



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DEVELOPMENT OF FLOOD MONITORING
SYSTEM USING BLYNK**

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

by

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APPROVAL

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

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ABSTRACT

This report proposes the development of flood monitoring system using Blynk that enables users to detect the distances and water level in the aquarium. This project is to build flood monitoring system which associated with IoT platform, Blynk. In this system, ultrasonic sensor and water level sensor are to be used to the aquarium. The level of water will be notified in the android app. User will be notified in real for the water level in the aquarium. ESP8266 Wifi module is integrated in the project for data transmission via WiFi with relatively good coverage and data capacity for this project. Thus, it enable user to monitor the system within the coverage from the system base. Arduino UNO is used as microcontroller in this system in order to control the system. When the level of water reach maximum, the users will be notified through a smartphone to indicate an early warning for a heavy flood during rainy time.

ABSTRAK

Laporan ini mencadangkan sebuah sistem pemantauan banjir menggunakan Blynk yang membangun dengan kos yang rendah dan membolehkan pengguna mengesan jarak dan paras air di akuarium. Projek ini adalah untuk membina sistem pemantauan banjir yang berkaitan dengan platform IoT, Blynk. Dalam sistem ini, sensor ultrasonik akan dipasang di atas akuarium untuk membaca tahap air dalam akuarium. Semasa di dasar akuarium akan memasang sensor paras air untuk membaca tahap air. Tahap air akan dimaklumkan dalam aplikasi android. Pengguna akan diberitahu data masa sebenar mengenai tahap dan jarak air dalam akuarium. Modul ESP8266 Wifi disepadukan untuk menghantar data melalui Wifi kerana teknologi internet telah dinaik taraf di Malaysia. Semua sistem masuk disepadukan dengan Wifi sekarang untuk menjadikan kehidupan lebih mudah. Ini membantu pengguna memantau sistem tidak kira di mana sahaja dan bila-bila masa. Arduino UNO digunakan sebagai mikrokontroler dalam sistem ini untuk mengawal sistem. Apabila paras air mencapai maksimum, pengguna boleh dapat maklumat dan berwaspada dengan banjir semasa hujan lebat melalui telefon bimbit.

DEDICATION

“This report is dedicated to my parents, who have supported me the way since the beginning of my studies. Also, this report is dedicated to my sibling and my friends who has been a great source of motivation and inspiration. Finally, this report is dedicated to all those who believe in the richness of learning.”

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LIST ABBREVIATIONS, SYMBOLS AND NOMENCLATURES

IR sensor	-	Infrared sensor
EEPROM	-	Electrically erasable programmable read-only memory
IDE	-	Integrated Development Environment
LED	-	Light emitting diode
OS	-	Operating System
USB	-	Universal serial bus
GUI	-	Graphical user interface
GPS	-	Global Positioning System
GSM	-	Global System for Mobile
IoT	-	Internet of Things
RFID	-	Radio-Frequency Identification
DC	-	Direct current
AC	-	Alternate current
RF		Radio frequency
LAN		Local Area Network
LCD		Liquid crystal display

CHAPTER 1

INTRODUCTION

1.0 Introduction

The main concepts and development of the flood monitoring system is by using the Internet of things (IoT) platform. The Blynk platform is being used in this project. In this chapter, the explanation of the project background, problem statement, objectives and project scope will be make up into few parts. Moreover, explanation about this project system and how the system working will be explain in this chapter. Besides that, the starting of the process begin for this flood monitoring system using internet of things (IoT) connectivity will beings introduce also in chapter one. This section also vital for the user because it will be the guidelines for the users. The developer also can achieve the desired goals based on the sections included in this chapter with the clearly specified statement stated.

1.1 Project background

The concept of internet of things (IoT) platform was appeared as a topic emerged in the wireless technology field. Internet of things (IoT) depicts the unavoidable nearness of an assortment of devices, for example, sensors, actuators, and advanced cells or cell phones that through one of a kind tending to plans, can collaborate and participate with each other to achieve shared objectives. Thus, internet of things (IoT) is a worldview because of the meeting of three extraordinary internet- oriented visions (middleware), things situated (sensors) vision and semantic-arranged (information) vision. In past works managing this term. Hence, it is suitable to utilize the idea of IoT to give correspondence abilities to a gadget that could alert ideally to a people before natural disaster happens. Before utilizing sensors incorporated into IoT ("things"- arranged vision) a few works have been proposed to disaster circumstances. In particular "things"- arranged vision works like where RFID innovation is utilized. Be that as it may, we are particularly keen on those applications focused in misfortunes by flood.

