Forensic Investigation • Information Security • Legal and Privacy Issues • Software Engineering
Nasuha Lee Abdullah BsEE/CE, UPM MSc, USM Eng.D, UTM	Service Computing: • Technopreneurship • Information Systems Development

Nibras Abdullah Ahmed Faqera BSc, HADHRAMOUT MSc, PhD, USM	Enabling Technologies And Infrastructures • Multimedia Networks Protocols • Intelligent Transport System • Internet Of Things • Cyber Security
Noor Farizah Ibrahim Btech(Hons), UTP MSc, UiTM PhD, BRISTOL	Service Computing: • Data/Business Analytics • Social Media Research • Online Engagement • Machine Learning
Nor Athiyah Abdullah BIT (Hons.) SE, UMT MSc, USM PhD, IWATE PREF.	Service Computing: • Social Media • Human-Computer Interaction • Disaster Communication • Usability
Nur Hana Samsudin BcompSc (Hons.), MSc, USM PhD, BIRMINGHAM	Data to Knowledge: • Speech Synthesis • Natural Language Processing
Nur Intan Raihana Ruhaiyem BMM (Hons.), UUM MSc, USM PhD, QUEENSLAND	Data to Knowledge: • Cellular Electron Tomography • Image Analysis and Visualisation • Medical Image Analysis and Visualisation • Computer Vision • Computer Graphics and Multimedia
Pantea Keikhosrokiani BsEEE, ISLAMIC AZAD UNIVERSITY MSc, PhD, USM	Service Computing: • Service Systems Engineering • Social & Sustainable Computing • Enterprise Computing
Rosnah Haji Idrus BSc, MBA, E. ILLINOIS	Service Computing: • ERP and Capacity Planning • Technopreneurship Education • Computer Ethics • Digital Library

Sharifah Mashita Syed Mohamad BIT (Hons.), UUM MSc, USM PhD, TECHNOLOGY SYDNEY	Service Computing: • Software Reliability • Software Testing • Software Analytics • Agile and Incremental Development • Empirical Software Engine
Siti Hazyanti Binti Mohd Hashim BCompSc., MSc, Ph.D, UTM	Service Computing • Game Technology • Virtual Reality • Interactive Computing • Multimedia Computing
Sukumar Letchmunan BSc, MSc, UPM PhD, STRATHCLYDE	Service Computing: • Software Metrics • Computer Systems • Software Reliability and Testing • Machine Learning
Suzi Iryanti Fadilah BSc, MSc, UteM PhD, USM	Enabling Technologies and Infrastructures: • Wireless Networks • Vehicular Ad hoc Networks • Intelligent Transport System
Syaheerah Lebai Lutfi BSc. (Hons.) Computing, BOLTON MSE, UM PhD (Cum Laude), TECHNICAL UNIVERSITY MADRID	Service Computing: • Human-Computer Interaction • Affective and Social Computing • Emotion and Culture Modelling • Spoken Conversational Agents
Tan Tien Ping BcompSc (Hons.), MSc, USM PhD, JOSEPH FOURIER	Data to Knowledge: • Automatic Speech Recognition • Natural Language Processing
Teh Je Sen Beng (Hons.), MULTIMEDIA UNIVERSITY MSc, PhD, USM	Enabling Technologies & Infrastructures: • Information Security • Cryptography
Zarul Fitri Zaaba BIT (Hons.), UUM MSc, ROYAL HOLLOWAY UNIVERSITY OF LONDON PhD, PLYMOUTH	Enabling Technologies and Infrastructures: • Information Security • Security and Usability (Usable Security) • Human Aspects of Security • Acceptance of Security • Internet Safety

Honorary Professor/ Assoc. Professor	Research Cluster: Specialisation
Abdullah Zawawi Haji Talib BSc (Hons.), BRADFORD MSc, NEWCASTLE UPON TYNE PhD, WALES	Data to Knowledge: • Graphics and Visualisation • Geometric Computing • Computational Modelling
Ahamad Tajudin Khader BSc, MSc, OHIO PhD, STRATHCLYDE	Data to Knowledge: • Evolutionary Algorithm • Metaheuristics • Genetic Algorithm • Scheduling/Timetabling/Planning
Ahmad Suhaimi Baharudin ACIS, UK Dip. Comp. Sc., UITM BSc, INDIANA STATE MBA, PhD, USM	Data to Knowledge: • Service Science and Innovation • Management of Information Systems • Human Computer Interaction • IT Operations and Management • Technopreneurship

FSRS Professor	Research Cluster: Specialisation
Rosni Abdullah* BSc, MSc, WESTERN MICHIGAN PhD, LOUGHBOROUGH *Appointed under TNCAA office	Enabling Technologies and Infrastructures: • Parallel and Distributed Computing • Parallel Algorithms for Bioinformatics Applications

Invited Lecturer	Research Cluster: Specialisation
Anusha Achuthan BcompSC (Hons.), USM MSc, PHD, USM	Advanced Medical and Dental Institute: • Computer Vision • Image Processing • Computational Intelligence
Chong Yung Wey Beng, UM MSc, USM	National Advanced Ipv6 Centre (NAV6): • Satellite and Wireless Communications • Mobile Computing • Embedded Systems • Green Computing
Hazrina Yusof Hamdani BICT (Hons), UTP MSc (Comp Science), USM PhD, UKM	Advanced Medical and Dental Institute: • Parallel Computing • Web Applications • Bioinformatics • Green Computing
Lokman Mohd Fadzil BSc, UNIVERSITY OF WISCONSIN- MILWAUKEE, WISCONSIN, USA MSc, USM PhD, UNIKL	National Advanced Ipv6 Centre (NAV6): • Manufacturing Intelligence and Optimization • Industrial Revolution 4.0 • Factory Of The Future • Manufacturing Security
Mohammed F. R Anbar B.SE, AL-AZHAR UNIVERSITI – GAZA MSc, UUM PhD, USM	National Advanced Ipv6 Centre (NAV6): • Web and Android Applications • Internet Security • Internet of Things
Selvakumar Manickam BcompSc (Hons.), MSc, PhD, USM	National Advanced Ipv6 Centre (NAV6): • Ipv6 • Mobile Technologies • Web Applications • Internet Security • Cloud Computing
Shankar Karuppayah BcompSc (Hons.), USM MSc., KING MONGKUT'S UNIV. OF TECH. NORTH BANGKOK PhD, TU DARMSTADT	National Advanced Ipv6 Centre (NAV6): • Cyber Security • Malware and Botnets • Distributed Networks

Adjunct Professor	Specialisation
Teo Yong Meng BTech, BRADFORD MSc, PhD, MANCHESTER	• High Performance Computing • Distributed Computing

Research Fellow	Specialisation
Laith Abualigah PhD, USM	• Bio-inspired Computing • Artificial Intelligence • Optimization Algorithms
Moatsum Khalif Oduh Alawida PhD, USM	• Chaotic systems • Multimedia security • Blockchain • Cybersecurity
Mohd Nor Akmal Khalid BSc, MSc, PhD, USM	• Evolutionary Algorithm • Expert Systems
Toqir Ahmad Rana BSc, MSc, University of Central Punjab PhD, USM	• Natural Language Processing

Offshore Coordinator and Research Fellows	Specialisation
Zaher Ali Hassan Al-Sai BSc, AL- Zaytoonah University MSc, Florida Atlantic University PhD, USM	• Machine learning

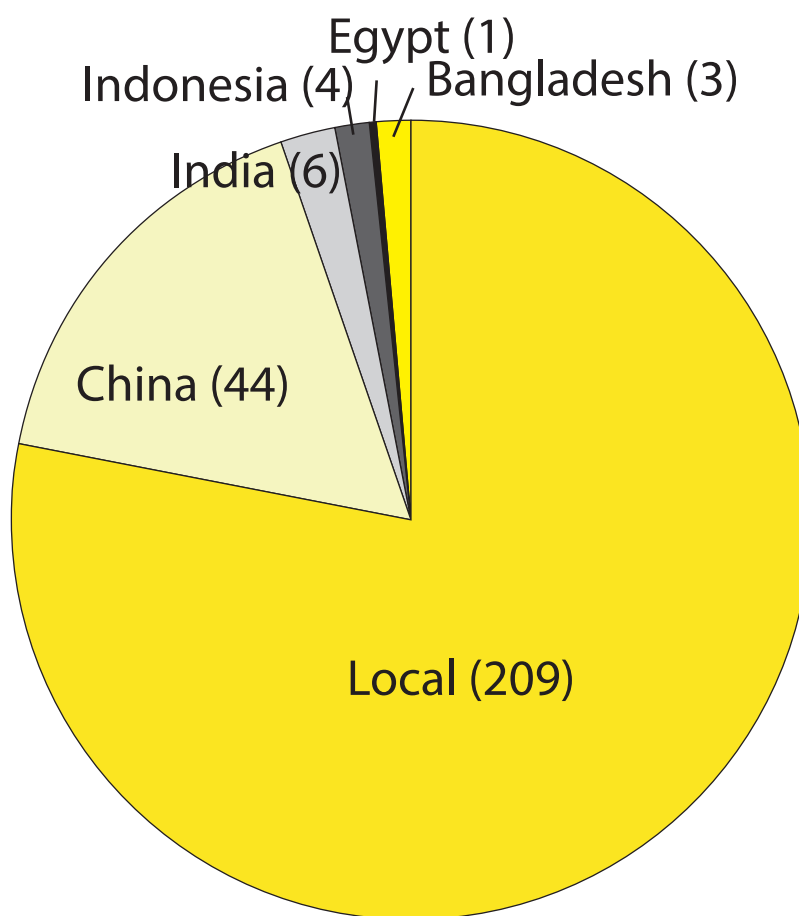
Administrative Staff	Position
Halizah Abdul Razak Juliana Abdul Aziz	Executive Secretary
Arief Ramadhan Juswa Rohana Omar	Senior Administrative Assistant (Clerical)
Mohamad Azahar Mustapa Nurul Nadiyah Zambri Sheela Muniandy	Administrative Assistant (Clerical)
Hilridzuan Romli Muhamad Hadzri Yaakop	Operation Assistant

