

# COMPUTER SCIENCE

UNM CS Newsletter October 2021 Edition

# WHAT'S NEW?



# COMPUTER SCIENCE

EDITION ... October 2021

# Welcome Speech by HoS

A very warm welcome to the 2021 Many of our students have performed edition of the School of verv well for different modules **Computer Science** and I am delighted to Newsletter. The year announce that 12 of our 2021 has been second-year students another challenging and 6 of our third-year yet productive year students have been Nottingham for the students and awarded the Dean's UK | CHINA | MALAYSIA staff at UNM. **Excellence Scholarship** Nonetheless, the School award. Additionally, many of Computer Science of our staff have published continues to provide effective their research work in highsupport to strengthen online learning, ranking international scientific journals teaching, and research. and conferences.



All this hard work marks another successful year of the School of Computer Science.

We hope you enjoy this edition of the CS newsletter and we look forward to welcoming you back to our beautiful campus.

Dr. Chen Zhiyuan Head of School (HoS)

### **Research Areas**

Machine Learning, Simulations, User Modelling and Ar<mark>tificial Intelligence</mark>

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### **NEW LECTURER**

### Dr. Mohammad Aazam

Dr Mohammad Aazam joined the School of Computer Science as an Associate Professor since the end of year 2020. Previously, he was a scientist senior research at Mellon Carnegie University (Qatar). He has also worked with Carleton University, Canada, and Ryerson University, Canada as a postdoctoral fellow. He completed his Ph.D. in Computer Engineering from Kyung Hee University, Korea, 2015. Additionally, he has in completed a course on Internet of Things from King's College London, UK, in 2016, and a course on Data Science with R from Harvard University, USA, in 2017.



He has more than 100 publications, including patents. He is also a founding member of IEEE SIG Intelligent Internet Edge (IIE). For additional details visit www.aazamcs.com.

#### **Research Areas:**

Internet of Things (IoT), Encompassing Cloud Computing and Fog/Edge Computing

# UNM

### COMPUTER SCIENCE INDUCTION WEEK

Students from around the globe were eagerly hoping that the start of their journey at Nottingham would be in person. Unfortunately, due to the pandemic, this year's induction had to be carried out online. These constraints, however, did not stop it from being an exciting and immensely successful week thanks to the well-planned and interactive events held on Microsoft Teams. Over a hundred first-years from the School of Computer Science took this time to smoothly transition into this new learning environment. Engaging sessions were scattered throughout the week, including talks on the overlapping fields of computer science, future careers and sharings from various teams and students.



Seniors came in to advise students on what to expect and how to prepare for the hurdles ahead. Taha Dhailey from KPMG held a talk open to all students on the highly requested topic of blockchain, consisting of interesting visuals and insightful tips. During an alumni sharing, Mr Jagathesan discussed the thrilling future of AI and advised us to stay passionate and to focus on a niche. To wrap it up, Dr Xiaolin Chen who holds a Ph.D. in Computer Science shared how she pursued her dreams in the financial sector, which greatly inspired us to be bold and never limit ourselves.





Dr. Xiaolin Chen is the Head of International at KraneShares. She manages the firm's business outside of the United States and oversees efforts to solidify KraneShares' thought leadership throughout the industry. Before joining the firm, Dr. Xiaolin was responsible for managing 70 billion dollars in client portfolios at J.P. Morgan Private Bank. She has extensive experience in developing strategic asset allocation for clients globally, investing across traditional and liquid alternative investments.

Having lived and worked in Asia, Europe, and the US, Dr. Xiaolin brings unparalleled market insight to her client engagements worldwide. Both her bachelor and Ph.D. Degree in Computer Science were obtained from the University of Nottingham.



"It's a funny thing about life; if you refuse to accept anything but the best, you very often get it" - W. Somerset Maugham



Balakrishnan Mr. Jagathesan Data is а Engineering and Data Science professional with over 20 years of IT related industrial experience. He graduated with a M.Sc. (Master of Science) in IT (Information Technology) from The University of Nottingham. His M.Sc. Research Project dissertation at Nottingham (Accelerated Deep received the best industrial Learning) presentation paper in 2014, leading to an opportunity at Petronas.

Since then, he has worked with many companies including Intel Technologies (Penang, Malaysia) and more recently, HESS Exploration and Production (Malaysia). His roles include proliferating applied Data Science knowledge to Data, Machine Learning and build Big AI capabilities in order to discover and deliver actionable insights for organizations.

Certification: Electromagnetic Compatibility Engineer (EMC), Data Science Associate and Enterprise Data Scientist (EDS) by Center of Applied Data Science (CADS)



For 3 years, the adventure of completing assignments in time, burning the midnight oil for exam preparations, meeting supervisors, learning new knowledge and gaining wisdom in the university has finally reached an end. It was a long and arduous journey that not every person will have the privilege of going through.

