

# SAUDI RESEARCH IDOL 2021



## MINUTE THESIS COMPETITION

PRESENT YOUR GRADUATE RESEARCH IN JUST 3 MINUTES

**WHY ARE YOU DOING IT ?**

MY SUPERVISOR TOLD ME TO DO IT ! DOES NOT COUNT

**HOW ARE YOU DOING IT ?**

ASSUMING YOU KNOW

**HOW DOES IT RELATES TO THE REAL WORLD?**

UMM..PAUSE!



\$3000



\$1500



\$500

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## *Chapter 1*

# *Saudi Research Idol 2021*

### *1.1 Vision*

Saudi Arabian Cultural Mission (SACM) in Australia is organizing this competition to provide an opportunity for Saudi students to showcase their thesis, enhance their presentation skills and gain experience to participate in future similar competitions.

### *1.2 Target*

A 3-minute competition where PhD candidates and research Master students shall professionally present a snapshot about their thesis in front of referees and non-specialist audience aiming at winning the competition.

## Chapter 2

# Engineering and Computer Science

### 2.1 *Ali Siddiq*

PhD Student, University of Technology Sydney

### **Modeling the Transmission of Dengue Fever**

Dengue fever (DF) is widely considered to be the second most serious vector-borne disease (VBD) and is caused by two types of mosquitoes: *Aedes Aegypti* and *Aedes Albopictus*. Dengue fever is a mosquito-borne viral disease with the fastest transmission rate on the planet. The annual global estimations of cases of DF infection exceeds 96 million. DF is influenced by environmental factors as the life cycles of these mosquitoes are well-adapted to the human environment. Ecological changes caused by social activities such as human movement and urbanisation have a significant influence on the transmission of vectors. Moreover, these mosquitos respond differently to the transmission factors in various

spatial distributions. DF is a considerable problem for the Ministry of Health in Saudi Arabia. In 2004, the second-largest number of DF cases was found in the western part, and since then this region has been considered a dengue fever epidemic area. Dengue viruses primarily circulate between humans and vector mosquitoes, and the existence of vector viruses is a restricting transmission factor. Therefore, there is susceptibility for the disease to be transmitted at the religious mass gathering during “Hajj” and “Umrah” times. Hence, this research investigates the principal factors responsible for DF transmission in Saudi Arabia based on three comprehensive stages after collecting the data; first, inserting the missing values for collected data by applying the self-organised map (SOM) that leads to sufficient result. Second, using the Spatial-Temporal Density-Based Spatial Clustering of Applications with Noise (ST-DBSCAN) to cluster and categorise the data based on feature similarities for efficient analysis. In the last stage, data derived from the previous stages will be used for modelling dengue fever transmission according to the main factors that influence the transmission of the disease by applying the geographically weighted regression (GWR). It’s projected that, the outcomes of this research will assist the decision-makers to make accurate decisions and implement the right procedures to control disease transmission.

[Participant’s Video Click Here](#)

## 2.2 *Raed Yahya AlBanna*

PhD Student, The University of Melbourne

**The Influence of The Learning Environment on Students’  
Embodied Learning Experiences: International Primary School  
Case Studies**

A growing body of research shows that the design of school learning environments can influence students' learning experiences and contribute to their academic achievement. Learning environments are increasingly using digital technology to enhance students' learning experiences in a way that can prepare them with 21st-century skills. However, little is known about how and why the relationship between architecture, digital technology and people manifests experience in the first place and, as such, questions are raised regarding how to articulate these relationships. This research explores how the design of learning spaces, digital technologies, peers and teachers influence students' experiences of learning with their bodies in primary schools.

This thesis is dedicated to understanding how designed environments can influence, and potentially enhance, students' embodied learning experiences. To do this, the research draws on theoretical ideas of embodiment: embodied cognition, embodied interaction, and embodied learning: using concepts from different disciplines including psychology, philosophy, human-computer interaction, art and science.