For instance, a system for flood monitoring give alert to the people. Different sort of sensors sent in the alert system is precipitation, water level, and climate sensors. These sensors supply data to the incorporated computer system. Another illustration is found in, it is a landslide detection system utilizing a WSN (wireless sensor network). This system has empowered a more helpful early cautioning system and gives a system ready to learn about the phenomena of natural disasters. Forecasting flash flood by the flooding of streams can process, break down (by methods for rain measure and stream check) and remotely detected information to distinguish the event of a problem. This system is the perfect arrangement, yet it is costly. An assortment of equipment, programming (counting PC applications and projects), and correspondence abilities are required to help and keep up this water level estimation system. A few researches have planned water level sensors utilizing

databases, handling crude information, extricating data and sending remotely this data to users.

Another more previous project have contemplated comparable issues. According to the environmental change for example climate change extreme rainfall is becoming more frequent often climate change extreme rainfall is becoming more frequent often causes heavy flooding. This causes the need to screen continually the river water level, so these estimations must be protected and to have solid sensors are basic. Concurring to area attributes, diverse estimating standards can be utilized. A water level measurement enables to know the amount of water that have a river, it also to know range of level it can become dangerous because it may cause an overflow. Therefore this overflow causes floods in that area. Sparring level esteems can make forecasts for future levels, behaviors in the water level of rivers, lakes, lagoons, ponds, lakes, and dams.

According to definitions of Internet of things (IoT), if we consider a sensor as an element which enables to communicate its current status and be connected on the internet. Nevertheless, the real intent of the proposal is to achieve a flood early warning system. So far, we have only built a model through a prototype that sends an audible signal and alert notification by apps about water level into container. This model was developed based on programmable electronic board (Arduino IDE) are series of kits which combines of software and hardware which gives the ability to detect the distances of water level. Thus, where some electrical resistors were connected to height into a water container, the rising water levels covering the resistance so that cause variation in the impedance, this fact indicates what is the water level covering the resistance so that cause variation in the impedance, this fact indicates what is the water level, and so on for the different distances. This information was transmitted to a web server via WiFi.

The Internet technology benefit is extensively recognized as a strategy for distributing data. It is filled in as two-way communication between providers and users. Subsequently, a large number of online applications

including web-mapping have been expanding. The Map, for example, Google Map, Google Earth and World Wind, offers the guide map visualization to public. They don't fill for the need of nature disaster cautioning, for example, floods alert. The reason is because the steps includes refreshed related information, satellite symbolism, land cover, and immersed zones which generally recorded.

Then, this data can be accessed by mobile devices, users can graphically observe the information, these information demonstrate the estimations of water levels. In this way, the model tests were led into a controlled situation, these tests comprised in estimating the water level in a holder with water, diverse filling levels were tried such testing demonstrated the normal outcomes. Given these actualities, on the off chance that it is known the time when rising the water level up to the edge while the water level passes each level check, it is possible to know precisely these counts in a genuine situation like a low land areas. Thus, individuals can be helpfully educated when rising river and drain levels, so residents can settle on a choice and begin getting ready to clear their homes if important. So now we can think about an extremely cautioning system to alarm residents of low lying areas.

1.2 Problem statement

The problem in the disaster management is oftenly the lack of accessibility of the data. The capacity to effectively utilize data advancements to find and manage data, the capacity to basically assess, and properly apply such data to solve of an issue, are the key of researchers and observation to discover disaster recovery solution. Accordingly, the methods for distinguishing, finding, getting to information and deciding is important for doing productively react to the issue.

There are few problem statements that project try to solve it such as getting late information and ease to monitor water level. Flood monitoring system nowadays still not helping drivers in the road from trapping in flash flood due to the slow information given to the road users. But using Flood Monitoring system, this system can inform about flash flood that occur in a place much faster and accurate. Before this, flood monitoring system works manually where it only detects the flood by using river water level detection circuit only. One of the current issues that happen was a continuous heavy rain on November 5, 2017 in parts of three states such as Penang, Kedah and Perak. The several schools are closed because of this currently underwater issue. Road users also faced the problem that been advised to use different route for their actual place to go but now change to an alternative route from Alor Setar to Butterworth.