On Wednesday, 4 August 2021, the celebration of new graduates took place virtually. With friends and family, everyone got together to celebrate this joyous and eventful occasion! The School of Computer Science held a Virtual Graduation as an internal celebration for its graduates by commemorating the efforts poured in through special videos and photo-taking sessions. We believe all the graduates are still looking forward to the physical graduation ceremony, hopefully to be held next year. After all, a graduation is only complete when one is holding the scroll, fully dressed in the ceremonial robe!



# VIRTUAL TO GRADUATION

A virtual degree roll call was made by the Dean of Science and Engineering to signify the students' achievement in receiving their degree certificate on this special day. Then, our Class of 2021 graduates were asked to reflect upon their Nottingham experience in 3 words. They left us with a summary of their experiences visualized in the form of a word art. Once again, hats off to the Class of 2021!

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amazing

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life changing

hard work

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## HCI DESIGN CHALLENGE 2021

The imposed travel restrictions due to the pandemic is definitely a devastating blow to the travel and tourism industry. Without access to the heritage sites in Malaysia, Buddyz offered live virtual tours to allow audiences all over the globe to immerse themselves in unique visiting experiences. In collaboration with Buddyz and the Bendahari, the Human Computer Interaction (HCI) module organized the HCI Design Challenge to find a solution to the question -"How do we design an interactive virtual tour that bridges the gap between our older and younger generation?" Students were required to create innovative solutions for a virtual tour to help preserve the rich Malaccan culture and heritage stories while keeping the younger audience engaged.

To understand the context and cultural stories of Praya Lane, where most of the Portugese descendants settled in Malacca, students participated in an immersive live virtual tour to Praya Lane that was hosted by Mr Martin Theseira.





HCI Design Challenge 2021 IN COLLABORATION WITH BUDDYZ AND THE BENDAHARI







### HCI DESIGN CHALLENGE 2021

By participating in the live tour itself, students also gained insights as a user – to allow them to better understand the requirements of a virtual tour and how to engage with users. A round table meeting with stakeholders to include Miss Melissa Chan from the Bendahari and Mr Eric Yap from the Buddyz was held to further help students understand the problems faced by tour companies and marginalised communities.





"THE HERITAGE OF THE PAST IS THE SEED THAT BRINGS FORTH THE HARVEST OF THE FUTURE" – WENDELL PHILLIPS The winning project was a mobile application – VirtuaLane integrated with live tours, a 3D interactive map, an online store and mini games. What captured the judges' interests was the 3D interactive map which used the AR technology that simulated Praya Lane as if users were walking around the environment. The interactive map also offered additional information when user hovered over the buildings. Moreover, searching a specific location would teleport the user to the desired place.

Applying learned knowledge into solving a real world problem is an effective and fun way to learn about a module. We believe students are definitely better user experience (UX) designers now!



### Gan Yi Thung

"Joining the Schools Experience Team has definitely made my virtual university life fascinating. We plan targeted workshops with the aim of allowing students to learn effectively while having fun. In the process of preparing and conducting these workshops, we have the opportunity to gain many skills and meet people from different backgrounds. I am glad to be a part of this team!"







### Gabriel Quek

"I've had the amazing opportunity to collaborate with other individuals and help conduct a wide range of workshops - from programming and web design to STEAM (Science, Technology, Engineering, Art and Math) carnivals and competitions. This constantly allows us to learn new skills. Personally, I enjoy hosting the learning workshops because not only am I able to teach others, but also practice and improve my programming skills.

Before starting my university journey, I had a personal goal to improve my communication and leadership skills. By volunteering for Schools Experience, I have both achieved my goal as well as learned many valuable lessons and skills from my peers that could not have been found anywhere else."

### SCHOOLS EXPERIENCE TEAM TESTIMONIALS

### DATAVIZ CHALLENGE 2021



Supported By



### DATAVIZ GHALLENGE 2021

DataViz Challenge The 2021 was organised by the Faculty of Science and Engineering and supported by MDEC. In order to make this possible. student volunteers assisted various facilitated teams and workshops. A total of 13 schools and 67 students signed up.

**Testimonial from a student** 

Eashan Yasinda Samaranayake Amugoda Kankanamge Don, Year 2 "For the national DataViz Challenge 2021, I was presented with the opportunity to demonstrate data analytics and visualisation using the Seaborn Library in Python. We repeatedly rehearsed our individual presentations prior to the scheduled training workshop sessions in order to help students learn the necessary knowledge and skills in big data analytics and visualisation. Our efforts paid off when we received positive feedback from students and teachers in all the workshops we organised. Participants appreciated the opportunity to learn about the concept of Internet of Things (IoT) and Big Data. We also had the opportunity to listen from Mr. Irvin Hoh, a Manager from MDEC, talk about the promising careers in data science.

