
RESEARCH EXHIBITION IN MATHEMATICS & COMPUTER SCIENCES

REMACS 5.0



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

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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 5th 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.



RESEARCH EXHIBITION IN MATHEMATICS & COMPUTER SCIENCES
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

RESEARCH EXHIBITION IN MATHEMATICS & COMPUTER SCIENCES
REMACS 5.0

AN ENHANCEMENT OF SMART TRAFFIC LIGHT IN LORA NETWORK FOR SMALL SCALE AREA

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Abstract

Vehicles such as cars, motorcycles, trucks, busses etc. are increasing day by day due to convenient purposes. This phenomenon leads to traffic jam that can affect ones delay activities. A smart traffic light is needed to improve the traffic congestion. Implementing LoRa technology is one of the efficient way because of the long-distance coverage and low power consumption. This research built a prototype of three traffic lights using Cytron LoRa- RFM Shield and Passive InfraRed (PIR) Mini motion sensor. The prototype traffic lights work fine in three-way junction that can control the flow of the traffic. The result of functionality test and usability test shows that the traffic light is in good condition and accepted by 93.5% of the respondents. In addition, the prototype is agreed 100% by the respondent for improving the traffic flow safety. For the future work, artificial intelligence (AI) features can be implemented to replicate the real time traffic light for a more efficient system.

Keywords: LoRa, traffic light, Arduino, Smart Traffic Light

1. Introduction

The aim of this research is to develop an enhanced smart traffic light using LoRa for rural areas that can improve the existing one and to evaluate the functionality and the efficiency in reducing traffic light accidents. This research scope is focusing on the usage of LoRa in rural areas. Sensor that will be used in this project is the PIR Mini Motion sensor that will detect the presence of vehicles. It also uses Arduino Uno as the controller board. This research does use Cytron LoRa-RFM Shield as the connector from nodes to nodes.

2. Methodology

Method that was used in this research is the model will be developed via a peer-to-peer communication approach. The clients and servers attached a Passive InfraRed (PIR) motion sensor and led lights. When there is motion detected at any node which is the, the data of the motion sensor will be sent using LoRa shields to other nodes to inform that the detected motion node is going green. As for the nodes that detect no motion, they will remain red lights until there is motion. The entire process occurs in the rural area of Kampung Alor Ara and the open space of Padang Kawad UiTM. Data were collected from participant observations using Google Form by referring existing models, such as using google form to collect data from usability and functionality testing.

3. Results and Discussion

Based on the functionality and usability testing, the prototype of the traffic light works fine. The separation between the client and server can range from 50 to 250 metres. Same goes for all of the models that were created. Interferences that were close to the test site were what caused it. The technique was applied to look at the network testing part. A greater distance will cause a lengthier wait for the server to receive sensor data because response times increased with client and server distance. Additionally, the RSSI reduced as the distance increased.

4. Novelty of Research / Product

There have been a number of research that have investigated how a city develops, particularly those intended for traffic light, such as (Kai, 2020; Razavi, 2019). Previous research about LoRa traffic light was done on how does the traffic light can control the congestion (Kuzlu, 2019; Mudbi, 2017). There have also been several research on development of congestion level based dynamic traffic management system using IoT (Ramzan, 2020; Bali, 2020).

5. Conclusion

To conclude the entire project, it can be said that a model enhanced traffic management system utilising lora shields in rural regions is capable of controlling traffic with a similar functionality to traffic signals on routes that users commonly use on major roads.

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