Information Technology Officers
Ahmad Anas Ismail Nor Azman Shahiran

Technical Staff	Position
Abdul Rohim Mansur Badriyah Che May Jasmi Chek Isa Mohamad Tarmizi Hat Ramlee Yahaya Ruslan Ahmad Shik Abdulla Mohamed Ali	Assistant Engineer
Mohd. Hidzir Shamsul Bahrin Nor Baizura Abdullah	Assistant Information Technology Officer



undergrad. enrolment



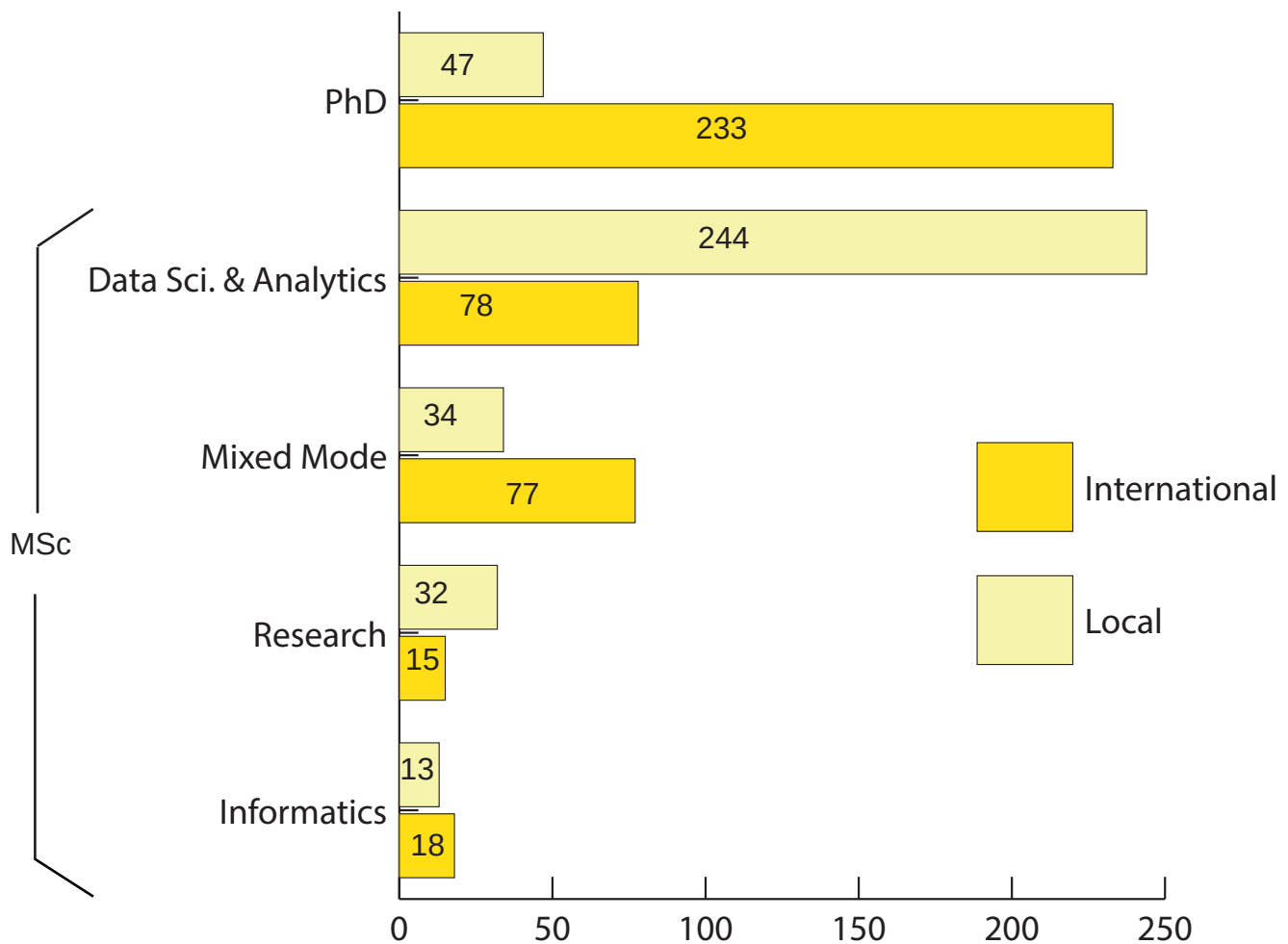
There are a total of 267 undergraduate students that were accepted into School of Computer Sciences, USM BSc (Computer Science) programme in 2022. Local Malaysian students make up the largest number at 209 or 78%. The largest number of foreign students in the

programme is from China at 16%. In addition, there are also students who are from India, Indonesia, Bangladesh and Egypt.



Undergraduate 2022 graduation: 156

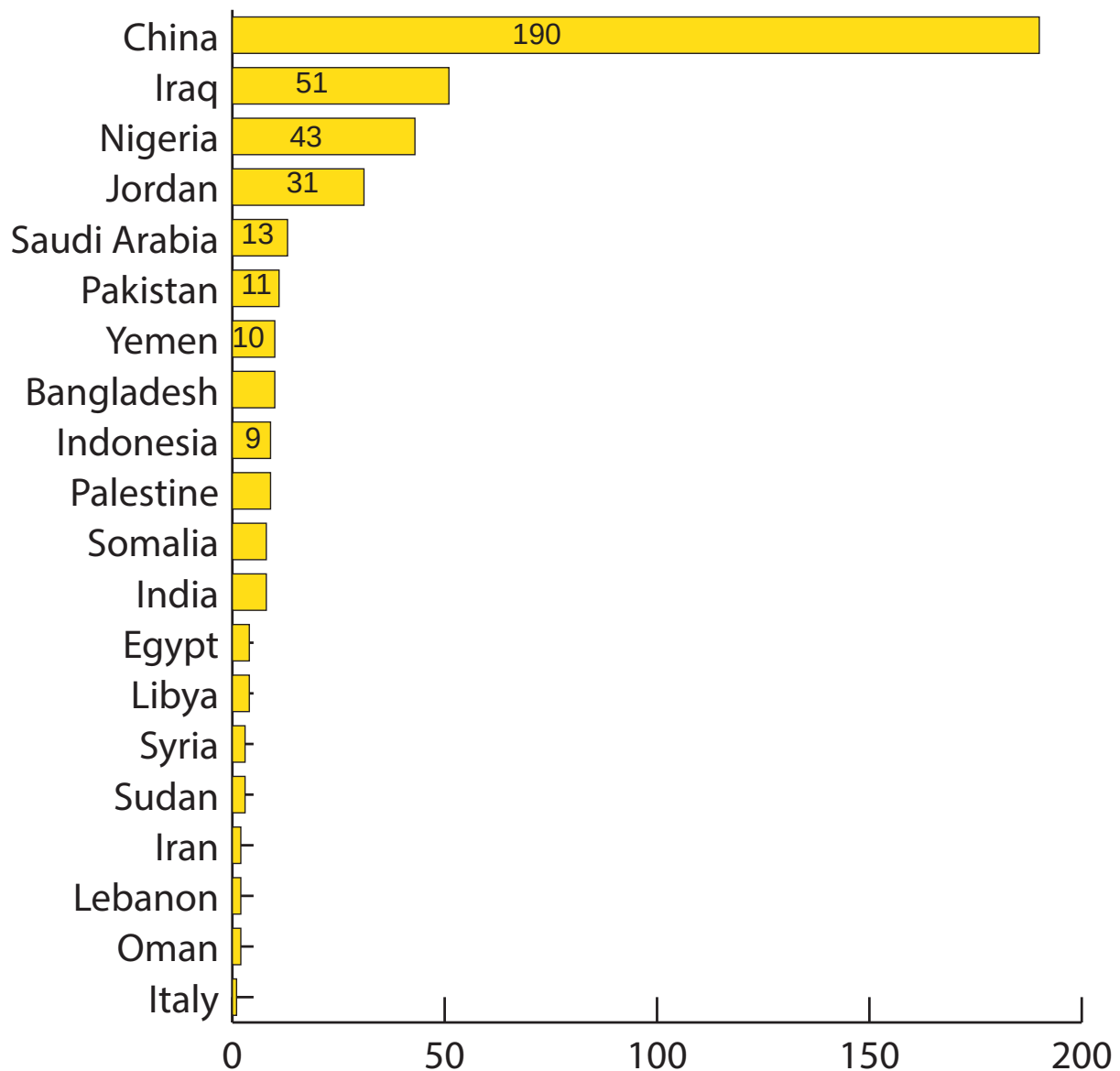
postgrad. enrolment



Total enrolment of postgraduate students in School of Computer Sciences for year 2022 are 280 for PhD program, 322 for MSc Data Science & Analytics, 111 for MSc Computer Science (Mixed mode), 47 MSc Computer Science

by research and 31 for Master of Informatics. From the total of 791, majority are international students from various countries all over the world (421) and the other 370 are from Malaysia.

