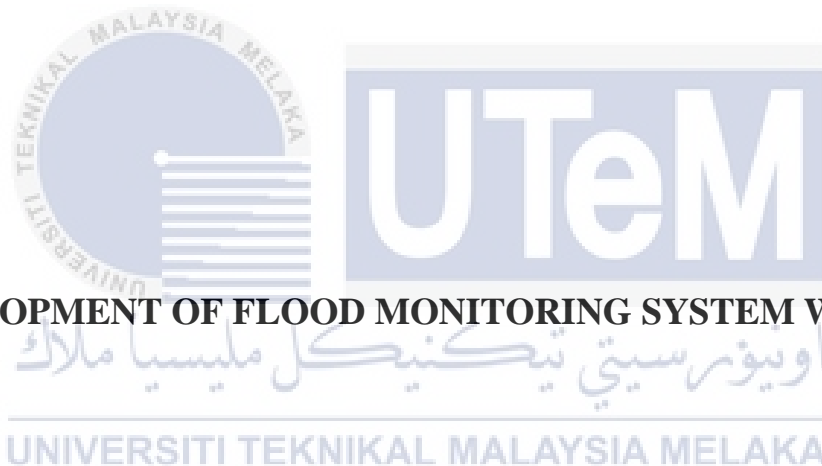




Faculty of Electrical and Electronic Engineering Technology



DEVELOPMENT OF FLOOD MONITORING SYSTEM WITH IOT

NUR AINA INSYIRAH BINTI ABD LATIFF

Bachelor of Electronics Engineering Technology with Honours

2022

DEVELOPMENT OF FLOOD MONITORING SYSTEM WITH IOT

NUR AINA INSYIRAH BINTI ABD LATIFF

**A project report submitted
in partial fulfillment of the requirements for the degree of
Bachelor of Electronics Engineering Technology with Honours**



Faculty of Electrical and Electronic Engineering Technology

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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DECLARATION

I declare that this project report entitled “Development of Flood Monitoring System with IoT” is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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DEDICATION

This thesis is dedicated to everyone that have support me support in terms of physical assistance, mental assistance and financial assistance from beginning until the end of this project development. These special thanks I dedicates to my lovely parents, my whole family, my supervisor, my lecturers, my housemates, my classmates and to all my dearest friend. Thank you so much for all the guidance, support and encouragement until the end of this project.



ABSTRACT

In recent times, many areas have been hit by unpredictable floods but residents have not received any warnings before it occurs. The majority of flood monitoring approaches are based on telemetry systems, which necessitate the use of transmitters and repeaters in order to communicate the information to a central terminal. It is expensive and unreliable when there is equipment malfunction in a section of the sensed area, as is the case in this case. This flood monitoring system using ultrasonic sensor and NodeMCU ESP8266 will help people to monitor and predict the floods before it occurs at an affordable price. The main objective of developing a Flood Monitoring System with Iot is, to detect water levels of the river when it rains before a flood occurs. Besides, the project is to notify residents earlier to save their life and lower the risk of death. The goal of this project is to use ultrasonic sensor to monitor the water level of the river. The siren, tower lamp and the Blynk app will be used to alert residents in the surrounding region. Fire fighter, residents or APM will be notified by Telegram Bot and will take their further actions and be ready before flood occur. Therefore, it is predicted that this system will give many advantages to prevent substantial property damage and loss of life.

ABSTRAK

Sejak kebelakangan ini, banyak kawasan dilanda banjir yang tidak menentu namun penduduk tidak menerima sebarang amaran sebelum kejadian berlaku. Majoriti pendekatan pemantauan banjir adalah berdasarkan sistem telemetri, yang memerlukan penggunaan pemancar dan pengulang untuk menyampaikan maklumat kepada terminal pusat. Ia mahal dan tidak boleh dipercayai apabila terdapat kerosakan peralatan di bahagian kawasan deria, seperti yang berlaku dalam kes ini. Sistem pemantauan banjir menggunakan sensor ultrasonik dan NodeMCU ESP8266 ini akan membantu orang ramai memantau dan meramal banjir sebelum ia berlaku dengan harga yang berpatutan. Objektif utama membangunkan Sistem Pemantauan Banjir dengan Iot adalah, untuk mengesan paras air sungai apabila hujan sebelum banjir berlaku. Selain itu, projek ini adalah untuk memaklumkan penduduk lebih awal untuk menyelamatkan nyawa mereka dan mengurangkan risiko kematian. Matlamat projek ini adalah untuk menggunakan sensor ultrasonik untuk memantau paras air sungai. Siren, lampu menara dan aplikasi Blynk akan digunakan untuk memberi amaran kepada penduduk di kawasan sekitar. Anggota bomba, penduduk atau APM akan dimaklumkan oleh Telegram Bot dan akan mengambil tindakan selanjutnya dan bersedia sebelum banjir berlaku. Oleh itu, sistem ini diramalkan akan memberi banyak kelebihan untuk mengelakkan kerosakan harta yang besar dan kehilangan nyawa.