All in all, this opportunity was an extremely gratifying experience. We were honoured to hear that our workshops assisted participants in tackling the DataViz Challenge 2021. Being an active member of the Schools Experience Team, I had been involved as a facilitator in various workshops in the past. However, this demonstration felt comparatively more challenging as we had to cater to secondary school students from all over Malaysia and help them acquire the knowledge and skills to create infographics to tell the data story of Covid-19 pandemic in a short time. "

Our team firmly believes that **"Teaching is one of the best ways to learn.** "

#### **Remus Wong Jia Xuan**

In 2019, I joined UNMC's Foundation in Science right after my IGCSEs. Despite not being chosen as the foundation representative at that time, I wanted to try something different and thus decided to sign up as the computer science course representative. I was elected! Fast forward a few years, I once again set myself the goal of becoming a school representative.

I am honoured and grateful to have finally been given the chance to have this role. I would like everyone to know that you should not give up easily and continue to strive for what you want both academically and in all other aspects of life. As a school representative, I would be a voting member of the Student Council and I am the first

### SCHOOL REPRESENTATIVE

"Everyone goes through minor setbacks. However, unless you put it upon yourself, it never means permanent defeat.."

point of contact for the school's representative. I will also be responsible for chairing and facilitating LCF meetings. In short, the other representatives and I would be the student's vocal advocates to ensure that you have a valuable experience in the university. I look forward to working with all of you!

### PRESIDENT OF CSS

I initially joined the Computer Science Society (CSS) with the sole goal of gaining experience working in a team. Doing my best in every given task, the thought of being the next president had not once crossed my mind. As time went on, the previous committees saw something in me and appointed me to be the next president. At first, I was really shocked and felt overwhelmed to the point where I rejected the offer and asked for a smaller position. Looking back, it was not a wise move to make and I am glad that I ended up where I am now. As president, I decide on the goals and main focus of the society for the upcoming year. Envisioning and planning on what is to come, I steer the society as a whole.

### Alvin Chaidrata

Being a junior committee member last year, what I strongly believed in having the courage to not be afraid when expressing ideas, and I still practice this today. Even if you are just a junior, don't be scared to challenge anyone's ideas with yours. That is what discussions are for: to point at each aspect objectively and come up with the best solution. If a certain part of your idea is rejected by the majority, think critically as to why that is so. That is when I learnt the most.

"Set a goal, always be hungry and grasp at any opportunity you see."

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**CS Newsletter Vol.21** 

### STUDENT INTERNSHIP

DR. HAFEEZ DR. MARINA DR. IMAN DR. TOMAS DR. AAZAM



### Heng Yuen Qi

Machine Learning for Detection of Epileptic Seizure Activity in EEG signals

My project was about exploring EEG data and cleaning noise from it to perform feature extraction which includes EEG frequency bands such as delta, theta, and gamma bands. Then, machine learning algorithms such as Support Vector Machine (SVM) were used to classify them as seizure, interictal (between seizures) or ictal free. This was implemented using the built-in classification learner app available in MATLAB. Overall, it was an insightful experience for me and I learnt a lot during the summer break. This motivates me to further explore the wonderful field of computer science.

This EEG displays a healthy subject with eyes open



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### Yong Jia Yin

Machine Learning framework for mental workload assessment using EEG signals

This project aimed to explore the machine learning applications for EEG data analysis to develop а model for mental workload assessment. А public EEG dataset was incorporated in the project and signal processing techniques were used to extract relevant information from the data as features. These results would be useful for human wellbeing, especially in the workplace. Throughout this experience, I have learnt essential research and writing skills, as well as discovered how computer science, combined with the use of EEG is important towards human brain research.

"It was a pleasant experience that allowed me to prepare myself for my Final Year Project and future career"



< > CS Newsletter Vol.21

DR. HAFEEZ

DR. MARINA

DR. IMAN DR. TOMAS

### Salma Tamer

Adaptive Mobile App for Health Monitoring, Prevention and Condition Management of Cancer

The aim of this project was to develop a mobile health application to manage the conditions of cancer patients and to provide assistance when planning their food intake.

My main tasks were to identify requirements through text analysis, design a user-friendly User Interface (UI), and contribute to writing a research paper. This internship required me to do a lot of research with regards to cancer patients and their conditions. Thus, I have become more aware of their struggles and how they may be supported using technology. I believe that once this application is released, it will bring numerous benefits to patients and help in the prevention of cancer.

This experience enriched me with a lot of knowledge, teaching me how to work better in an environment outside of studying. Furthermore, it felt very fulfilling knowing that it is bringing a positive impact to the world.



"Enlightening, enriching and fulfilling"



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DR. AAZAM

### Khor Yoong Joo

Dutch Roots of Malacca Virtual Exhibition

This internship was about creating a virtual exhibition to educate the public on the Dutch Culture and Heritage of Malacca. I was responsible for developing a role-playing game using Ren'Py (a visual novel engine used to program interactive computer or mobile games through the use of images, text, and sound) and integrating it into the virtual exhibition website.