inter. enrol. by country



The figure above shows the top 20 international postgraduate school of Computer Sciences student enrolment in term of number of students. of our postgraduate students are from

China, followed by Iraq, Nigeria, Jordan, Saudi Arabia and others.

postgrad. graduation

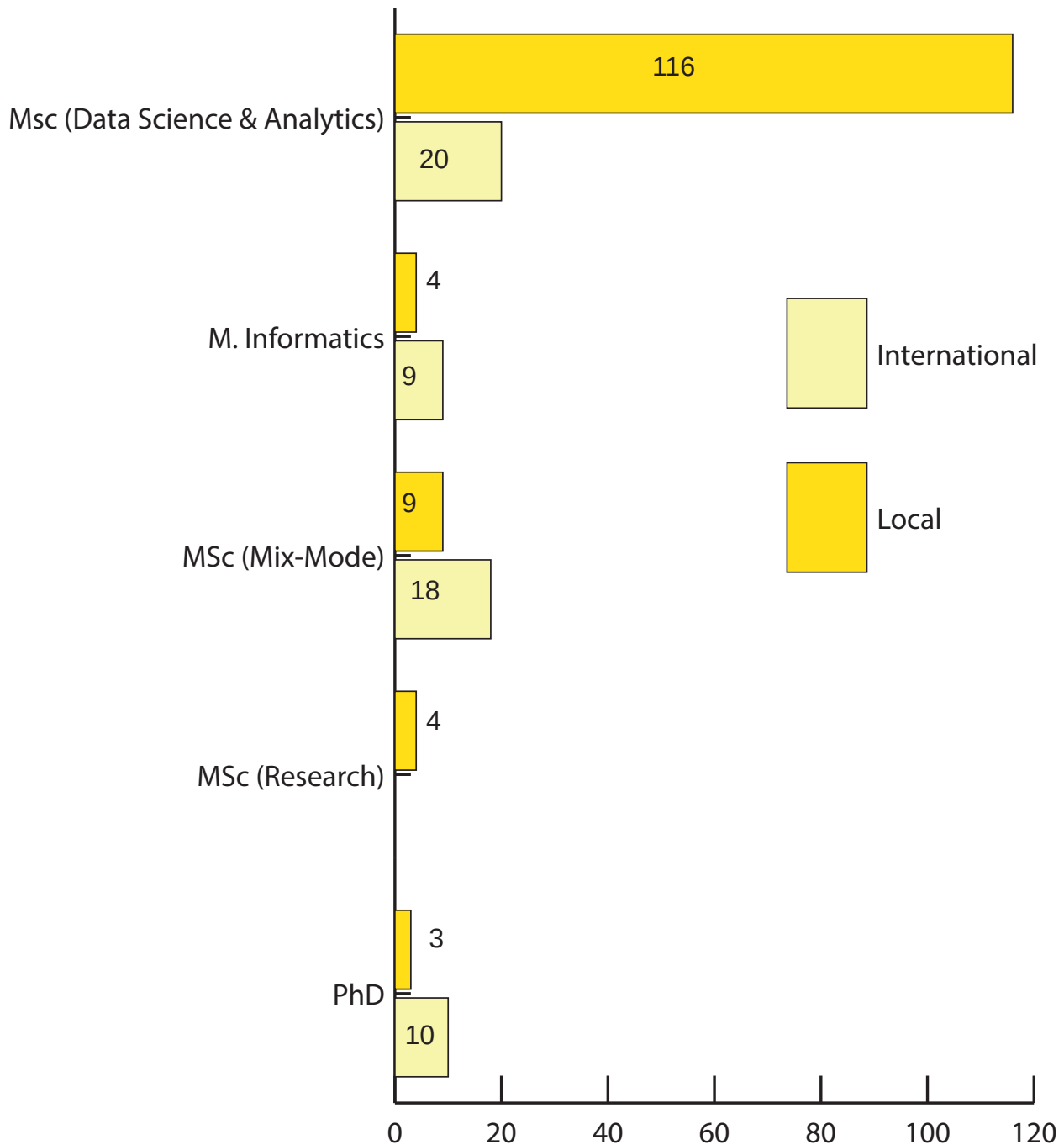


Figure above shows the statistics of 2022 postgraduate graduation. The number of graduates consists of 13 PhD, 136 Master of Data Science & Analytics, 27 MSc Computer Science

(mixed mode), 13 Master of Informatics and 4 MSc Computer Science (research). Total number of local graduates are 136, and international students are 57.



academic programmes

In 1974, the Computer Science program at USM began with a course focused on programming. Over time, it evolved into a specialization within the Bachelor of Science (Mathematics) honours degree, and later became the Bachelor of Science (Computer Science) (B.Sc. (Comp.Sc.)) degree with honours.

highly successful in producing well-qualified graduates who are widely sought after by both public and private sectors. One of the key factors contributing to this success is its robust curriculum, which strives to strike a balance between theoretical instruction in computing and practical exposure.

USM's B.Comp.Sc. (Hons.) program has been

The curriculum has consistently kept pace with



current technology and undergone periodic updates. In the 1992/93 academic session, a new and updated curriculum was implemented, followed by further modifications in the 1994/95 session to align with the University Academic System (SPU). Starting from the 1996/97 session, the curriculum was revised to reduce the minimum graduation period from 4 years to 3 years under the Three Year Academic System (SPTT). In the 2000/01 session, a new curriculum aligned with the recommendation of the National Higher Education Council on SPTT (SPTT(M)) was introduced.

A revised curriculum was introduced for the 2006/07 session, and in 2009/2010, the degree program was adjusted to restore the minimum

graduation period to 4 years under the Four Year Academic System (Sistem Pengajian Empat Tahun) (SPET).

In the 2019/20 academic session, a new revised curriculum was introduced, which involved restructuring the degree program to allow students to specialize in three areas: intelligent computing, computing infrastructure, and software engineering.

The School of Computer Sciences at USM was the first within the university to collaborate with private colleges at the diploma level starting from 1995. Additionally, it pioneered the USM external degree program in 1997.



BSc (Computer Science)

The 4-year Bachelor of Science (Computer Science) degree program comprehensively covers all aspects of computing as an academic discipline. The primary objective of the program is to produce highly competent graduates equipped with the necessary professional skills to succeed as computing professionals and effectively compete in a rapidly evolving technological landscape. As a result, the program encompasses both the theoretical and scientific foundations of computing, as well as its practical applications in various industries and commerce. Throughout the curriculum, there is a strong emphasis on problem-based learning, which is achieved through practical, project-based, and training-based courses that are integrated

across the years. Moreover, the program instills a research-oriented mindset among students.

The Bachelor of Computer Science (Honours) degree offers students the flexibility to customize their studies according to their individual interests, needs, and circumstances. The program provides specializations in the following areas:

- Intelligent Computing
- Computing Infrastructure
- Software Engineering



MSc (Computer Science)

The School of Computer Sciences provides three study options for postgraduate programs: Coursework, Mixed Mode, and Research.

- Mixed Mode Programme – Master of Science (Computer Science)
- Coursework Mode Programme – Master of Science (Data Science & Analytics)
- Coursework Mode Programme – Master of Science (Digital Transformation)
- Research Programme - Ph.D. & M.Sc. by Research

The Mixed Mode Program offers students a strong foundation in Computer Science and a comprehensive understanding of innovative computer technologies. It enables students to establish connections between various disciplines, concepts, and practices within computer science. The program focuses on applying knowledge and skills to meet industry demands and prepares students for research work, encouraging them to pursue a doctoral program.

The Master of Science (Data Sciences & Analytics) program aims to produce professionals in the field of Big Data Analytics who can make informed decisions based on comprehensive data. It provides students with a deep understanding of core concepts, practices, and tools in the domain of data science and analytics. The program equips students with the knowledge and skills to collect and integrate data, perform big data analysis, and apply them across

various sectors. It also trains students to proficiently use big data analytical tools in different industries, while fostering social and effective communication skills and nurturing leadership qualities. Graduates are encouraged to be innovative in applying data analytic tools across domains and are prepared for further interdisciplinary research involving ICT.

The Master of Science (Informatics) program aims to develop graduates with a comprehensive understanding of theoretical and practical aspects of informatics and their interconnections. It equips graduates with scientific, engineering, and advanced analysis skills in ICT, which can be applied in various fields, particularly in business, technopreneurship, and biomedical sectors. The program produces highly skilled ICT users for industries such as biomedical, healthcare, marketing, and business.