Data will be collected through multiple qualitative methods, and an exploratory case study methodology will be adopted as the primary approach for data collection, with the objective of gaining in-depth understandings of students' embodied learning experiences. Due to the complex nature of embodiment, as mediated through different forms of communication and collaboration, this study will deploy a multi-modal analytical approach to video analysis to examine the complex patterns of bodily-based interactions in students' learning experiences in science and art classrooms.

Finally, the findings and discussion will be communicated by drawing together key variables through the conceptual framework of embodiment, with the aim of outlining deep insights into the ways in which students experience learning with their bodies. The findings may in-

form policy making, school architecture and pedagogical design and technology integration. Architectural designers, including furniture and digital technology designers, researchers from interdisciplinary fields, school teachers, principals and parents are most likely to benefit from this study.

**[Participant's Video Click Here](#)**

### 2.3 *Haifa Mohammed Almutairi*

PhD Student, The University of Western Australia

#### **Classification of Obstructive Sleep Apnoea from Single-Lead ECG Signals**

Sleep Apnoea is a prevalent sleep disease that has three types: Obstructive Sleep Apnoea (OSA), Central Sleep Apnoea and Mixed Sleep Apnoea. OSA is a common sleep disorder characterized by repeated episodes during sleep. It occurs when the upper airway is obstructed despite attempts to breathe. When the upper airflow is partially closed, the amount of air entering into the lungs is reduced, this is called Hypopnea. The typical symptom of a person suffering from OSA after a full night of sleep as a result of these episodes is that they experience excessive daytime sleepiness. Other typical symptoms include a headache in the morning, exhaustion and fatigue throughout their day. Snoring is considered a sign of OSA. Detection of OSA can protect patients from other disease such as: cardiovascular diseases, recurrent heart attacks, diabetes, stroke and neurocognitive deficits. Conventionally, polysomnography (PSG) is a clinical procedure used for the diagnosis of OSA which uses different physiological signals including Electrocardiography (ECG), Electroencephalogram (EEG) and Electromyogram (EMG) in a sleep laboratory. It

is an expensive as well as inconvenient clinical procedure. The alternative solution is wearable sensors that can be used at home to record the physiological signals like Electrocardiography (ECG), Electromyogram (EMG) and Electroencephalogram (EEG). Therefore, automatic detection of OSA from ECG signals plays an important role in early OSA diagnosis and will help the physicians to make better decisions. In this research, we propose deep learning based models for OSA detection.

**[Participant's Video Click Here](#)**

## 2.4 *Hussain Ali Alsadiq*

PhD Student, University of Queensland

### **Acoustofluidic Manipulation Of Microbubbles For Drug Delivery Applications**

The use of microbubbles in theronostic applications has been proposed by several studies after they have been proven to be effective in diagnostic applications as ultrasonic contrast agents. One of the theronostic applications of microbubbles is to encapsulate medication and manipulate them through body fluids using ultrasonics and then burst them for drug release. This research uses low cost widely available medication that is capable of treating Age Macular Degeneration AMD if positioned at the retina. The method suggested by this thesis investigates an efficient delivery method of ELIPs loaded with hydrophilic medicine and injected inside the sclera. After injection, they are moved towards the back of the eye using acoustofluidic concepts and traced through their echogenic properties. Once at the macula, they are left to degrade, and the drug is released.

**[Participant's Video Click Here](#)**

## 2.5 *Afrah Alanazi*

PhD Student, Latrobe University

### **MoLeCaP: Mobile Learning of Computer Programming by Female Students in Saudi Arabia**

Programming courses require both theoretical and practical teaching and learning approaches to effectively foster the appreciation and application of concepts learned in class. However, students usually face cultural restraints in accessing some learning tools that would otherwise be important in fostering a better understanding of the course. In particular, the Saudi Arabia culture denies female programming students the opportunity for interaction and active participation in programming lectures; instead, they rely on passive listening of lectures. Mobile-based learning approaches (m-learning) provide an opportunity of delivering theoretical and practical programming lessons through visualization software. To date, there have been a lack of studies about using mobile learning approach to teach female programming students in the Saudi context. The overarching aim of this proposed study is to investigate the effectiveness of Mobile-based learning approaches that rely on mobile technology in delivering both theoretical and practical components of programming courses through the use of mobile-based visualization applications. This study proposes four study phases for data collection and analysis. The first two phases aim to investigate Computer Science students and lecturers' perceptions toward the mobile-based learning and teaching approach in programming lectures. The next two phases will use both quantitative and qualitative methods to assess the attitudes of students and lecturers towards Mobile-based learning approach. All phases will focus on understanding the cultural implications of mobile-based learning, especially in delivering programming

