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**RESEARCH EXHIBITION IN MATHEMATICS & COMPUTER SCIENCES**

# **REMACS 5.0**

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**CS240 - BACHELOR OF INFORMATION TECHNOLOGY [HONS.]**  
**CS248 - BACHELOR OF SCIENCES [HONS.]**  
**MANAGEMENT IN MATHEMATICS**  
**CS251 - BACHELOR OF COMPUTER SCIENCE [HONS]**  
**NETCENTRIC COMPUTING**  
**CS255 - BACHELOR OF COMPUTER SCIENCE [HONS]**  
**DATA COMMUNICATION & NETWORKING**

**2<sup>nd</sup> February 2023**  
**Stor Complex, UiTM Perlis**

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**Organized by:**  
**College of Computing, Informatics and Media**  
**Universiti Teknologi MARA Perlis Branch**

**Research Exhibition in Mathematics and Computer Sciences  
(REMACS 5.0)**

Research Exhibition in Mathematics and Computer Sciences (REMACS 5.0)

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# Preface

It is with great pleasure that we present this extended abstract book, titled "The 5<sup>th</sup> Research Exhibition in Mathematics and Computer Sciences (REMACS 5.0)". This book is a collection of research work in the fields of Computer Science and Mathematics, contributed by the final year students from Universiti Teknologi MARA, Perlis Branch. The aim of this book is to showcase the diversity and depth of research in these two interrelated fields.

Mathematics and Computer Science are two fields that have seen tremendous growth and advancement in recent years. With the rise of new technologies and the increasing demand for data-driven solutions, researchers in these fields have been working hard to develop new theories, algorithms, and models that can help solve some of the most pressing problems of our time. This book is a testament to their hard work and dedication.

The abstracts in this book cover a wide range of topics, including algebra, analysis, logic, computer architecture, algorithms, artificial intelligence, machine learning, computer network, netcentric computing and many more. The work presented here is both theoretical and practical, and has the potential to impact many areas of society, from finance and healthcare to education and security.

We hope that this book will serve as a valuable resource for future students in the fields of Mathematics and Computer Science. We also hope that it will inspire more students to pursue innovative and groundbreaking research in these two fields. Finally, we would like to express our gratitude to all the contributors for their hard work and dedication, without which this book would not have been possible.



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**REMACS 5.0**

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# EVENT SCHEDULE

8:00 – 8:30 am

- Registration

8:00 am – 12:00 pm

- FYP Project Presentation

12:00 - 2:00pm

- Lunch Break

2:15 – 2:35 pm

- National & Wawasan Setia Anthems
- Doa Recitation

2:35 – 2:45 pm

- Welcoming Address by Director of REMACS 5.0

2:45 – 2:55 pm

- Officiating & Closing Remarks from Rector of UiTM Perlis

2:55 – 3:00 pm

- REMACS 5.0 Montage

3:00 – 4:00 pm

- Awarding of Winners:
  - Best Poster
  - Best Project Award
- Photo Session
- End of Ceremony

*Dress Code: Formal / Corporate*

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# EXTENDED ABSTRACTS

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# SMART IRRIGATION SYSTEM USING LORA-BASED IOT DEVICE

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## Abstract

Agriculture plays the main role in a country's economy. Agriculture provides food and jobs to the community. In Malaysia, agriculture has been one of the main activities that contributes to income, especially to the people that stay in rural areas like villages. However, the method use is traditional and energy consuming. This article will explain the implementation of technology in the current traditional agriculture method. The aim is developing a smart irrigation system using a LoRa-based IoT device in order to help owners and farmers that used to monitor their crop manually. Using the LoRa increases the range covered compared to the previous wireless technology. Through the result gained from the project, it was clear that LoRa is better in an open space area. This study will test the functionality of the system and to test the network of LoRa in terms of distance, packet latency, and obstacle.

*Keywords: Iot, LoRa, distance, delay, obstacle*

## 1. Introduction

According to previous research, there are already some wireless technologies that have been implemented in the traditional agriculture method. However, the previous research found that there are some limits which is the range that wireless technology covers. This project will implement LoRa to solve the distance limitation. The objective for this project is to develop a smart irrigation system that use LoRa to enable the user to monitor their crop and automatic irrigation system. Other than that, this project will test the functionality of the system and will test the network of LoRa in term of distance, packet latency, and obstacle.

## 2. Methodology

Data were collected from self-observation like the LoRa transmitter and LoRa receiver will be placed far away from each other. Through the testing, it will show the maximum distance that can be reached by the LoRa module through the RSSI reading. Other than that, the created web page will be a tool to observe the data latency with the timestamp created in the web page. In a distance test, the LoRa receiver will be placed stationary at a place with the laptop to insert the data from the receiver into the laptop while the transmitter will move to a distance that has been set. There is also an obstacle test to test the distance the LoRa module can penetrate obstacles.

## 3. Results and Discussion

Through the data gathered during the testing, it has been clear that the functionality of smart irrigation systems using LoRa-based IoT devices is successful as all the components work as planned. From distance testing, it is quite clear that LoRa can work in a great distance. However, the distance can be achieved if the transmitter and receiver are in an open area. For a packet latency test, the data from the receiver into the web page will be observed as there is a timestamp in the web page every time there is data from the receiver. This shows that there is some delay in data delivery if the distance increases. For the obstacle test, the transmitter will be placed stationary while the receiver will move around the obstacle. From the obstacle test, it was shown that the result is not the same as the result from the open area. It is concluded that the LoRa module have some difficulty to connect to each other if there is more obstacle between the transmitter and the receiver

#### 4. Novelty of Research / Product

There have been a number of studies that have investigated how the Internet of Things is being implemented in the traditional agriculture method (Fadziso, 2018), (Said Mohamed et al., 2021). There are also previous research about the wireless technology that is being implemented in the current agriculture methods (Radouan Ait Mouha, 2021) and (Bakare & Minah-Eeba, 2019). The previous research about the LoRa and LoRaWAN and how the LoRa and LoRaWAN works in real life is also being studied in this project (Saban et al., 2021), (Augustin et al., 2016). There has also been research on the capability of LoRaWAN in terms of distance. Finally, there is some study that uses the same method of this project but uses different wireless technology (Ratnadewi et al., 2018), (Prathipa et al., 2021).

#### 5. Conclusion

In conclusion, this project achieved the objectives. The smart irrigation system by using a LoRa-based IoT device has successfully worked and has been tested. The limitation of previous wireless technology which is the range covered has been solved by using LoRa. However there are some challenges to achieve the great distance.

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