On the other hand, a research degree is awarded based primarily on a **thesis** that presents the results of a research project. It may also involve coursework or other formal studies required by the University and the School of Computer Sciences. The degree can be pursued under the supervision of at least one academic staff member from the School. In this mode of study, candidates are required to complete a thesis within a specified timeframe. Typically, full-time M.Sc. candidates complete their theses in 12-18 months, while Ph.D. candidates take 30-40 months.

research & **innovation**

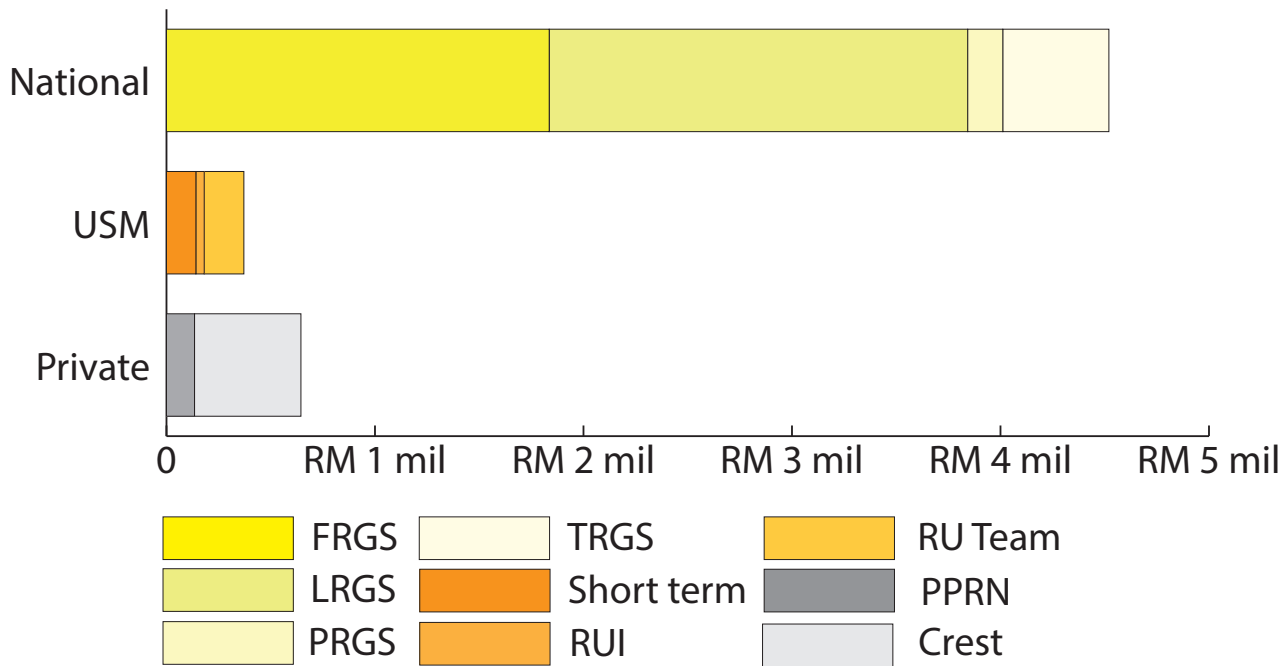


The school is now in a leading position in research and development. The research and development of the school are supported by 3 research clusters. They are Enabling Technologies & Infrastructure (ETIC), Data to Knowledge (D2K), and Service Computing (SC). The research clusters allow cooperation among academics in research studies particular in multi-disciplinary and transdisciplinary research.

Research and innovation in School of Com-

puter Sciences continue to strengthen in 2022. There are 54 active research grants in 2022. The sources of the research grants are USM, Ministry of Higher Education and industry. The grants from USM are Research University Grant (RU), short term grant and bridging grant while the Ministry of Higher Education offers Fundamental Research Grant Scheme (FRGS), Long Term Research Grant Scheme (LRGS) and Trans-disciplinary Research Grant Scheme (TRGS).

research grants



Fundamental Research Grant Scheme (FRGS): This grant scheme supports fundamental research that is relevant to the development of new knowledge in various fields.

Long Term Research Grant Scheme (LRGS): This grant scheme supports long-term research programs that are focused on strategic areas of research that are important for the development of the country. It is typically awarded to larger research teams and institutions.

Prototype Development Research Grant Scheme (PRGS): This grant scheme supports the development of prototypes for new products, technologies, or processes. PRGS grants are typically awarded to research teams that are working on applied research projects.

Transdisciplinary Development Research Grant Scheme (TRGS): This grant scheme supports research projects that are interdisciplinary in

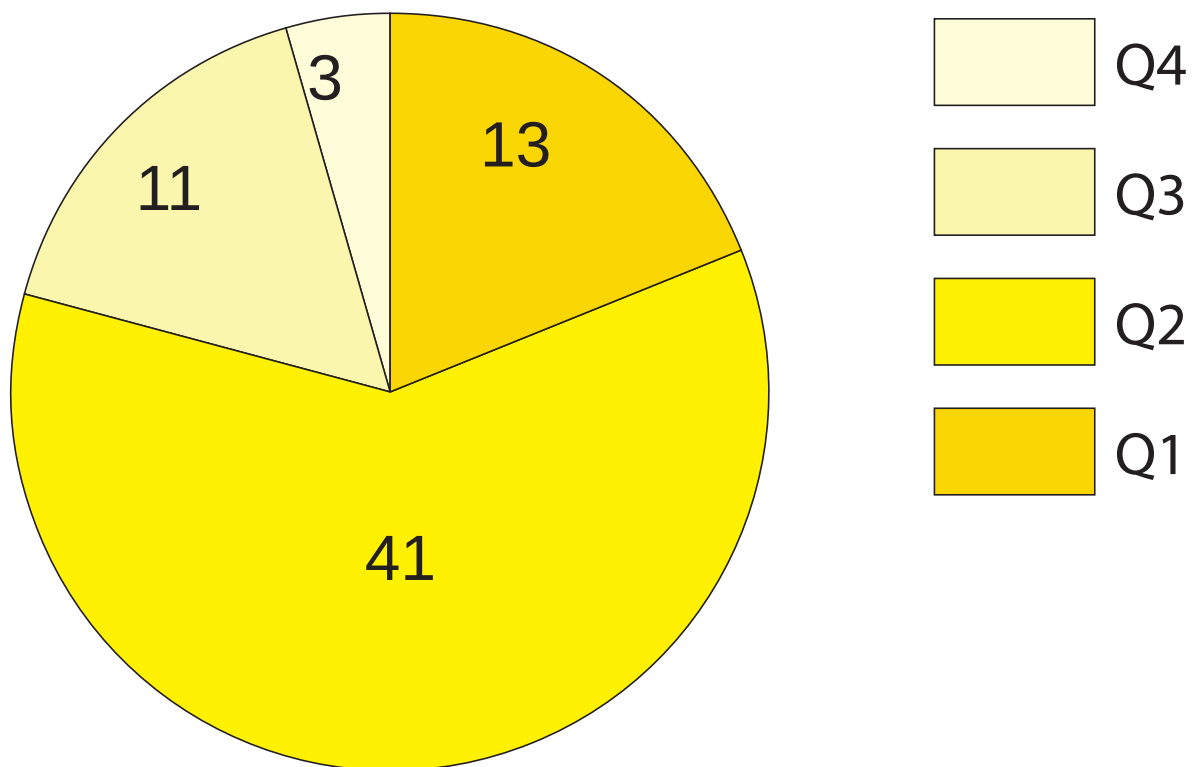
nature and involve collaboration between researchers from different fields.

Research University Grants (Individual/Team): These grants are awarded by USM to individual or small research teams.

Public-Private Research Network Grant (PPRN): This grant scheme supports collaborative research projects between public and private sector organizations. PPRN grants are typically awarded to research teams that are working on projects that have commercial potential.

Collaborative Research in Engineering, Science and Technology (CREST) Grant: This grant scheme supports collaborative research projects in the areas of engineering, science, and technology. CREST grants are typically awarded to large research teams and institutions.

research publication



JCR stands for Journal Citation Reports, which is a tool developed by Clarivate Analytics (formerly Thomson Reuters) to provide quantitative data and analysis for academic journals. The JCR provides a systematic and objective means to evaluate the world's leading journals and their impact on the academic community.

Q1, Q2, Q3, and Q4 are quartile rankings assigned to journals based on their Journal Impact Factor (JIF) scores as reported in the Journal Citation Reports (JCR) publication.

These quartile rankings are used to categorize journals into four equal groups based on their JIF scores, with Q1 being the highest quartile and Q4 being the lowest quartile.

A total of 68 journal articles indexed by JCR were published by School of Computer Sciences academics in 2022. Among the journals are IEEE Internet of Things Journal, IEEE Transactions on Games, Artificial Intelligence in Medicine, International Journal of Bio-Inspired Computation, Frontiers in Neurology, etc.

CS ranking



201-250



401-500

The QS ranking is a global university ranking system developed by the British company Quacquarelli Symonds. It ranks universities based on a set of criteria including academic reputation, employer reputation, research impact, and internationalization.

The THE (Times Higher Education) World University Rankings is an annual publication that ranks universities worldwide based on a variety of factors such as research output, teach-

ing quality, international outlook, and industry income. The THE rankings are published by the Times Higher Education magazine, a UK-based publication focused on higher education news and analysis.

In 2022, School of Computer Sciences, USM was rank 201-250 by QS, while it was rank 401-500 by THE. The school ranking improves 50 position in QS, and 100 position in THE compared to 2021.

industry engagement



School of Computer Sciences engages with the industry through various means such as internships, training programs, consultations, MOUs (Memoranda of Understanding), industrial advisory panels, and industry involvement in the classroom plays a vital role in bridging the gap between academia and the professional world.