courses. Knowledge obtained from this proposed study will form the basis of developing an effective evaluation framework that will be called MoLeCoP (Mobile Learning for Computer Programming), upon which mobile-based approaches for preliminary programming courses will be assessed.

**[Participant's Video Click Here](#)**

## 2.6 *Hamad Zogan*

PhD Student, University of Technology Sydney

### **Detecting Depression Through Social Media**

Social networks enable people to interact with one another by sharing information, sending messages, making friends, and having discussions, which generates massive amounts of data every day, popularly called as the user-generated content. This data is present in various forms such as images, text, videos, links, and others and reflects user behaviours including their mental states. It is challenging yet promising to automatically detect mental health problems from such data which is short, sparse and sometimes poorly phrased. However, there are efforts to automatically learn patterns using computational models on such user-generated content. While many previous works have largely studied the problem on a small-scale by assuming uni-modality of data which may not give us faithful results, we propose a novel scalable hybrid model that combines Bidirectional Gated Recurrent Units (BiGRUs) and Convolutional Neural Networks to detect depressed users on social media such as Twitter-based on multi-modal features.

**[Participant's Video Click Here](#)**

## 2.7 *Abdulrahman Hassan Alhazmi*

PhD Student, LaTrobe University

### **Developing an Awareness Framework for Software Developers to Implement Privacy into Software Systems**

Do you know why despite the claims of having the most secure internet, we still become the victims of data breaches? The use of software applications is inevitable as they provide different services to users. The software applications collect, store users' data, and sometimes share with the third party, even without the user consent. The Internet has also grown, and this has significantly increased data breaches in software systems. One of the reasons for this might be that software developers who are responsible for ensuring that software systems are embedded with the appropriate privacy guided by laws such as GDPR fail to implement the laws. GDPR law has guidelines that can be followed by software developers to implement privacy into software systems. Nevertheless, many data breaches occurring might be due to the failure of putting the guidelines into practice. Developers might be lacking enough motivation to implement the GDPR law. Therefore, to equip developers with the motivation to implement their skills to mitigate such breaches, this paper proposes a GDPR game-based teaching framework. Gamification, widely described as "the use of game design elements in non-game contexts" has previously shown potential in the development of exciting and efficient learning experiences, both in the sense of education and business. Some researchers have concentrated on the connection between software privacy and gamification, but they only focus on a few data privacy elements. The proposed framework will focus on improving developers' security coding behaviour by way of their motivation. This framework will incorporate all GDPR principles which have not

been done before. The proposed framework will ensure that software developers can put GDPR into practice resulting in software systems embedded with privacy.

**[Participant's Video Click Here](#)**

## 2.8 *Tawfeeq Reda M Alsanoosy*

PhD Student, RMIT University

### **The Influence Of Culture On Requirements Engineering Activities**

Requirements Engineering (RE) plays a significant role in ensuring software quality. It involves the critical activities that are required to capture clients' requirements accurately, completely and in line with users' needs. RE is a human-centric activity, and therefore, requires intense communication with software stakeholders. As culture plays a major role in the way individuals communicate and perform tasks, RE activities might be strongly influenced by individuals' cultures. However, few studies have been conducted to explore the influence of culture on RE activities. Thus, cultural influences need to be explored, as better understanding them might result in better RE quality and outcome. The goal is to explore the influence of culture on RE activities. We employed Hofstede's model and a mixed-methods design within two different cultural contexts. We adopted Hofstede's model because it is a comprehensive model of culture. We adopted the mixed-methods design to systematically examine the issue by considering the strength of qualitative and quantitative approaches. The mixed-methods design comprises two phases. In Phase 1, we conducted 41 face-to-face interviews with RE practitioners. In Phase 2, we conducted 30 follow-up interviews to