Players will learn how the Dutch East India Company conducted their business in Malacca through the lens of a ship crew, with the aim of rising through the ranks to become the governor of Malacca. Players learn historical stories through the game-play. This improves user immersion, which in turn enhances knowledge retention. I've since learnt that games can be a complex piece of software to develop, requiring a programmer to synergise all game elements well.

Overall, it was a fun experience of adapting to the changing needs of clients and learning to appreciate the value of experienced advisors.



# STUDENT INTERNSHIP

DR. HAFEEZ

DR. MARINA

DR. IMAN

DR. TOMAS DR. AAZAM

### Thomas Tan Kean Yew

**INCREMENTAL LEARNING FOR BODY LANDMARK DETECTION** 

The project I worked on during my internship involved building upon a machine learning network that can detect the positions of certain landmarks on the body to be used for purposes such as online clothes-fitting. Before I began working on this project, I knew about the theory behind machine learning. However, I did not know how to use a tool to build a machine learning program. I spent about two weeks to learn about PyTorch and I am now confident that I can create useful machine learning programs. In fact, I believe that anyone from the School of Computer Science can pick it up as long as you have internet and put in enough effort!

Besides that, I spent my time learning to write good scientific reports as well as the proper way to approach a project to be able to document it in stages easily. I struggled with writing my project report as I didn't start it with documentation in mind. Because of that, I would like to advise everyone to consider that factor before beginning a project. Throughout my internship, I worked on finding and developing methods to use transfer learning machine models (machines that learn from the experience of other machines) to reduce machine model complexity. Additionally, I worked on increasing the accuracy of the machine models to be able to handle new data which previously developed models were not designed to handle.

Three hour's headache for three seconds' eureka – It's worth it, I promise.





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I had taken an internship during my summer break under the supervision of Dr. Tomas Maul. The aim of the project was to develop a system to semiautomatically process camera-trap data for uploading to biodiversity websites. It was a great opportunity for me to learn some new things or skills that I do not normally learn from the modules I was taught. Overall, the experience has been great and meaningful to me as I learned a lot of new knowledge on Python, image processing, machine learning and software development. These skills that I acquired will be very useful in my future studies.



### Syed Muhammad Hassan Zaidi

EVALUATING AND COMMENTING ON THE VARIOUS CONSENSUS ALGORITHMS USED IN BLOCKCHAINS

During this internship, I had many findings which I summarised into a report. I learned a great deal about the fundamentals of blockchains as a technology and how decentralised distributed networks like them function. Besides that, I found out about the potential use cases of blockchains in the real world as well as the various research being done to come up with new consensus algorithms, which would be used to apply blockchain technology in different contexts. On top of that, I managed to learn Solidity, a programming language that is used to write a smart contract on the Ethereum blockchain. I then used Solidity to implement a very basic smart contract which further allowed me to understand current practical applications of public blockchains such as Ethereum and Cardano. Now, I understand how blockchains have the potential to revolutionise much more than just finance. All in all, the internship had helped me to understand where Computer Science is heading as a field.



### Maybank\_Student\_Ambassador.txt(

The Maybank Student Ambassadorship is a 12-month student development and mentorship programme. It is aimed at honing the professional development of their selected student #Mbassadors by developing their leadership, technical and communication skills. More information can be found at: https://myroaringcareers.com/



#### NOTTINGHAM #MBASSADOR: MEHUL VARSHA



As soon as I found out about this programme through the Career Advisory Services email, I signed up immediately. The opportunity to learn from such a prominent and prestigious figure in the industry simply could not be passed.

While participating in the programme, I had the chance to interact with industry leaders and Global Maybank Apprentices in various fields. I met Ms. Claire Sancelot (environmental activist based in Hong Kong), Mr. Kenneth Lim (Head of Digital Innovation and Strategy, Virtual Banking and Payments at Maybank) and Datuk Nora Manaf (Group Human Capital Chief of Maybank) just to name a few. I even received a Starbucks gift voucher from Datuk Nora after my presentation in a talk! In addition to that, I was exposed to many current trends ranging from financial services to technology.

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Throughout this platform, I was able to showcase my talents, especially with activities such as the MDASH, which consisted of several talks by industry leaders and a series of challenges to test our logical skills, accuracy and teamwork.



An interesting part of my experience was the chance to promote Maybank's e-wallet. It introduced a fully digital banking experience which promoted digital literacy amongst the youth. As a team, all the #Mbassadors managed to accumulate over 120 signups!

This once-in-a-lifetime opportunity was truly fruitful, as I expanded my knowledge and network while doing my best in serving the student community. On a final note, I want to thank the University of Nottingham Malaysia for making this all possible!