The university offers internships to students, providing them with practical experience and exposure to real-world work environments. These internships are established in collaboration with industry partners, allowing students to apply their theoretical knowledge in practical settings and gain valuable industry insights.

Besides, the school also organizes training programs tailored to meet the specific needs of industries. These programs focus on developing industry-relevant skills and enhancing the employability of students. They may include workshops, seminars, and short-term courses conducted by industry professionals or in partnership with industry organizations.

The university provides consultation services to industries seeking expertise in various fields. Faculty members and researchers offer their knowledge and advice to address specific industry challenges or provide guidance on innovative solutions. This collaboration allows industry partners to tap into the intellectual re-



sources available at the university.

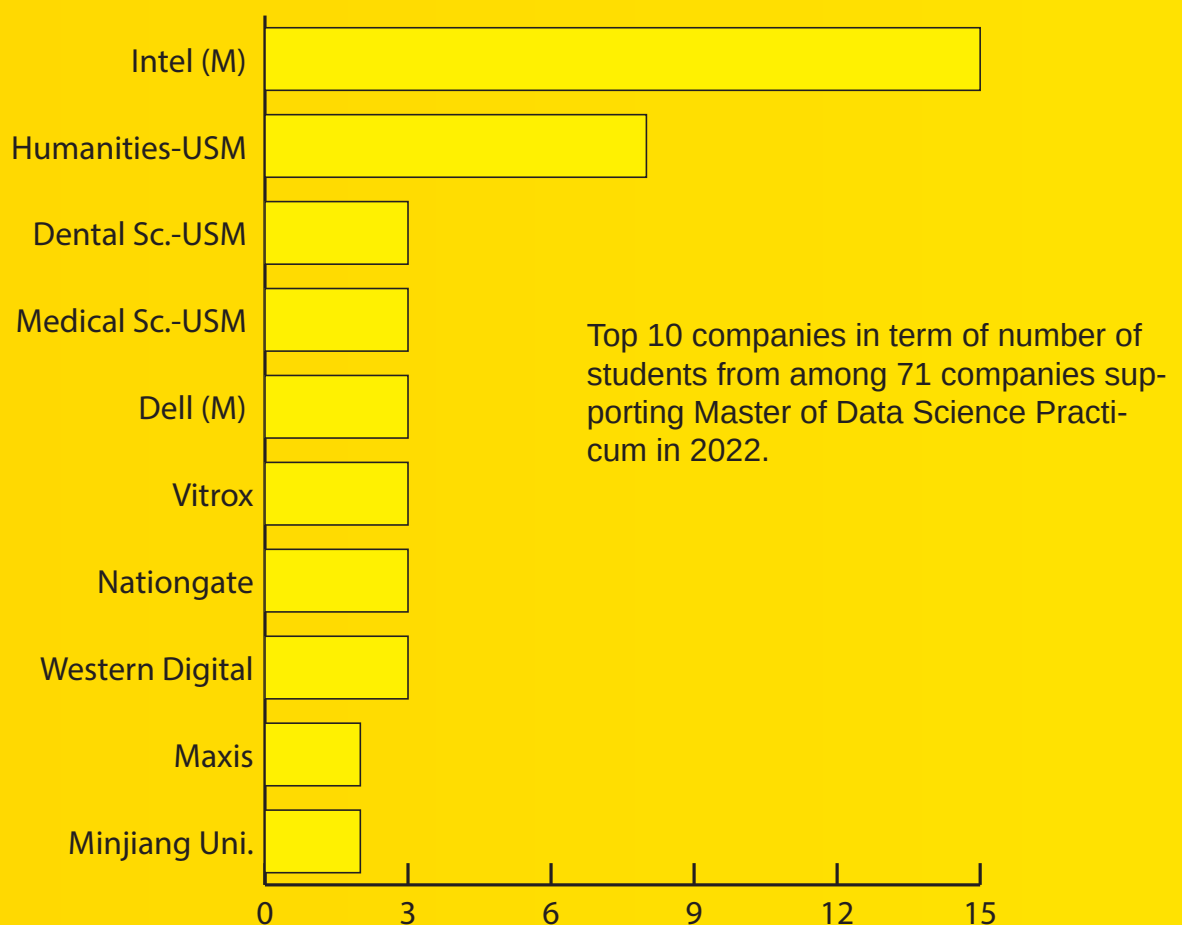
Memoranda of Understanding are formal agreements established between the university and industry partners. These agreements outline the terms and conditions of the collaboration, including joint research initiatives, knowledge sharing, technology transfer, and collaborative projects. MOUs help foster long-term relationships and facilitate ongoing cooperation between the university and industry.

The school also forms advisory panels comprising industry experts, professionals, and leaders. These panels provide strategic guidance and insights into industry trends, ensuring that the university's curriculum remains up-to-date and aligned with industry requirements. They contribute to program development, review curriculum content, and provide feedback on industry-relevant skills and knowledge.

In addition, the school also encourages industry professionals to participate in the classroom by inviting them as guest lecturers or adjunct faculty members. This brings real-world perspectives, case studies, and practical insights into the academic setting. Industry representatives share their experiences, discuss current industry practices, and provide students with a deeper understanding of the industry they will be entering.

Overall, a university that actively engages with industry through internships, training programs, consultations, MOUs, industrial advisory panels, and industry involvement in the classroom fosters a mutually beneficial relationship. It equips students with practical skills, helps industries access the latest academic research and talent pool, and ensures that the university remains responsive to the evolving needs of the professional world.

postgrad. practicum



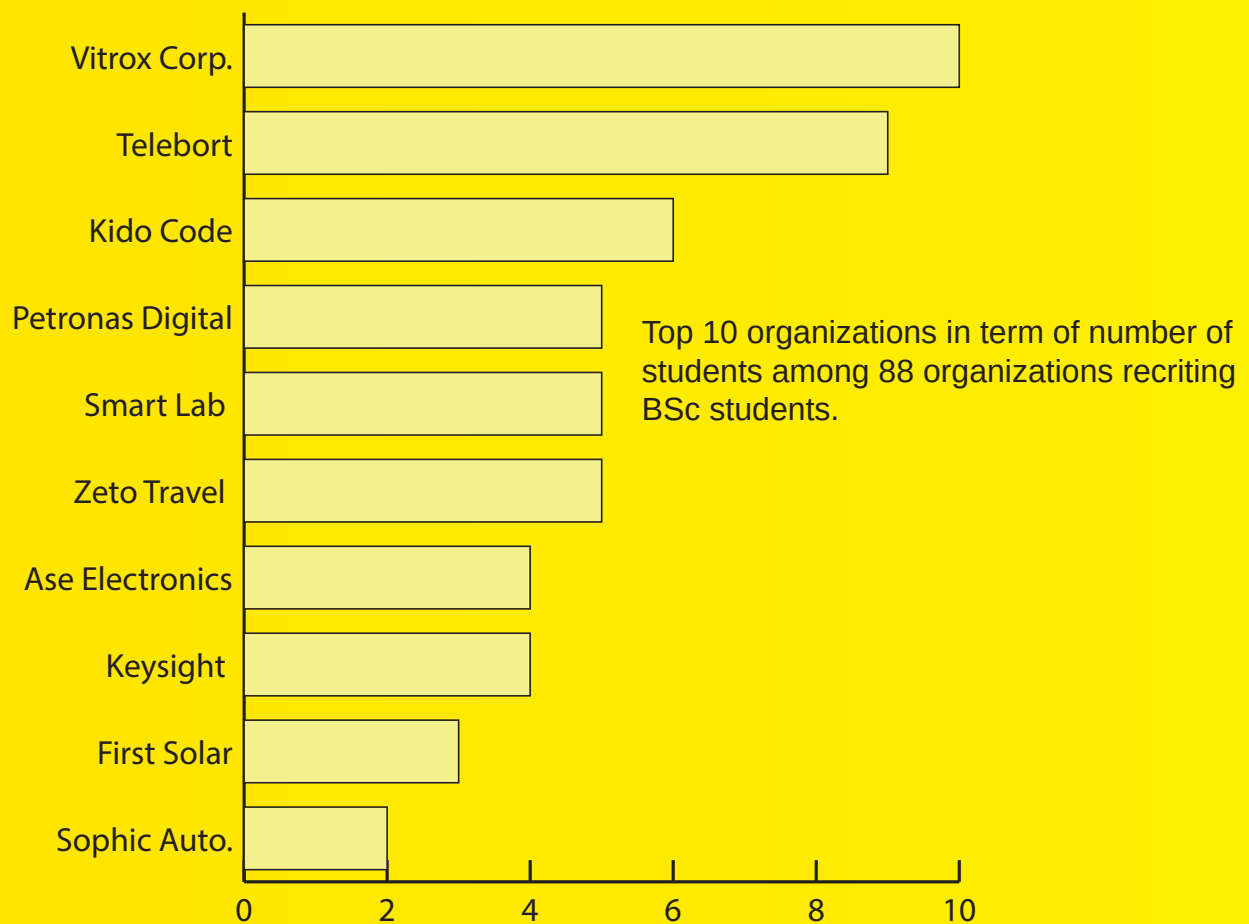
The students in MSc (Data Science and Analytics) are compulsory to conduct a consultancy project and practicum in industries. A student could perform practicum at their respective workplaces or at their chosen/assigned organisations.