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LIST OF SYMBOLS

V	-	Voltage
cm	-	Centimeter
m	-	meter
sec/s	-	second



LIST OF ABBREVIATIONS

GSM	-	Global System for Mobile Communication
FMWS	-	Flood Monitoring Warning System
IoT	-	Internet of Things



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CHAPTER 1

INTRODUCTION

1.1 Background

Floods caused by heavy rains were reported across Peninsular Malaysia's central-western region on March 6-7 on 2021. More than 1,290 individuals have been moved to 14 evacuation centers across the states of Kuala Lumpur, Melaka, Negeri Sembilan, and Selangor, according to the ASEAN Disaster Information Network (ADINet). Floods in the districts of Gombak, Hulu Langat, Kuala Langat, Petaling, and Sepang have displaced 1,020 residents, mostly in Selangor.

Although, river flooding occurs during the local tropical wet season, which normally occurs between the months of October and March. Flooding happens when heavy rain or when heavy rain falls over a long period of time causes the flood levels of a river or stream to rise to the point where they submerge land. Normally, this type of flood happens along the east coast of Malaysia, in places like Kelantan, Pahang, and Terengganu. River flooding results in the death of people and the destruction of property.

It is one of the technologies that may be utilized to reduce loss of life in floods, and it is particularly useful in east coast states such as Kelantan, Terengganu, and Pahang. In order to prevent loss of life due to flooding, it is possible to integrate an alarm system into the system to inform the public and authorities. When the water level in the river exceeds a certain threshold, the system will send an alert to the user, indicating that the system has detected an abnormal situation. It is specifically built for rescue teams such as PDRM, BOMBA, and the Joint Pararescue Mission (JPAM). With the use of this technology, the

rescue team will be able to obtain information about the water level and distribute that information to the general public, particularly flood victims, in order to facilitate evacuation.

1.2 Problem Statement

In recent times, many areas have been hit by unpredictable floods but residents have not received any warnings before it occurs. The majority of flood monitoring approaches are based on telemetry systems, which necessitate the use of transmitters and repeaters in order to communicate the information to a central terminal. It is expensive and unreliable when there is equipment malfunction in a section of the sensed area, as is the case in this case. This flood monitoring system using ultrasonic sensor and NodeMCU ESP8266 will help people to monitor and predict the floods before it occurs at an affordable price.

1.3 Project Objective

The main aim of this project is to be developing a Flood Monitoring System with Iot. Specifically, the objectives of this project are as follows:

- a) To develop a system that will be able to analyze water levels of the river when it rains before a flood occurs.
- b) To develop a system that will able to notify residents earlier to save their life and lower the risk of death.
- c) To develop a flood early warning and notifications system to minimize damage property and lives.

1.4 Scope of Project

The scope of this project is focused on areas that are found to be areas prone to flooding. This is to make it easier for them to be prepared for flooding. This will also make it easier for many parties such as firefighters to act more quickly when floods occur. It will also be able to save important items from being destroyed by floods. Firstly, to operate this system, the hardware should be placed near the river to let the ultrasonic read the water level. There are 3 stage of water level in the river. For the first stage is low level, which is water still in safe position. Second level of water is moderate level. When water level reach moderate level, residents must be alert with the condition of water and prepare for the flood by rescuing valuables things. Lastly in danger condition is the last level. Resident, firefighter or JPAM shall immediately take safety actions of the residents. Protect from death, missing and drown cases. Users will be notified or monitor this system through the blynk app and they also can monitor manually at the river. The attention of this system is monitoring the water level of the river and measuring the rate of rainwater drop.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In order to complete this Flood Monitoring System, conduct a literature review to gather the necessary information and skills. The bulk of this section comes from previous projects and thesis that are related to this one. From books, journals, and articles on the internet, this source can provide information. Researcher study of the project provides a way for project developers to learn about what features are missing from their work. Improve and construct a successful project is quite important.

2.2 Past Related Research

2.2.1 Smart IoT Flood Monitoring System

The purpose of this research is applicable to both urban and rural areas. The system that has been proposed has a design that is both simple and inexpensive to maintain. This project will automatically update the water level on the web server, and the system will send out a warning signal to the people in the area, urging them to evacuate as quickly as possible. Previous research that are relevant to this topic suggest that the system was developed using a variety of different approaches. According to the findings of this study report, the Arm Mbed IoT device platform provides both an operating system and a large number of cloud services. In the Smart IoT Flood Monitoring System, the microcontroller used a Mbed LPC1768 with an application board. These components were chosen since they are Internet of Things (IoT) solution based. This particular family of microcontrollers is known as the

LPC176x. It also has a drag-and-drop programming interface, with the board being displayed as a USB drive, and it has online resources that are simple to use [1].

