UNIVERSITI TEKNOLOGI MARA

IOT-BASED SAFETY ALARM SYSTEM IN LABORATORY

MUHAMMAD SHAMIZAL BIN SAMSUL KAMAL

Thesis submitted in fulfillment
of the requirements for the degree of
Diploma of Electrical Engineering

Centre for Electrical Engineering Studies
College of Engineering

JAN 2024

ACKNOWLEDGEMENT

First and foremost, I would like to thank my supervisor, Dr. Fatimah Khairiah Abd Hamid, for her guidance, assistance and valuable insights throughout the project. Her mentorship have been invaluable in shaping the direction of this work.

Additionally, I would like to acknowledge the vast body of knowledge contributed by researchers, authors, and scholars in this field. Their work has provided a strong foundation for this project and has guided my understanding of the subject matter.

Finally, I dedicate this milestone achievement to my parents. Their unwavering belief in education and their constant support have been my guiding light. This achievement stands as a tribute to their vision and determination.

ABSTRACT

This safety alarm system in laboratory is an important aspect in detecting the source of danger and warn people through visual and audio appliances when smoke, fire, carbon monoxide or other emergencies are present. This project aims to design an IoT-based safety alarm system in laboratory using Arduino UNO as microcontroller. The input sensors that were utilized are MQ-2 gas sensor, DS18B20 temperature sensor and LM393 fire sensor. The sensors are used to detect dangerous elements that might harm the people in laboratory. Meanwhile, the outputs employ of three LEDs, buzzer, lcd display and remote monitor. The system would alert the user as the sensors detects the presence of danger in laboratory.

TABLE OF CONTENT

CHAPTER 1

INTRODUCTION

1.1   Research Background

Safety and security continue to be top priorities in the laboratories. The management of laboratories must include both the detection of dangerous gases and the prevention of fire events. While flame sensors provide early warnings of probable fire outbreaks, gas sensors are essential tools that enable the identification of dangerous and flammable gases. In order to provide the highest level of laboratory safety, temperature sensors are essential for tracking small changes. These sensors are used in a variety of situations, including homes, offices, industries, and manufacturing facilities, in addition to laboratories.

Laboratory users face significant challenges when it comes to detecting and monitoring hazardous gases, flames, and fire incidents. Users frequently lack awareness of the quantity and presence of different gases, which poses serious threats to their safety. Furthermore, spotting fires early on is essential for quick preventive measures, but the absence of adequate monitoring systems makes this task difficult. Users may also be caught off guard by fire outbreaks brought on by short circuits since they are unaware of them until it is too late. A better safety alarm system that solves these issues and offers early warnings is therefore urgently needed to ensure laboratory safety.

This project proposal aims to design and develop an Internet of Things (IoT)-based safety alarm system specifically tailored for laboratory environments. The system attempts to improve the detection of hazardous gases, fire breakouts, and the presence of poisonous gases by using the Arduino platform as the principal hardware, combined with gas sensors and flame sensors. The project uses IoT technology to enhance early detection abilities, lower the danger of fire events, and less air pollution