Every student works under the supervision of

a lecturer and an industry supervisor. They are required to solve real world problems or tap opportunities related to data science and analytics during their practicum.

Figures show the top 10 organizations among 71 organizations, where the students performed their practicum in 2022.

undergrad. internship



The undergraduate students of School of Computer Sciences are also required to conduct internship during their 3rd year of their study. In 2022, there are a total of 153 students conducting internship in 88 companies and organizations.

training programmes ---

School of Computer Sciences offers variety of training program outside the scope of the curriculum syllabus. The training may be categorised into two: In-House Certification Training and General Training. The In-House Certification Training is training sessions tailored to a specific organisation specification in which they will send their own employee to attend the

training. The employees are also required to do hands-on projects which will be supervise or facilitate by the trainer.

General Training is open to USM students, USM staffs, and even the general public. The contents are generally less intense and more adaptable to general understanding.

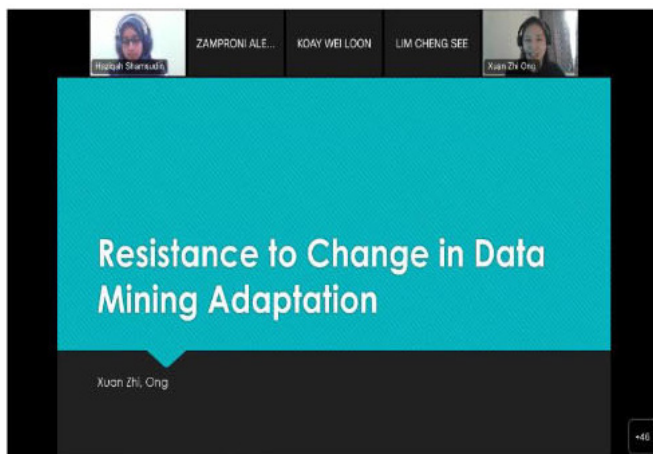
Certification Programmes	Participants	Date	Instructor
Creating Dashboards With Microsoft Excel	Public	19 Mar	Ts. Dr. Chew XinYing
Dashboard In A Day - Data Visualization By Microsoft Power Bi	Public	26 Mar	Ts. Dr. Chew XinYing
Principle Of Data Science	Public	3 Sep	Ts. Dr. Chew XinYing
Introduction To Machine Learning In Python	Public	24 Sep	Ts. Dr. Chew XinYing
Introduction To Big Data Technologies	Public	8 Oct	Ts. Dr. Chew XinYing
Introduction To Deep Learning In Python	Public	26 Nov-3 Dec	Ts. Dr. Chew XinYing
Text Analytics : Mining And Discovery	Public	22 Oct-29 Oct	Ts. Dr. Chew XinYing
Data Storytelling And Visualization By Tableau	Public	5 Nov-12 Nov	Ts. Dr. Chew XinYing
Professional Certificate For Data Science	Public	1 Sep-30 Nov	Ts. Dr. Chew XinYing

Data Analytics 1 : Statistics For Data Science (Ks01)	Keysight Technologies	10 Jan-17 Jan	Ts. Dr. Chew XinYing
Data Science For Manufacturing & Supply Chain (Kc01)	Keysight Technologies	24 Jan-7 Feb	Assoc. Prof. Dr. Umi Kalsom Yusof
Business Intelligence & Analytics - Call For Action (Ki01)	Keysight Technologies	14 Feb	Assoc. Prof. Dr Cheah Yu-N & Dr. Nasuha Lee Abdullah
Data Analytics 2 : Machine Learning (Km01)	Keysight Technologies	21 Feb-28 Feb	Assoc. Prof. Dr. Umi Kalsom Yusof
Big Data Technologies With High Performance Computing, Scalability And Availability (Kt01)	Keysight Technologies	7 Mar-14 Mar	Assoc. Prof. Dr. Chan Huah Yong
R Basic For Data Science (Kr01)	Keysight Technologies	21 Mar-28 Mar	Dr. Jasy Liew Suet Yan
Text Search And Analytics : Harnessing Natural Language Data For Enterprise Management (Ka01)	Keysight Technologies	11 Apr-18 Apr	Dr. Gan Keng Hoon
Data Analytics 3 : Visualization (Kv01)	Keysight Technologies	25 Apr-9 May	Dr. Nur Intan Raihana Ruhaiyem
Program Pengeraja Profesional Data Scientist	Kulim Advanced Technologies	18 Dec 2021 - 17 Apr 2022	Dr. Mohd Halim Mohd Noor
Program Pengeraja Profesional Data Scientist	Kulim Advanced Technologies	19 Mar-17 Jul	Dr. Mohd Halim Mohd Noor
Program Pengeraja Profesional Data Scientist	Kulim Advanced Technologies	16 Jul-6 Nov	Dr. Mohd Halim Mohd Noor
Program Pengeraja Profesional Data Scientist	Kulim Advanced Technologies	24 Sep-8 Jan	Dr. Mohd Halim Mohd Noor

mou & moa

Agreement	Organization	Date	Person in Charge
MoU	Yunnan University Of Finance And Economics		
NDA	Howern Wasser Sdn Bhd	2 Dec 2022 - 1 Dec 2032	
NDA	Jobstreet.Com Shared Services Sdn. Bhd.	31 Oct 2022 - 30 Oct 2025	
NDA	Pro B Bisnet (M) Sdn Bhd	5 Aug 2022 - 4 Aug 2025	
NDA	Dell Global Business Center Sdn. Bhd.	18 Jul 2022 - 17 Jul 2025	
NDA	Walta Ideaville Automation Sdn Bhd	2022 - 15 May 2027	
NDA	Webacode Sdn. Bhd	15 Apr 2022 - 14 Apr 2025	
NDA	Maxis Broadband Sdn. Bhd.	4 Aprl 2022 - 3 Apr 2024	
NDA	Recomn Technologies Pte Ltd	16 Mar 2022 - 15 Mar 2027	
Academic Programs (Dual Degree)	UOW Malaysia Kdu Penang University College	21 Mar 2022	
Database Subscription Agreement	Universidad Politécnica De Madridobuda University, Hungary	2022 - 3 Mar 2023	
NDA	Intel Microelectronics (M) Sdn. Bhd	2022 - 24 Jan 2024	
NDA	Vitrox Corporation Berhad	8 Mar 2022 - 7 Mar 2024	
Collaboration Agreement	Aimsity Sdn. Bhd.	1 Apr 2022 - 31 Mar 2025	

industry in classroom



Top: Online lecture conducted by Mr. Weiling Tan during CDS511. Bottom: Ms. Ong Xuan Zhi during CDS513 class.

CS-Industry Strategic Partnership for 2022 continue to focus on exposing the students on the applications of the knowledge they learn in classes in the industries via Industry-Content Lecture.

This year, four classes were conducted. The first one was conducted by Mr. Weiling Tan from Motion Branding Sdn Bhd on 11 Jan 2022 in the postgraduate CDS511 class. Besides, School of Computer Sciences also has the opportunity

to invite Ms. Ong Xuan Zhi, Senior Engineer, Product Design Engineering from Western Digital (Malaysia) Sdn Bhd to share her experience during the CDS513 class.

Finally, School of Computer Sciences was also honor to receive two speakers from National instruments (Malaysia) Sdn Bhd. They were Ms. Clara Leong and Ms. Jess Cheng to share their knowledge in the undergraduate CPT441 and postgraduate CCS525 classes respectively.

cs industrial forum (CSIF) ---

This year Computer Science Industrial Forum CSIF 2022 was organized on 25 March 2022 from 8:30am to 12:15pm as a hybrid event, where participants could attend the event physically in Eastin hotel or through WebEx. The theme for CSIF2022 was “Fostering Strategic Engagement for Sustainable University-Industry Partnership”.

The forum was attended by 53 participants from industries, academics, and student representatives from the School of Computer Sciences. Among the industrial partners that have attended the event were Vitrox Corporation Bhd, Intel Malaysia Sdn Bhd, Micro Modular Sdn Bhd Springtech Ventures, Telebort Technologies Sdn Bhd, Aemulus Corporation Sdn Bhd, Operion Ecommerce & Software Sdn Bhd, Neptrix Sdn Bhd, Western Digital Sdn Bhd, Digital Penang Sdn Bhd, Micron Memory Malaysia Sdn Bhd, and Hilti Malaysia Sdn Bhd.

where the participants discussed the following topics: CSUSM - Industry Strategic Partnership Program, Future CS Programmes, Undergraduates and Master Programmes, Research Developments and Collaborations with Industry, and Staff and Student Development.

The participants were divided into different tracks for discussion, then subsequently all participants were gathered to discuss all the tracks. The following sections 2, 3, 4, 5, and 6 document the outcomes from the discussion tracks.

There were in total five tracks of discussion





CS activities



2022 had been a busy but full-filling year for School of Computer Sciences.

Numerous knowledge sharing and research events were organized such as postgraduate colloquium CSPC, postgraduate knowledge sharing at CS Journal Club, postgraduate project demonstration at CSMInD, undergraduate final year project demonstration, etc.

Besides that, School of Computer Sciences had organized career talks and career fair CSIRF for third year undergraduate students looking for industrial training placement.

This year, our school had received visits by guests from Université de Limoges and Universiti Utara Malaysia.



Prof. Emeritus Zaharin Yusoff with Prof. Dato' Bahari Belaton at CSPC 2022.



