UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF SMART FLOOD DETECTOR

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronic Engineering Technology (Industrial Electronics) with Honours.

by

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APPROVAL

This report is submitted to the Faculty of Mechanical and Manufacturing Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Mechanical Engineering Technology (Industrial Electronics) with Honours. The member of the supervisory is as follow:

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ABSTRAK

Banjir merupakan salah satu bencana alam yang telah berlaku di Negara kita. Bencana banjir ini disebabkan oleh hujan yang berpanjangan ,disamping itu sikap manusia yang membuang sampah mahupun sisa toksik disungai merupakan salah satu punca berlakunya banjir. Banyak nyawa dan kehilangan harta benda yang terkorban akibat banjir ini. Justeru itu , ia memerlukan satu system amaran banjir yang boleh memberi peringatan kepada penduduk setempat tentang paras kedudukan air banjir terutamanya pada musim tengkujuh. Kebanyakan daripada mereka yang terkorban adalah kerana tidak menyedari tentang paras kedudukan air banjir. Tujuan kajian ini dijalankan adalah untuk menghasilkan satu system yang memgukur paras air banjir dengan menggunakan sensor ultrasonik .Sensor ultrasonik tersebut akan mengukur kepada tiga peringkat, itu peringkat normal, peringkat amaran dan akhir sekali paras bahaya. Sensor ultrasonik ini akan menghantar data kepada Arduino UNO dan disambungkan terus kepada Wi-Fi modul. Fungsi Wi-Fi modul adalah untuk sambungan internet bagi disambungkan kepada telefon pengguna melalui aplikasi telegram. Maka dengan adanya sistem ini pengguna akan pendapat pesanan ringkas melalui aplikasi telegram yang memberitahu tentang paras kedudukan air banjir yang terkini. Kesimpulanya, dengan adanya sistem ini penduduk yang tinggal dikawasan yang rendah mahupun berhampiran dengan sungai akan dapat membuat langkah berjaga-jaga sekiranya berlaku banjir dikawasan mereka

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ABSTRACT

Flood is one of the natural disasters that have taken place in our country. This flood disaster is caused by prolonged rain, as well as the human attitude that dumps waste and toxic waste is one of the causes of flooding. Many lives and loss of property died from this flood. Hence, it requires a flood warning system that can alert the locals about the level of flood water level especially during the monsoon season. Most of those who died were unaware of flood status. The purpose of this study is to produce a system that measures the level of flood water using ultrasonic sensors. The ultrasonic sensor will measure to three levels; it's a normal level, a warning level, and an end to the danger level. This ultrasonic sensor will send data to Arduino UNO and is connected directly to the Wi-Fi module. Wi-Fi module function is for internet connection to connect to user phone through telegram application. So, with this system the user will think of a short message through a telegram app that tells the current level of flood water ranking. In conclusion, with this system the people living in low or near rivers will be able to make precautionary measures in the event of floods in their area.

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DEDICATION

I dedicate this dedication to my beloved family, my mother, Wan Norahayati Binti Wan yusof and my father, Elias Bin Othman, who never broke the words of prayer and prayer so that I could succeed. Also, do not forget to my siblings for not giving up on advice and becoming a supporter for this project.

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LIST OF SYMBOLS

D, d	-	Diameter
F	-	Force
g	-	Gravity = 9.81 m/s
I	-	Moment of inertia
1	-	Length
m	-	Mass
N	-	Rotational velocity
P	-	Pressure
Q	-	Volumetric flow-rate
r	-	Radius
T	-	Torque
Re	-	Reynold number
V	-	Velocity
w	-	Angular velocity
x	-	Displacement
z	-	Height
q	-	Angle

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LIST OF ABBREVIATIONS

SMS	Short Messaging Service
LED	Light Emitting Diode
TX	Transmit
RX	Receiver
USB	Universal serial Bus
I/0	Input/ output
IC	Integrated circuit
GPS	Global Positioning System
PSM	Projek Sarjana Muda
LO RA	Long Range
NB-LoT	Narrowband
AP	Access Point
LPWA	Low-Power Wide-Area
IoT	Internet of Things
IDE	Integrated Development Environment
GSM	Global Mobile Communication System
LCD	liquid-crystal display

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CHAPTER 1

INTRODUCTION

1.0 Background

The purpose of this chapter is to explain a little bit about the overview of the application or flood system and this application's main purpose is created. Among the content in this chapter is that it briefly describes the project background and includes an explanation of why this system is being created. The scope of the work and the end of the contribution to the project, as well as the objectives expected to be achieved.

