

**THE PERFORMANCE EVALUATION OF REAL TIME FIRE
ALERT SYSTEM BASED ON INTERNET OF THINGS (IOT)**

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**THE PERFORMANCE EVALUATION OF REAL TIME FIRE
ALERT SYSTEM BASED ON INTERNET OF THINGS (IOT)**

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**This report is submitted in partial fulfilment of the requirements
for the degree of Bachelor of Electronic Engineering with Honours**

**Faculty of Electronic and Computer Engineering
Universiti Teknikal Malaysia Melaka**

2018

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : The Performance Evaluation of Real Time Fire Alert System Based on Internet of Things (IoT)
Sesi Pengajian : 2017/2018

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APPROVAL

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Signature :

Supervisor Name : DR. NORIHAN BINTI ABDUL HAMID

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DEDICATION

To my beloved mother and father

My beloved sister and brother

My supervisor and all lecturers

All my friends

For their support and encouragement through my journey of education

ABSTRACT

Businesses and institutions are crucial to protect against fire, but the best defense is to prevent a fire from starting in the first place. This project focuses on the development of a Fire Alert System (FAS) that contact emergency responders fast and efficient nevertheless the system can also determine the accurate location of fire occur. The system is develop to analyze the measurement changes in humidity and quality of air in certain area using a sensor. Besides that, it also to integrate sensor with Arduino mega and other component to develop Fire Alert System (FAS). Furthermore, it also to evaluate the performance Fire Alert System (FAS) to be used in commercial industries. By adopting smoke and humidity sensor, all data collected is analyze and assumption will be made. The entire system is been controlled by software that is implemented using Arduino Mega and built in micro C compiler. The FAS will sent the notification about the location and time to the authorized person such as police/ambulance/fire fighter. Notification will send wirelessly to the base station and upload to the cloud for monitoring via the internet-of-thing (IoT) platform.

ABSTRAK

Perniagaan dan institusi penting untuk melindungi kebakaran, tetapi cara terbaik adalah dengan mencegah kebakaran dari permulaan. Projek ini memberi tumpuan kepada pembangunan Sistem Amaran Kebakaran (FAS) yang menghubungkan pihak kecemasan dengan cepat dan efisien, namun sistem ini juga boleh memberikan lokasi kebakaran berlaku. Sistem ini dibangunkan untuk menganalisis perubahan kelembapan dan kualiti udara di kawasan tertentu menggunakan sensor. Selain itu, ia juga untuk mengintegrasikan sensor dengan Arduino mega dan komponen lain untuk membangunkan Sistem Amaran Kebakaran (FAS). Selain itu, ia juga untuk menilai prestasi Sistem Amaran Kebakaran (FAS) untuk digunakan dalam industri komersil. Dengan menggunakan sensor asap dan kelembapan, semua data yang dikumpulkan akan dianalisis. Seluruh sistem dikawal oleh perisian yang dilaksanakan menggunakan Arduino Mega dan dibina dalam mikrocontroller. Sistem Amaran Kebakaran (FAS) akan menghantar pemberitahuan tentang lokasi dan masa kepada orang yang diberi kuasa seperti pihak bomba. Pemberitahuan akan dihantar ke stesen pangkalan dan memuat naik ke awan untuk pemantauan melalui platform internet-of-thing (IoT)

ACKNOWLEDGEMENTS

First and foremost, I would like to take this opportunity to express my sincere acknowledgement to my supervisor Dr. Norihan binti Abdul Hamid from the Faculty of Electronic and Computer Engineering Universiti Teknikal Malaysia Melaka (UTeM) for her essential; supervision, support and encouragement towards the completion of this thesis.

Special thanks to my beloved mother, father and siblings for their moral support in completing this degree. Lastly, thank you to everyone who support me a lot during this time.

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LIST OF SYMBOLS AND ABBREVIATIONS

°C	:	Celsius
API	:	Application Programming Interface
CSV	:	Comma-Separated Values
DHT	:	Digital Temperature and Humidity Sensor
FAS	:	Fire Alert System
GND	:	Ground
GPIO	:	General-Purpose Input Output
GPS	:	Global Positioning System
GSM	:	Global System for Mobile Communication
HTTP	:	Hyper Text Transfer Protocol
IoT	:	Internet of Things
IPU	:	Indeks Pencemaran Udara
IT	:	Information Technologies
JSON	:	Java Script Object Notation
LAN	:	Local Area Network
MEMS	:	Microelectromechanical Systems
OT	:	Operational Technologies
PCB	:	Printed Circuit Board

ppm	:	Parts-per million
RH	:	Relative Humidity
SMS	:	Short Message Service
USB	:	Universal Serial Bus
Wi-Fi	:	Wireless Local Area Networking
XML	:	eXtensible Markup Language

LIST OF APPENDICES

Appendix A: Source code for the whole system

Appendix B: Data sheet of components

CHAPTER 1:

INTRODUCTION

This chapter consist of introduction, problem statement, objective and scope of the study.