Computer Science Postgraduate Colloquium (CSPC) is a yearly event that is organized in School of Computer Sciences since 2004 to provide a platform for postgraduate students to meet and share their knowledge.

This year CSPC was held in Olive Tree hotel after two years of virtual colloquium due to COVID-19. A pre-colloquium was held on 3 October 2022 online. The main activities were writing workshop, virtual poster presentation, and in-

vited talk.

The main event was conducted the next day on 4 October 2022. Among the activities conducted are two keynotes speech, research forum, poster presentations, and 3MT presentation.



Prof. Dato' Bahari Belaton giving an opening speech.



Prof. Emeritus Zaharin Yusoff giving the keynote speech "Graduate on Time"



Research forum with the title "Opportunities Post PhD: The Way Forward" Dr. Fakhitah Ridzuan, Dr. Maged Nasser, and Nur Aqilah Paskhal Rostam



Some of the participants in 3MT who were presenting their work.

CSMInD

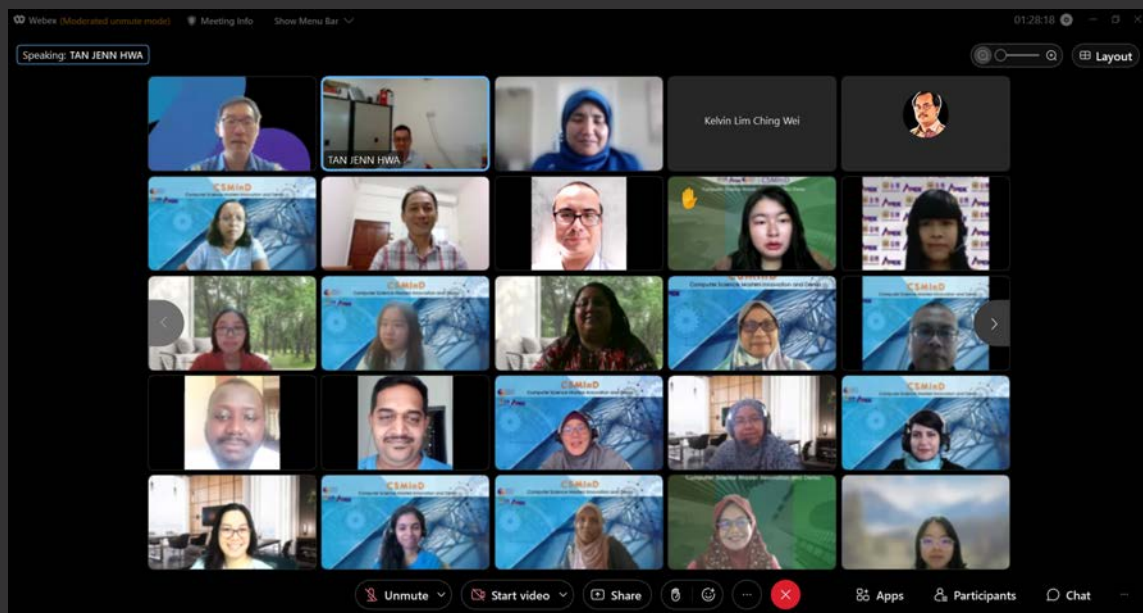
CSMInD is a biennial event for CS MSc coursework students to showcase their work. This year CSMInD was held on 8 Feb 2022 at School of Computer Sciences, and it was participated by 54 Data Analytics students and more than 10 Informatics students.

Mr Usman Sarwar, Chief Engineer and Software Architect Programmable Solution Group from Intel Malaysia was invited to give a talk with the title “The Impact of IoT on Big Data and Data Science”.

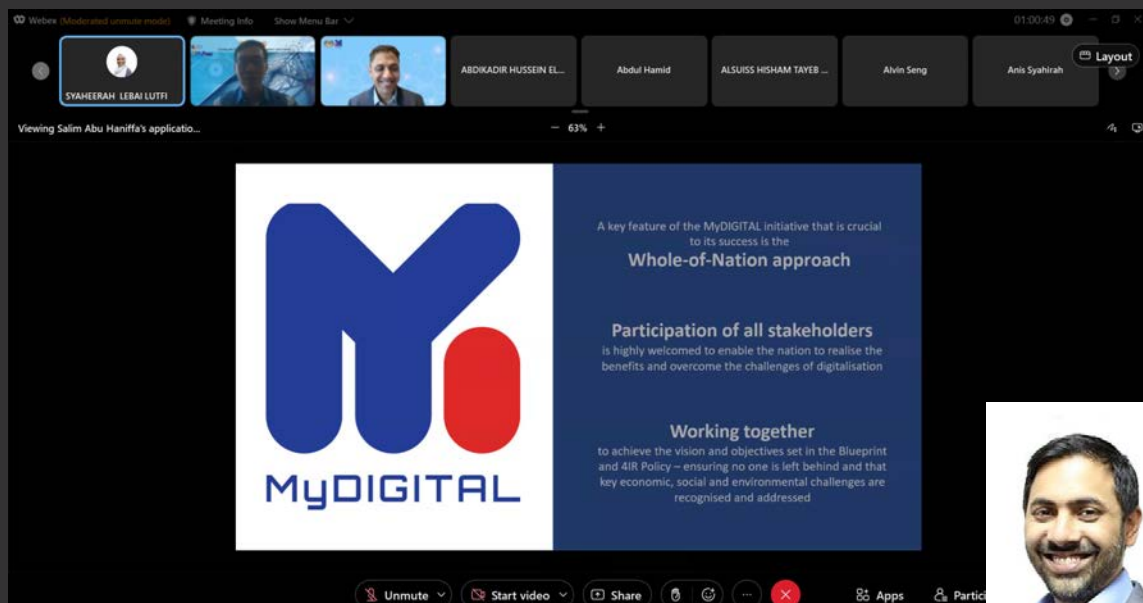


The second CSMinD for 2022 was organized virtually on 27 July 2022. Mr. Salim Abu Haniffa from Strategic Change Management Office (MyDIGITAL), Economic Planning Unit (EPU), Prime Minister's Department was invited to

give a talk with the title "Data Science & Analytics Career Development and Opportunities in the Era of Digitalization"



Lecturers and students attending the online talk.



Mr. Salim Abu Haniffa giving the talk.

cs journal club

CS Journal Club is a biweekly event that allows post-graduate students to meet up to discuss on research works. At the earlier of 2022, the activities were conducted online.

Subsequently after the COVID situation in the country improved, CS Journal club was back to face-to-face.



Service Computing track on 25 Nov 2022.



Postgraduate students, Mr. Asraf S. Mashaleh and Ms. Haifa Saleh Alfurayj presented their work.

Dr. Nibras presented a talk with the title "Financial Aid".



Assoc. Prof. Dr. Cheah Yu-N presented certificate of participation to the presenters. Left to right: Ms. Noratikah binti Nordin, Ms. Fatimah Al-Aswadi, and Dr. Mohd Halim bin Mohd Noor.



Data to Knowledge track on 16 Dec 2022.



Project Innovation & exploration in CS Education and Learning (PIXEL) is an annual event organized by School of Computer Sciences since 2019 to showcase undergraduate students final year projects and gain valuable feedback from industries.

This year PIXEL was organized in Dewan Budaya, Universiti Sains Malaysia. The following are the Top Ten Award winners, Outstanding Award winners, and Gold Award winners.

Top Ten Award Winners

1. Ms. Shu Hui Yii
2. Ms. Chew Mi Chi Ko
3. Mr. Sum Joe Ming
4. Ms. Yeo Pui Yan
5. Mr. Azwaar Khan bin Azlim Khan
6. Mr. Ong Joo Hom
7. Mr. Chan Siang Sheng
8. Mr. Yaap Eng Tatt

9. Ms. Syarifah Nur Fatimah
10. Mr. Muhammad Iqar Amin

Outstanding Award by Fusionex winners:

Ms. Yeo Pui Yan
Ms. Syarifah Nur Fatimah binti Syed Firdaus
Mr. Chan Siang Sheng

Gold Award winners:

Mr. Azwaar Khan bin Azlim Khan
Mr. Chan Bey Kun
Mr. Chan Siang Sheng
Ms. Chew Mi Chi Ko
Ms. Farhana Zulaikha binti Fadzli
Ms. Kang Yi Qing
Mr. Lim Chang Lap
Mr. Loo Min Jian
Mr. Lye Kong Quan
Mr. Mohamad Hilmi bin Johari



Top left: PIXEL officiated by Prof. Dato' Bahari Belaton, Prof. Azlin-da Azman (Deputy VC BHEPA), Mr. William Teo (VP Fusionex Group). Together with them were AP Dr. Cheah Yu-N, AP Dr. Nurul, and Ms. Iris Yan.

Middle right: Winners of the PIXEL outstanding awards.

Bottom left: Winners of PIXEL Top 10 awards.

Bottom right: One of the lucky draw winners.



career talks



Mattel (Malaysia) located at Bayan Lepas Free Trade Zone is a subsidiary of Mattel, Inc. a global toy company headquartered in El Segundo, California, USA. The Penang facility is one of Mattel's largest manufacturing sites.

The Mattel Penang facility was established in 1989 and has since become a key manufactur-

ing hub for the company, producing a range of toys and games for children of all ages. The facility covers an area of approximately 350,000 square feet and employs over 4,000 people.