1.1 Background Study

In everyday human life, water is a fundamental requirement. Excessive and inaccessible water conditions, however, will flood vast areas and cause a variety of problems. Heavy rain occurred due to winds from northeast monsoon winds, according to a meteorological study. This change in wind caused the record rain rate to rise above normal levels to 40%. A major feature of the monsoon intermediate season is the rain phenomenon with strong winds. Therefore, this continuous rain will cause floods that lead to loss of life, property destruction and affect traffic smoothness.

Flooding is a natural disaster that is hard to prevent, but we cannot control it. Ways to prevent property damage or loss of life from flooding, leading to applications that only monitor smartphones. The system will be installed in a low area and, using this application, the user will receive information from the telegram app near the river or a potential floodplain. The latest stage information will be transmitted to flood water levels by the system. Users will be aware of the current levels of floodwater from simple medium to hazard level with the application of this flood system.

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1.2 Problem Statement

Every year, the states on Malaysia's east coast and west coast will experience a flood season. This season of floods is either ending or beginning this year. When flooding occurs, it is difficult to see most rivers and drains as water levels have high elevation levels for locals. To prevent such a thing from happening at the arrival of the flood season, flood warning devices will be created to reduce unwanted accidents. How to use this tool is to place it close to water, river or drainage

1.3 Objective

This is objective that needs to be achieved are:

- To develop an IoT flood alarm system.
- To detect the current level of the flood where the system sensor will be divided into three levels.
- To implement and helping people to get ready earlier in case happened flood.

1.4 Scope of Project

The scopes of the project have as follows:

i. Warning to people that stay low in the area or close to river, so that be on the lookout for situation of the water level.

ii. Informed people who do not live in the area about the condition of the river water level or flood water that occurs in the area.

iii. Informed parties on the flood water level position that occurred in that area to make initial steps or alert in that area.

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1.5 Thesis Outcome

In this report is divided into five chapters, the first chapter is the introduction, the second chapter is literature reviews, the third chapter is methodology, the fourth chapter is the result and discussion, the last five is the conclusion. In the first chapter, describes the project's introduction and describes the project's background covering the history of the previous flood. We also describe problem statement, objective, project scope and report result thesis in this chapter. It explains the idea or component previously carried out by previous projects in the second chapter of literary reviews. To upgrade existing projects, all the ideas of this study are considered.

It relates to the methodology in the third chapter, describing the components used from the hardware to the software. He also explained the steps needed to complete the project. It relates in chapter four of the results and discussion to the tests we run on the flood system. He also talks about the hardware and software needed. Lastly, in chapter five needs to conclude all chapters and the outcome of this project. After that, in this project also need to provide some recommendation to improve this project for next times.

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CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This section will cover component research and the development of this project will involve system research. To make this project successful, the selection of components must be precise. The source of the research refers to the books, journal and article that have been published. Studying on the project-related journal is necessary because knowledge and skills are necessary to complete the project. This chapter, in other words, is the brief or idea on the flood detector above.

2.1 Past Related Research

Some studies and investigations were taken as part of the relevant flood-related literature and related components to make this project successful. For this project, data and research collects various related resources such as books, articles, newspapers and websites. All these data are used as a guide in this project to ensure that this project can be completed and completed at a given time.

All the research and information collected depends on the importance of the information and the topics associated with this project. Reliable sources obtain all information about past research. Several Scopus website publishing articles and journals are being explored on the scope.

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2.1.1 A Study on real-time Flood Monitoring System based on Sensors using Flood Damage Insurance Map

It is impossible to avoid natural disasters, but it is possible to prevent them from doing much worse. Natural disasters do not focus on floods, but natural disasters also disrupt landslides, snowstorms. According (*Yeon et al.,* 2018) In Korea, a map system is introduced that can illustrate the degree of risk of wind and flood, snow damage and the basis for the prevention and preparation of all types of natural disasters. To ensure the latest disaster information content, the system automatically connects to the public data.

By supporting decision-makers in relation to flood damage, it is expected to prevent and prepare for natural disasters. The notification device for flood information consists of different sensors. This system focuses on endurance such as power management and waterproofing to be able to monitor without the need for permanent power supply for more than two years. The sensor that use in this system is referred to in the table below:

Table 2.1.1(a): List of Sensor

Kind	Purpose	Product Name
Acceleration	Trixie sensor Measures gravity acceleration	BMA250E/BOSHE
Tilt Sensor	Control of the electricity use of the tilt sensor	SQ-MIN-200
Level Sensor	water level detection	
Network Module	LoRa, NB-IoT	SoluM, Huawei

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