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 11:00 AM 13/10/2021

# **FOSE SEPRS PhD Scholarship**

The University of Nottingham Malaysia is a fully research-led university, committed to the mission of research, especially in the Faculty of Science and Engineering (FOSE), where it is highly ranked in various research surveys, including the recent Malaysian Research Assessment (MYRA). The FOSE Science & Engineering Postgraduate Research Scholarship (SEPRS) for PhD confirms the university's commitment to nurturing and supporting our very best students to conduct world-class research. More importantly, UNM wants you to be the core of our success. The SEPRS will cover the full PhD tuition fees of three years. Scholarship awardees are expected to start their PhD research studies right after graduation during the September intake.

### Award Recipient 2020: Muhammad Alif Danial



"Do what you love, if you want to pursue a PhD about a topic you are passionate about then go for it. If there is an idea you have always wanted to pursue, go for it."

My PhD title is Internet of Things (IoT) Visual Analytics Toolkit for End User Development. With this scholarship, I am able to research on how Artificial Intelligence (AI) and IoT technologies can be combined to enhance data analysis and facilitate enhanced learning of complex technological concepts for nonexperts. My research focuses on improving data analysis with AI, lowering barrier of the entry into IoT development. as well as promoting technological literacy in IoT, AI and data science for everyone. My hope is that this research will be helpful to education, healthcare and other sectors in the future. Overall, working on my research has certainly been challenging with the ongoing pandemic, but I am still excited to finish what I have started.





Education has always been my utmost importance, and to be recognised as the best student by the Faculty of Science and Engineering is very humbling. I would like to take this chance to express my gratitude to my lecturers, friends and family. Their teachings and undivided support throughout my university life has made this possible.

Time really flew by as a Computer Science student in the University of Nottingham. Looking back on my first year in the university when I was still a Foundation in Science student, I found myself struggling to learn MATLAB as my first programming

language. Thankfully, I met friends sharing the same passion and interest towards the IT field who helped me along the way. As time went on, I organised and participated in events for Computer Science students and completed multiple great and meaningful projects. Later, I went on a student exchange programme to the UK campus. Following that, I faced a pandemic where I spent one and a half years learning online. Fast forward to today, I am working as a Machine Learning Engineer at Intel.

The past few years of learning in the University of Nottingham Malaysia made me realise the importance of being a versatile, strong-willed and disciplined person. In this rapidly changing world, we often find ourselves in unfavourable situations, be it for study or for work. Therefore, it is vital to always be prepared to face sudden changes and adapt accordingly. In the instance of a tough situation, we should recollect our thoughts, adjust our priorities, set deadlines and work on our problems immediately. A helpful tip to accomplish goals would be to stay away from distractions and to resist temptations. Once again, I am extremely honoured to be presented with this award and I promise that I will continue to strive for success.

### **Best Software Eng Student Award**

### Award Recipient: Sonia Mubasher

As a refugee in Malaysia, studying at an international university has always been a dream to me, not to mention at such a prestigious university like the University of Nottingham. My three years with the School of Computer Science was nothing short of an incredible journey. During these years, participated in various extracurricular activities of top on organising workshops to share mv knowledge with the help of the School Experience module. Nearing the end of my studies, the university was inevitably hit by

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the COVID-19 pandemic, limiting my face-to-face interactions with my classmates and lecturers. Despite this drawback, I would like to thank the School of Computer Science for not compromising my studies by providing an excellent online learning platform. Don't run after grades because grades do not determine who you are. You are worth so much more than you can imagine.

> Don't limit yourself. Life is a hurdle of challenges but there is always a way to overcome them.

### **Best Final Year Project Award**

Award Recipient: Lim Wei Han

Hello everyone! I joined the University of Nottingham Malaysia in 2018. I have always enjoyed playing around with both the hardware and software aspects of computers. From that, I noticed the conventional teaching methods for programming have not been very engaging or fun in the eyes of the youth. This inspired me to start my final year project of creating a new tool to teach programming and computer knowledge in a friendlier manner, in hopes of provoking the next generations' interest in this field.



The project incorporates the concept of Natural Language Programming so that users, especially students, can program IoT sensors in an intuitive way. From that, users can create fun games or useful utilities using hardware sensors. Together with an AI face recognition feature and Python extension support, there are thousands of possibilities and fun to be had in this system. By learning important programming concepts using the easier "Natural Language Commands", the learning curve of common programming languages such as Python can be flattened.

After working on the project, I would consider ourselves to be very lucky, as we currently live in a time in which we have access to many resources that can help us translate our ideas into reality. For example, 3D printing used to be a rare amenity which only big companies could afford. Nowadays, we can find 3D printing services online for reasonable prices. Because of that, I hope that we can make use of these resources to work on useful projects which can benefit the rest of the world.