The products manufactured at Mattel Penang include some of the company's most popular brands, such as Barbie dolls, Hot Wheels cars, and Fisher-Price toys.



CS intern candidates listening to Mattel Malaysia Senior Manager introducing the company



Mattel wooing students with their tempting gifts, the hotwheels.



National Instruments Penang, also known as NI Penang was established in 1994, a subsidiary of National Instruments Corporation, a multinational company headquartered in Austin, Texas, USA.

NI Penang is primarily involved in the production of a wide range of high-tech electronic instruments and systems, including data acquisition devices, signal generators, and automated

testing systems. In addition to manufacturing, NI Penang is also home to a number of research and development teams, who work on developing new products and technologies to meet the evolving needs of NI's customers in the region. The facility also provides customer support and training services, helping NI's customers to get the most out of its products and solutions.



Presenters from NI Penang. Among them are CS, USM graduates.



Dr. Adib giving a token of appreciation to NI Penang representative.

visits

CS receives the visit by Prof. Dr. Samir Adly and colleagues from **Université de Limoges** on 16 Nov 2022.

Université de Limoges is a public research university located in Limoges, a city in the Nouvelle-Aquitaine region of France. The university offers a wide range of undergraduate and

graduate programs in fields such as law, economics, science, engineering, humanities, and social sciences. The university has a strong research focus, with a number of research centers and institutes dedicated to exploring cutting-edge topics in fields such as materials science, health and biotechnology, digital technologies, and sustainability.



Top left and bottom right: CS Academics and students having a discussion with delegate from Université de Limoges.

Bottom left: Prof. Dr. Samir Adly giving a talk on “On the Acceleration of First Order Methods: Applications in Optimisation and Learning”



A delegate from School of Computing, Universiti Utara Malaysia visit CS on 29 Sep 2022. The delegate was headed by dean of School of Computing Prof. Ts. Dr. Azham Hussain. The School of Computing at Universiti Utara Malaysia (UUM) was established in 1992. It of-

fers a range of undergraduate and postgraduate programs in computer science, information technology, and software engineering.



CS academics receiving the guests from UUM at School of Computer Sciences auditorium.



Prof. Zaharin conferment



Prof. Zaharin Yusoff was conferred the title of Prof. Emeritus by Universiti Sains Malaysia in conjunction with USM's 59th convocation on 21st May 2022.

To celebrate the occasion, School of Computer Sciences held a dinner at Olive Tree hotel. Among the guests of honour were Prof. Rosni Abdullah, Prof. Sureswaran Ramadass, Prof. Rajeswari Mandava, Abdullah Zawawi, Assoc Prof. Dr. Tang Enya Kong, and many ex-colleagues of School of Computer Sciences.

Prof. Emeritus Zaharin Yusoff was the founding Dean of the School of Computer Sciences, Universiti Sains Malaysia. He served as the dean from 1987 until 2005.

He obtained his Doctorate in Computer Science specialising in Computational Linguistics from USM and Université Joseph Fourier, Grenoble, France in 1987.

He earned his Bachelor of Science degree in Pure Mathematics with first class honours, and a Master of Science in Pure Mathematics with emphasis in Algebraic Geometry from the University of Kent, Canterbury, Britain.



competition awards



Kuala Lumpur, 14 March 2022 - Dr. Jasy Liew Suet Yan was the 'country winner' in AI impact shaper' category, for designing AI Solutions that would make learning coding more fun and personalised.

Beside her, three Malaysian students were also recognised for their unique AI projects and innovations as part of the Intel AI Global Impact

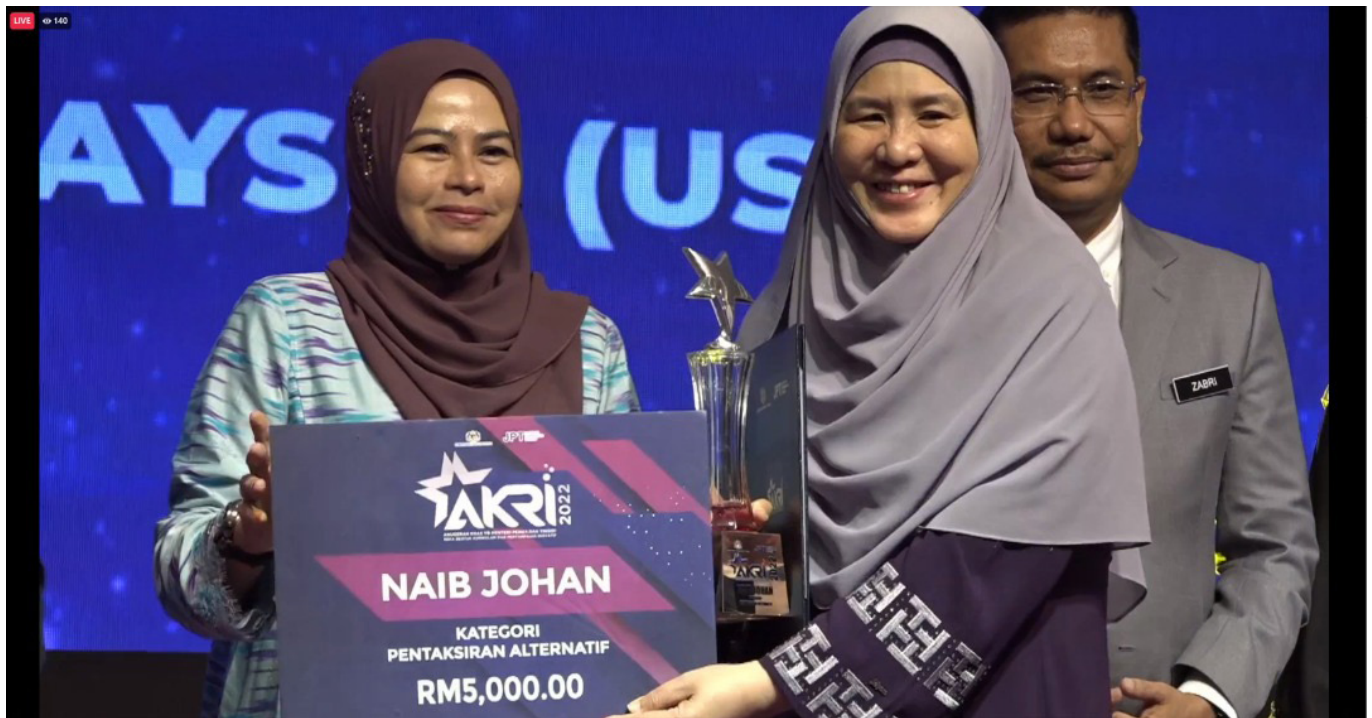
Festival – a global event, which was created by Intel in 2021 as part of their ongoing global 'Digital Readiness' initiative.

With 'Enriching Lives with AI Innovations' as the theme, the Intel AI Global Impact statement. Participants in the event submitted over 230 AI Innovations, with 14 of these entries coming from Malaysian students and teachers, it added.

The background of the poster is a deep blue gradient. It features a network of glowing blue lines and dots, resembling a circuit board or data flow. On the left, there is a 3D icon of a shield with a padlock inside, sitting on a small base. Below it is a small yellow cube. On the right, there is a 3D icon of a document with a circular graphic on it. In the bottom left corner, there are two overlapping circles, one light blue and one purple.

intel. innovation

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PUTRAJAYA, 2 September 2022 - Dr. Nasuha Lee Abdullah and her team have won an award at the Anugerah Khas YB Menteri Pelajaran: Rekabentuk Kurikulum Dan Penyampaian Inovatif Tahun 2022 (AKRI 2022) for their outstanding innovation in teaching and learning. The competition, organized by the Ministry of Higher Education, aims to identify and recognize the best practices of creative and innovative project in Teaching and Learning that have been implemented at either the institutional or individual level

The competition consists of four categories, namely Innovative Curriculum Program, Transformative Teaching, Immersive Learning Experience, and Alternative Assessment. Dr Nasuha and her team won the 1st runner up in the Alternative Assessment category for their winning

entry entitled Alternative Assessment for Consultancy Project and Practicum.

The winning entry demonstrated how alternative assessment was applied to assess a course with seven learning outcomes, where six of them were in the affective domains. The course, CDS 590 Consultancy Project and Practicum, required students from the MSc Data Science and Analytics program to go for practicum at the industry and solve a problem using data science techniques with real data. The team members include Prof. Dato' Dr. Bahari Belaton, Ts. Dr. Chew XinYing, Assoc. Prof. Dr. Wong Li Pei, and Puan Farahiyah Abu Bakar from PPKT. The team took home RM 5,000 cash and a trophy as the 1st runner up in the Alternative Assessment category.



Kuala Lumpur, 11 November 2022 - Congratulations to Ms Iris Yan Ning (Year 3 Software Engineering Major) from the School of Computer Sciences for winning the first runner up in the "Hong Leong Can You Hack It 2022" Competition!

The national level competition which saw about 120 participants from Malaysia and other countries was a hackathon on re-imagining banking through hyper-personalization and metaverse.

Ms Iris Yan won this award together with 2 other team members from the University of Nottingham and The Monash University. The team presented a project for a solution that harness psychological methodologies through implementation of reinforcement learning model to integrate hyper-personalisation in the financial goals of the user. The team won RM5000 in total.



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