1.1 Project Overview

Fire is an undesirable event that could bring a great loss of social wealth and human life. Businesses and institutions are crucial to protect against fire, but the best defense is to prevent a fire from starting in the first place. Traditional fire alarm system mostly introduced wired connections mode. This design require large amount of investment and have complex work. The ability to decide a fire when it happens is basic, yet there is the need to notify the owner of a building and rescue team when a fire happens. Oxygen, warmth and fuel frame the primary elements of flame known as the fire triangle. The extent of every one of these elements decides the idea of the fire.

Uncontrolled fires have prompted significant fire outbreaks leading to massive loss of lives and property. With advances in technology it has turned out to be more obvious that the utilization of various sensors in fire detectors altogether diminishes false alerts and builds the efficiency of the detection system.

Purpose of this project is to support rescue workers through the production of inventive administrations in view of the utilization of rising advances empowering the Internet of Things (IoT) including sensors, cell phones, cloud advances and the utilization of inserted gadgets. Inside the structures of the buildings to be observed, the establishment of low-cost devices that can distinguish the environmental parameters of interest will be arranged in each place.

This project focuses on the improvement of a fire alert system (FAS) that contact emergency responders fast and efficient. The system can also determine the accurate location of fire occur. However, all the current frameworks looked into concentrated on multi-sensor fire recognition and notifications. The system is develop to investigate and measure the sensitivity in identifying the changes of humidity and quality of air in certain area. Besides that, it also to integrate sensor with Arduino Mega and other component to develop FAS.

By adopting smoke and humidity sensor, all data collected is analyse and assumption will be made. The entire system is been controlled by software that is implemented using Arduino Mega and built in micro C compiler. The Fire Alert System (FAS) able to provide three main functions which are tracking fire incident location, send an emergency alert notification and upload the data of the fire incident location to the cloud. When the smoke is detect, the smoke and humidity sensor in this system will give an alert and then send data to the Arduino Mega for the next action.

Arduino Mega will get the location from the Global Positioning System (GPS) and then send the location to the cloud using Wi-Fi module. All the data will be stored in the cloud. So the rescue team can retrieve the information from the cloud using email that link together with the system through Wi-Fi.

1.2 Objectives

This study is carried out to achieve the following objective:

- To analyze the measurement the changes in humidity and quality of air using a sensor.
- To integrate sensor with Arduino mega and other component to develop Fire Alert System (FAS).
- To evaluate the performance Fire Alert System (FAS) to be used in commercial industries.

1.3 Problem Statement

In recent years, when there are fire incident, there will be a difficulties to the emergency response to trace location even though the right and exact address is given. If fire occurs without any notice, there would be a lot of losses that need to be borne by the owner of the building compared to earlier notice of the fire. The early fire alert system ought to be considered as safety equipment in each working building to prevent fires and decrease mortality. Thus, the solution is to determine a fire at the early stage when it happens is critical, however there is the need to inform the occupants or owner of a building when a fire happens.

1.4 Scope of Project

The scope of this project is to develop the fire alert system, therefore the concentration on efficiency and accuracy of the sensor will be identify. In addition, this research will also increase the technical knowledge on how to connect and integrate Arduino Mega with sensors, mobile devices, cloud technologies and embedded devices together. Moreover, a humidity in certain area related with Indeks Pencemaran Udara (IPU) will also investigates and measure.

This research will be continue on how smoke sensor and humidity sensor works. Meanwhile, the data about thickness of air can be obtained from Jabatan Bomba dan Penyelamat and to develop a fire alert system that gives fast response to the authorized person / department with an accurate location of fire scene. Thus, all component to build Fire Alert System (FAS) will be combine into one system at this moment.

1.5 Thesis Structure

The structure of this thesis is divided into five main chapters excluding their subtitles. There are Chapter I Introduction, Chapter II Literature Review, Chapter III Research Methodology, Chapter IV Results and Discussion and Chapter V Conclusion and Recommendation.

Chapter I is an Introduction of this thesis. This chapter acts as the first acquaintance of this thesis that touch on the project overview, the objective of this project, problem statement and scope of work.

Chapter II is about the Literature Review which is an important part of this project and the most important section in this thesis. It discusses on the previous work that had been done in the same field and the improvement towards the project. Literature review will cover on the reviewed journals and also some theory that required in supporting the research of this project.

Chapter III is discussing on the Research Methodology. This chapter explains the procedures that have been conducted in order to complete this project. In this chapter will also discuss briefly about flow of this project and system overview to give more understanding of the design and development concept of the project.

Chapter IV is about Result and Discussion. This chapter is about analysis and the finding of this project. The result will be presented and discussed through the experimental and analyses for future improvement will be included.

Chapter V is about Conclusion and Recommendation. The conclusion of the experimental result has been made due to overall project. This chapter also contain a recommendation for future work that can be made to this project to make it more reliable.