consolidate the collected data. The interviews were conducted with practitioners from two cultures: Saudi Arabia and Australia. We selected Saudi Arabia and Australia because: 1) the significant differences between and 2) the cultural profiles of both cultures have similarities to many other cultures, which make the results applicable to them. We identified 25 cultural factors that can influence RE activities. We investigated the implication of these cultural influence on RE activities, mapped them into Hofstede's cultural dimensions, and examined how these cultural influences might hinder or facilitate RE practices. We also developed a framework that maps between Hofstede's model and the identified cultural influences. This mapping allows for increasing the generality of our framework to identify cultural influences in many other cultures. The framework provided 89% accuracy for the Thai culture and 75% accuracy for the Chinese culture. Thus, the framework will not only assist RE practitioners to communicate with software stakeholders more effectively but also improve the implementation of RE activities and their outcomes.

**[Participant's Video Click Here](#)**

## 2.9 *Ebtesam Almansor*

PhD Student, University of Sydney Technology

### **Measuring The Quality Of Chatbot Using Intelligent Machine Learning Approaches**

Developing an intelligent chatbot has evolved in the last few years to become a trending topic in the area of computer science. However, a chatbot often fails to understand the user's intent, which can lead to the generation of inappropriate responses that cause dialogue breakdown

and user dissatisfaction. Detecting the dialogue breakdown is essential to improve the performance of the chatbot and increase user satisfaction. Recent approaches have focused on modeling conversation breakdown using several approaches, including supervised and unsupervised approaches. Unsupervised approach relay heavy datasets, which make it challenging to apply it to the breakdown task. Another challenge facing predicting breakdown in conversation is the bias of human annotation for the data-set and the handling process for the breakdown. To tackle this challenge, we have developed a supervised ensemble automated approach that measures Chatbot Quality of Service (CQoS) based on dialogue breakdown. The proposed approach is able to label the data-sets based on sentiment considering the context of the conversion to predict the breakdown. In this paper we aim to detect the effect of sentiment change of each speaker in a conversation. Furthermore, we use the supervised ensemble model to measure the CQoS based on breakdown. Then we handle this problem by using a hand-over mechanism that transfers the user to a live agent. Based on this idea, we perform several experiments across several data-sets and state-of-the-art models, and we find that using sentiment as a trigger for breakdown outperforms human annotation. Overall, we infer that knowledge acquired from the supervised ensemble model can indeed help to measure CQoS based on detecting the breakdown in conversation.

**[Participant's Video Click Here](#)**

## 2.10 *Ahmed Alkenani*

PhD Student, Queensland University of Technology

**Home-Based Prediction of Prodromal Dementia Using Linguistic Patterns and Deficits**

Quality of life has led to an increasing aging population. Dementia is one of the most persistent issues facing an aging population due to its nature of being incurable. Without medical breakthrough, early diagnosis is the only hope for people with, or likely to develop, dementia given its evident possibilities in decelerating the disease's progression and alleviating its symptoms. The importance of automating the diagnosis of dementia towards facilitating its early prediction has long been emphasized, hampered in part by lack of empirical support. Consequently, many recent studies have attempted to employ the language deficiency caused by cognitive decline in automating the diagnostic task via training machine learning (ML) algorithms with linguistic patterns and deficits. However, the initial diagnosis remains clinical based. There, therefore, is a high necessity for developing a fully automatic longitudinal diagnosis system appropriate for home-based monitoring of cognitive decline. Consequently, this research project aims to investigate and develop a conversational agent for a fully automatic longitudinal diagnosis based on the analysis of daily conversations in home-based settings. Using natural language processing and ML, this research project has already established state of the art diagnostic performance and been investigating a further improvement by exploring additional linguistic patterns and developing ML algorithms then integrate the highest resulted models with a chatbot that can be used in home-based environments.

**[Participant's Video Click Here](#)**

# ***THE END...***