## **Student Awards and Achievements** Second Year Group Project Journal Publication

Automated Agriculture Commodity Price Prediction System with Machine Learning Techniques Published: 1 August 2021 by ASTES Journal in Advances in Science, Technology and Engineering Systems Journal, Volume 6, pp 376-384; https://doi.org/10.25046/aj060442

The intention of this research is to study and design an automated agriculture commodity price prediction system with novel machine learning techniques. Due to the increasingly large amounts of historical data for agricultural commodity prices and the need of performing accurate prediction of price fluctuations, the solution has largely shifted from statistical methods to machine learning areas. However, the selection of proper machine learning techniques for automated agriculture commodity price prediction still has limited considerations. On the other hand, when implementing machine learning techniques, finding a suitable model with optimal parameters for a global solution, nonlinearity and avoiding the curse of dimensionality are still the biggest challenges. In this research, we address these problems by conducting a machine learning strategy study and propose a web-based automated system to predict agriculture commodity price. In two series of experiments, five popular machine learning algorithms, ARIMA, SVR, Prophet, XGBoost and LSTM have been compared with large historical datasets in Malaysia. The results validate the efficiency of the proposed Long Short-Term Memory Model (LSTM) and serve as the prediction engine for the proposed system. Particularly in the long-term experiment testing, the average performance of LSTM with MSE has improved by 45.5% while ARIMA has dropped by 74.1% and the average MSE of LSTM is 0.304 which outperformed all other four algorithms.

Authors: Zhiyuan Chen, Howe Seng Goh, Kai Ling Sin, Kelly Lim, Nicole Ka Hei Chung, Xin Yu Liew

# **Student Awards and Achievements** Second Year Group Project Journal Publication

CRYPTOCOINOPOLY: A Real-Time Online Multiplayer Board Game Conference: The 14th International Conference on Advanced Computer Theory and Engineering (ICACTE 2021) Supervisor: Mr Michael Chung



With the insurgence of cryptocurrency and the thriving business of mobile games, games related to cryptocurrency have gained enormous interest in recent years. This paper presents a real-time online multiplayer board game, Cryptocoinopoly which is a hybrid of the existing Cryptocoinopoly board game and Monopoly. Unity, a cross-platform game engine has been used in its development process together with Photon Unity Networking (PUN), which is a Unity package for creating online multiplayer games. At the abstract level, Cryptocoinopoly is represented by remote database, game server, network, application (game), local database and client components. In the game's development, notable functions were added, for instance multiplayer, unlimited rounds, investment in the cryptocurrency market, as well as user asset trading. Following that, functionality testing and debugging of the game were conducted under constrained conditions with limited resources due to the ongoing COVID-19 situation. Despite this challenge, all functional and non-functional requirements of the prototype have been fulfilled.

### Second Year Group Project Conference Publication

Intent Matching based Customer Services Chatbot with Natural Language Understanding Supervisor: Mr. Chew Sze Ker 2021 5th International Conference on Communication and Information Systems (ICCIS 2021)

Customer service is the lifeblood of any business. Excellent customer service not only generates returning business but also creates new customers. Looking at the market demand for 24/7 customer service, many organisations are increasingly engaged in popular social media and text messaging platforms such as WhatsApp and Facebook Messenger as a method to provide customer services. In this paper, we present an intent matching-based customer services chatbot (IMCSC), which is capable of replacing the customer service work of sales personnel, whilst interacting in a more natural and human-like manner through the employment of Natural Language Understanding (INU). With that, the bot can answer the most frequently asked questions. We also integrated a feature to process and export customer orders to a Google Sheet.

**Final Year Project Conference Publication** 

Interactive Tangible Game for Collaborative Play between Children with Cerebral Palsy

Authors: Chloe Hue Tung San and Dr Marina Ng (Supervisor)



### **Conference: The International Visual Informatics Conference 2021**

Interactive tangible systems have been widely designed with aims of rehabilitation for users with cerebral palsy. However, there is still a lack of tangible systems that can support collaborative play between children with cerebral palsy. This paper describes the complete development process and evaluation of an interactive tangible game system purposed to support collaborative play and rehabilitation. Based on a pilot study, a new prototype iteration of the tangible system incorporated multiplayer games with an accessible tangible interface. Two user experiments were conducted virtually with eight participants from the Spastic Children's Association of Selangor and Federal Territory (SCAS&FT) to test the system's usability. The children provided positive feedback and the experiment achieved 75 on the System Usability Score (SUS), deeming the system effective and practical. The main findings of this paper were that children with cerebral palsy preferred playing with friends rather than alone, and the system provided motivation for rehabilitation and social collaboration. Following this, we further discussed future work to improve the development of the game for collaborative play among children with cerebral palsy.



