

Project Definition: The project involves deploying IoT sensors near water bodies and flood-prone areas to monitor water levels and provide early flood warnings through a public platform. The objective is to enhance flood preparedness and response by issuing timely warnings to both the public and emergency response teams. This project includes defining objectives, designing the IoT sensor network, developing the warning platform, and integrating them using IoT technology and Python.

Design Thinking:

Project Objectives: Define objectives such as real-time flood monitoring, early warning issuance, public safety, and emergency response coordination.

IoT Sensor Network Design: Plan the deployment of IoT sensors to monitor water levels in flood-prone areas.

Early Warning Platform: Design a web-based platform to display real-time water level data and issue flood warnings.

Integration Approach: Determine how IoT sensors will send data to the early warning platform.

Smart IoT Flood Monitoring System

Introduction

In Malaysia, floods are caused by a combination of natural and human factors. Malaysians are historically a riverine people as early settlement grew on the banks of the major rivers in the peninsula. Coupled with natural factors such as heavy monsoon rainfall, intense convection rain storms, poor drainage and other local factors, floods have become a common feature in the lives of a significant number of Malaysians [1]. Flood is tremendously dangerous and has tendency to blow the whole city and area of houses away. Flood also can cause huge property damage and loss of life. It is a natural disaster where dry land suddenly submerged under water. Some floods can happen out of sudden and very fast. When a flood occurred, water will bring along and destroy things like houses, vehicles and variety of dangerous objects such as

sharp wood that can cause someone hurt. Some have been hit by with the swirling things. It is necessary to have early warning system that will warn the residents about the risk and threats when there is upcoming flood.

There are numerous technologies available to anticipate and avoid. It is truly believed that most of the citizens have tablets and smartphones at their fingertips. The smart IOT flood monitoring system plays big roles during the flooding where the high effective system will

help government and society to manage situation of flood victims efficiently and hence, reduce the disaster effect.

It is very important to make this system simpler, easy to be operated; cost effective system and most importantly is to effectively alert society as earlier as possible. The proposed system will provide simple and basic monitoring interface, sufficient data on flood level, and future short-term water level prediction.

Literature Review

According to previous related works, there are several methods used to develop the system. Based on this research paper [2] the web based IoT 'Thingspeak' platform is used which has an open API service that store and retrieve the data from the sensor and the sensed data output is displayed in graphical form. In this project, sensors are used to implement the IoT Operation for sensing and monitoring the heat, humidity, temperature, light intensity, rain sensing, air quality, barometric pressure and sea level pressure of the surroundings. Figure 1 shows ThingSpeak platform.

Figure 1: ThingSpeak IoT Cloud Website [3]

Then, the proposed system in [4], an Arduino was used to control the entire system. It is interfaced to GSM modem and pressure sensor. The pressure sensor is used to measure the water level and the Arduino is used to calculate the height value of the water using Pascal's Law. The level of water is calculated then will be equated with the threshold value that have been set. If the water level is exceeded than the threshold value, the microcontroller will alert the residence by sending SMS.

Arduino family have their own pros and cons features. For the Arduino family, they are all almost slow with small memories and limited functionality meanwhile the Mbed platform uses ARM Cortex microcontroller which are generally have more memory spaces, much faster and more functionality. Therefore, any projects that require more memory or processing speed are recommended to use ARM platform. Figure 2 shows ARM Mbed LPC1768 microcontroller.

Methodology

Methodology discusses about the approaches used to collect the data input and decision making to the public. Some improvement is needed to develop a Smart IoT Flood Monitoring System. This will focus on the system that uses the electronic based components for this project. The planning flow of this project will be explained in details.