Meanwhile, there are about 28 hikers found difficulty to cross the river near the Titi Hayun recreation area due to strong currents and the fall of tree in road causes the traffic around SK Singkir Darat is halt. Heavy rain reflected to flash flooding was reported by public person who was Balqis Jazimah Zahari forced dozens from their homes in Ipoh. Therefore, this flood monitoring system which one of real time monitoring system can collect data much easier and faster with more cost effective. It provides and allows the fastest possible response regarding flood event before anything lost happen to public. The system can reduce risks that causes with flooding and also provides flood warning coverage and community oriented.



Figure 1.1: An aerial view of Georgetown following the flood picture by reporter Ramdzan Masiam

Regarding the problem, a new application for flood monitoring is needed to provide an information on the current water in the low land areas. When the water level increase beyond the critical level, the system alerts by apps. This new application is to minimize flood damage costs which is correlated closely with the period of warning given before the flood phenomenon occurred. Through the idea of flood monitoring system by using internet of things (IoT), it will be a great way for people to be alerted easily and seamlessly by using a smartphone or any portable devices. The Arduino, which works as a microcontroller for this project can resolve the issue of having complicated circuit and it is likewise more appropriate gadget to be utilized for control system.

1.3 Objectives

The aim of this study is:

1. To develop a model of flood monitoring system that integrated with IoT platform, Blynk.
2. To study the operation of flood monitoring system by computing the distance and level of water.
3. To test and use the overall system by using Wifi module selected.

1.4 Scope

The scope of work in this project related on the objectives are stated as given:

1. There has been innovation in technologies of computing, mobile communication, wireless communication, computing field and this opens the door for Internet of things. It divided into two major part which are

transmitter and receiver in flood monitoring system. Thus, internet of things be the role as a network connected devices which can be a sensor, cell phone or anything that can transmit and receive information in a communication channel by anywhere of time and provide value added services for user to make their world more better.

2. This project uses the ultrasonic sensor to measure the water level in terms of distance. The ultrasonic sensor will interface with the Arduino and WiFi module to establish the connection to the internet Arduino for mobile apps accessibility to it. The WiFi module works as input or a receiver from ultrasonic sensor and store directly into Blynk with mobile apps.

1.5 Thesis organization

This thesis is divided into five parts. Following this introductory part which presents background information such as basic principles, history and applications of this flood monitoring system are outlined in order to better define specific aspects of system performance addressed in this thesis. Chapter 2 describes the same as before research done regarding this project which theoretical and an overview of available about comparison of components that used in this system. Thus, the chapter 3 describes a long term performance system based on the new method such as program flowcharts, hardware and software simulations. Chapter 4 explain final part of a new performance analysis method as outlines key components and various steps which make up new method. Last but not least, chapter 5 discusses the results of overall project by simulations and offers recommendations for improvement to this work.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter give an overview regarding topics about the previous work and literature study which are related with this project. The project is to create IoT flood monitoring system which constantly monitor the minimum to maximum water level and distances that will impact used of sensor to network to give response to users. Thus, the power source in this project is used to switch ON microcontroller, sensors and Wifi module. So that, the system will work on with sensor that will detect level and distances in the container or river and direct flash real time data into Blynk. The data in Blynk will be save with monitoring system and will be display on versatile application. By conduct the monitoring system project will get the right information from the river or affected area by the users.

2.1 An overview of Flood

A flood is a land which is typically dry being submerged by an overflowing of water stated by Rogger, M., Agnoletti, M., Alaoui, A., Bathurst, J. C., Bodner, G., Borga, M., Blöschl, G. (2017). Thus, flood of water from water bodies is the thing that happens in flooding, for example, an accumulation of water on immersed soil makes this phenomenon occur in an area flood or a lake or stream, bringing about some of that water flooding its typical breaking points. Close by with the size of other river or a lake will contrast with each occasional change in rainfall and snow soften, these adjustments in estimate are difficult to be considered huge unless they suffocate domesticated animals or flood property.