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# The Dean's Excellence Scholarship Award

Year 1 to Year 2 Recipients:

This is proudly given to

Liew Qian Hui Thomas Tan Kean Yew Clarine Tan Kaili Chai Xiang Zhi Lim Yi Hong Cheang Wai Bin Remus Wong Jia Xuan Bryan Ling Zehao Alden Sia Zheng Heng Ian Chong Zhen Ming Gan Yi Thung, Jason Lee

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# The Dean's Excellence Scholarship Award

Year 2 to Year 3 Recipients:

This is proudly given to

Boon Zhan Chew Yeoh Wei En Ahmad Rosehaizat Syed Ahmad Azhad Elsaid Salma Tamer Fathy Ahmed Lee Hock Siang Lee Hui Fang



# SECOND-YEAR GROUP PROJECT MODULE

**Best Presentation Team 2021:** 

Group B Elbiali Hashem Mohammad Sami Fadl Karim Ahmed Safieldin Fu Zijie Liew Yih Seng Lim Yen Kai Saha Amit Teo Shi Bin



# SECOND-YEAR GROUP PROJECT MODULE

Best Demo Team 2021:

Group B How Khai Chuin Lee Hui Fang Loh Qian Kai Ong Kwang Xi Umrit Sneha Lata Wongso Keitaro Mirake





### AUTOMATED ANALYSIS OF TUMOUR IMMUNE CELLS IN SOUTHEAST ASIAN BREAST CANCER.

Cancer Research Malaysia (CRMY) and the University of Nottingham Malaysia (UNM) signed a new agreement to collaborate on using AI to automatically analyse breast cancer histopathological images. The aim of the research is to study the distribution of immune cells in breast cancer, to further understand their relationship with the survival rate and response to treatment of its patients, particularly within the Asian population.

This project is led by Dr Amr Ahmed (UNM) and Dr Pan Jia Wern (CRMY). The team includes Prof. Datin Paduka Teo Soo Hwang (CRMY), Dr Iman Liao (UNM) and Dr Tomas Maul (UNM). The project is also recruiting a post-doctoral researcher to the team for twelve months, with funding by CRMY.

# RESEARCH HIGHLIGHTS

**DR. AMR AHMED** 

MODULATION OF CORTICAL ACTIVITY IN RESPONSE TO LEARNING AND LONG-TERM RETRIEVAL OF 2D VERSUS STEREOSCOPIC 3D EDUCATIONAL CONTENTS: EVIDENCE FROM AN EEG STUDY

Published in Computers in Human Behaviour: https://doi.org/10.1016/j.ch b.2020.106526



This study aims to explore the effects of Stereoscopic 3D (S3D) technology on human behaviour, along with corresponding brain responses during learning and memory using an electroencephalography (EEG) technique. A sample of 68 participants between 18-30 years of age were recruited and randomly assigned to two groups (2D and S3D) in such a way that their fluid intelligence ability, age, and background knowledge about the learning material were controlled. The analysis of behavioural data suggested that responses of both groups in terms of reaction time after two months of retention were statistically significantly different, F(2.66,125.09)=4.479, p=0.007, h2=0.087. The EEG source analysis, with an accuracy rate of over 90%, showed differences between the groups in the brain regions of BA 7, BA 10, BA 11, and BA 25, reflecting widespread neuronal networks in the S3D group as compared to the 2D group in the LTM recollection. In conclusion, it was experimentally shown that the human brain processed the S3D contents differently by utilising more cortical regions and neuronal networks than the traditional 2D contents, which modulates the behaviour of the participants by recollecting the LTM faster in the recall task.

# RESEARCH HIGHLIGHTS

DR. HAFEEZ ULLAH AMIN

Reference Frame Unification of IMU-Based Joint Angle Estimation: The Experimental Investigation and a Novel Method 202

YI, CHUNZHI, JIANG, FENG, YANG, CHIFU, ZHIYUAN CHEN, DING, ZHEN AND LIU, JIE, 2021. SENSORS. 21(5), 1813.

Inertial measurement unit (IMU) based joint angle estimation is an increasingly mature technique that has a broad range of applications in clinics, biomechanics and robotics. In this paper, we clarify the determination of the reference frame unification (RFU) to distinguish it with drift correction which has always been confused with the term RFU. We then design a mechanical gimbal-based experiment to study the deviations, where sensor-to-body alignment and rotation-caused differences of orientations were excluded. Accordingly, we propose a novel method to utilise the consistency of the joint axis under the hingejoint constraint, gravity acceleration and local magnetic field to comprehensively unify reference frames, which meets the nonlinear timevarying characteristics of the deviations. The results on ten human subjects revealed the feasibility of our proposed method and the improvement from previous methods. This work contributes to a relatively new perspective of considering and improving the accuracy of IMU-based joint angle estimation.



RESEARCH HIGHLIGHTS

DR. CHEN ZHIYUAN

Resource Allocation in Multiple Energy-Integrated Biorefinery Using Neuroevolution and Mathematical Optimization

WAI MUN CHAN, DINH VAN-KHOA LE, ZHIYUAN CHEN, JULLY TAN AND IRENE MEI LENG CHEW, 2021. PROCESS INTEGRATION AND OPTIMIZATION FOR SUSTAINABILITY. 5(1).