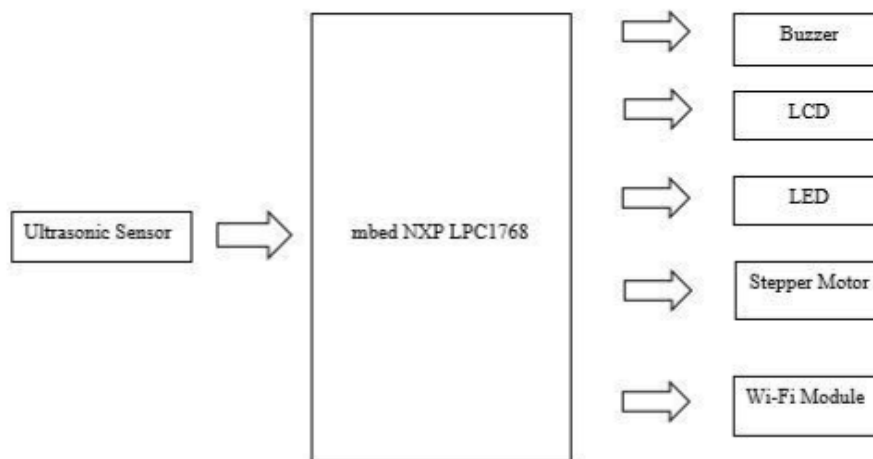


Figure 2.1 Block diagram Smart IoT Flood Monitoring System

2.2.2 The Development of Smart flood Monitoring System Using Ultrasonic Sensor with Blynk Applications

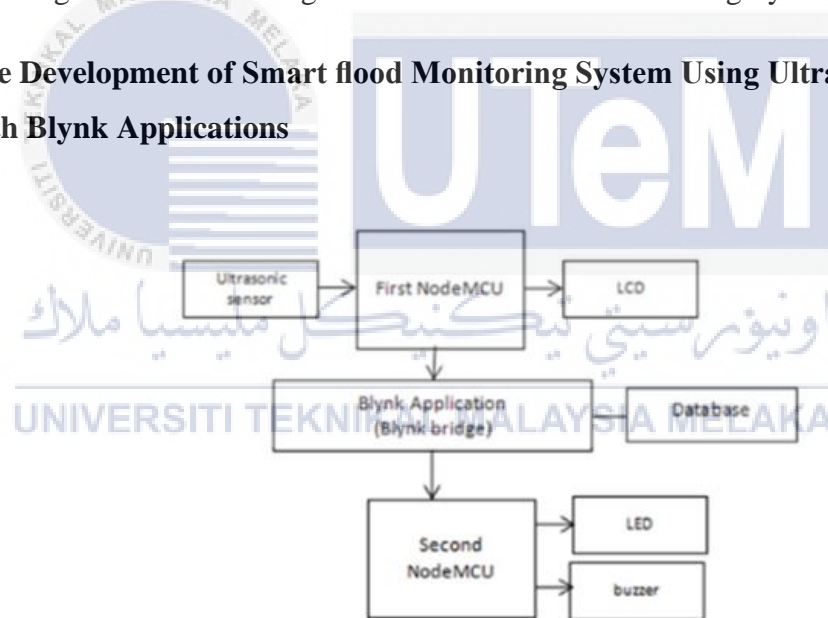


Figure 2.2 Block diagram Smart IoT Flood Monitoring System with Blynk Application

This article shows, the overall block diagram of this system is shown in Figure 2.2. The first NodeMCU, which is equipped with an ultrasonic sensor, will detect the flood level. The data will then be displayed on the LCD panel. The information will be sent to the Blynk

app through a wireless connection. The statistics will also be displayed on the Blynk app. Simultaneously, the data is kept in a CSV database, which may be transformed into Excel format via email and then sent to the second NodeMCU using Blynk Bridge. Once the level reaches warning and critical levels, the buzzer and LED will activate, alerting the local authority to take further action. This previous project system is using 2 NodeMCU compared to this project which only 1 NodeMCU for microcontroller [2].

2.2.3 A Real Time Solution to Flood Monitoring System using IoT and Wireless Sensor Networks

This paper shows an Android application for the project's software application. The Android app and online application for this project were both accomplished in this module. Login, Registration, the number of users registered to the app, the state of the sensor, and safe zones near the flood-affected area where people can move will all be displayed on the admin web page. individuals who have created an account will be able to use the Android app. The user is given a unique username and password to use when signing in to the site. The user can then access all of the app's functions. The program receives data such as the current water level and temperature. This application features a map that displays the user's current position as well as neighboring safe areas [3].

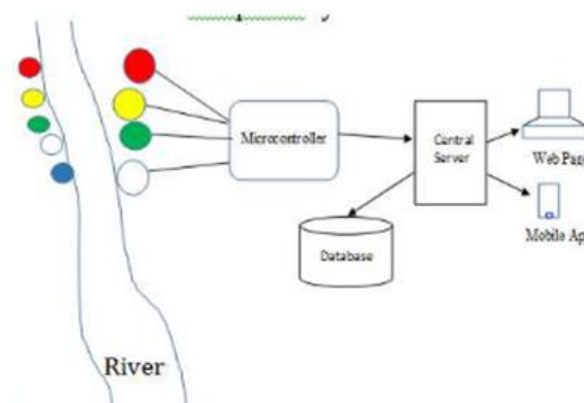


Figure 2.3 Block Diagram Sketching