A multiproduct lignocellulosic biorefinery converts various types of biomasses into value-added products or energy through different conversion pathways. However, its operation is susceptible to the changing nature of biomass properties, biomass feedstock supply, ambient temperature and product demands, causing supply issues. A new optimal resource allocation scheme must therefore be devised to address such fluctuations. In this paper, a resource allocation system based on a deep neural network (DNN) is proposed for biorefinery. In this system, the input nodes of the DNN are the parameters that undergo fluctuations while the output nodes are the flowrate allocations of biomass to different chemical and energy conversion pathways. The connection weights and topology of the DNN are optimized using the neuro-differential evolution (NDE) algorithm. The optimization results of the DNN yields an average optimality of 97.7% and reduces the response time by 99.5% compared to the conventional nonlinear solver. The proposed DNN-NDE framework accounts for both responsiveness and cost performance during the synthesis of a smart resource allocation system.

# RESEARCH HIGHLIGHTS

DR. CHEN ZHIYUAN

Variational Autoencoders and Wasserstein Generative Adversarial Networks for Improving the Anti-Money Laundering Process

RESEARCH

DR. CHEN ZHIYUAN

IGHLIGHTS

ZHIYUAN CHEN, WALEED SOLIMAN, AMRIL NAZIR AND MOHAMMAD SHORFUZZAMAN, 2021. IEEE ACCESS. 9446893.

There has been much recent work using machine learning techniques on fraud and Anti Money Laundering (AML) detection. However, most algorithms are based on supervised techniques. We propose a suite of unsupervised and deep learning techniques to implement an anti-money laundering and fraud detection system to resolve this limitation. This system leverages three deep learning models: autoencoder (AE), variational autoencoder (VAE), and a generative adversarial network. We pre-process the given dataset to separate the Transaction Date attribute into its base components to capture time-related fraud patterns, while Wasserstein Generative Adversarial Network (WGAN) is used to generate fraud transactions. This is mixed with the base dataset to train the AE and VAE models. We built two versions of the AE model (single-loss and multi-loss), using a novel method of calculating the anomaly score threshold called Recall-First Threshold (RFT) which helped enhance the model's performance. Experimental results demonstrated that the False Positive Rate (FPR) drops down to as low as 7% in the proposed multi-loss AE model. In comparison, we achieved an accuracy of 93%, with 100% of the fraud transactions recalled successfully.



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# **Social Media**



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## WORD SEARCH

D W S F S Q T U G S B B A V BQS Α Ρ QX ΟY L С о L н E С U н Ρ Y 0 А D х S D В R L Ρ А А Ε S Y S Х S L G G Y Ν 0 U В Е Т В D wо v Т Y С J Ρ Ζ Е К К F U NWA L R К L G т R С WC R Х К Α Т в ΜZ В В С U Е G Ε S Ε D Т Q L ΜA К В Х v L L Ρ А J 0 J Т L R А А ΗN В Н Т S Ν Е D х QΤ Ν K UWZ Ρ А S Т Ε D R С Е Т N M S н R 0 В L S WQ QD Ζ Е R Н Υ F L Μ Х F н Х А Ν Ρ L 0 Ν С Ρ R Y F F Ζ К F Т Е ΜA L Ζ D R А F Т Ζ К В 0 0 υ J O D Ζ ΖA В н Ζ R Т Ε Т Т С Ζ к ٧ Y v D Y OML S J R Х Y U В L Ζ Y ΝA Х S J G S Ζ L F J L L J R U С l QE н QG R Q J J Е Ν L Е J L L Ν D V J Т Е Ρ ΜZ Υ QK F Т А QQWN U ΜJ QO А R F Н Т D Y J J В D F С R v А z Е J 0 Y L J Т Y 0 Z v Е S х С Е Ρ Ζ Ζ F С Ζ v н Е L U 1 Ζ А v С R х М Ε F ΕН S Ζ В н Q L Х Ε R В В Ρ Ν οοα Υ н L L S Q Ρ WMC Ρ Ε А MOU Е А S Т Е В R U L Х L н S Ρ R н G А Ζ υ Y wο Ν 0 0 G Ε U L D х v к L W Е Ζ zυ Е Т R G С Ν Т н U R U ΜB С Х L Ζ N В Ν С L S J Κ Υ Κ В С С Т С Т F L ٧ L R U L Н А R Y Т S Ζ L к S А S С н U L Ε F A Ζ J G F I В Μ 0 S G F Ζ BDE Ζ С L Х 0 D Ε Т н В С GMR Ρ D L R S ΚS R Ρ QNWO R D S v L Ε MMAU Е Υ х WΕ Т υн JHMZQYNQE L ΜJ Ζ К J А S X W

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DRAG	EMAIL	LEMMA	PASTE	PIZZA
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