

**INVESTIGATION ON LOW COST CAPACITIVE FLOOD SENSOR  
OPERATION AND OPTIMIZATION BASED ON  
ARDUINO MICROCONTROLLER**

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## **ABSTRACT**

Flash flood problems often occurred on urban area. In Kuala Lumpur, SMART tunnel is built to handle this problem. Using a same concept, a low cost capacitive flood sensor is developed to overcome this problem on certain area around Kuala Lumpur. The development of flood sensor is based on Arduino microcontroller which used CapacitiveSensor library to detect the flood water level. The flood sensor is constructed from copper media which is implemented on the FR-4 PCB. The sensitivity of the flood sensor is tested under two different methods which used a single and parallel-plate capacitor respectively. The relationship between flood sensor sensitivity with different resistance values, temperature, size and gap between plates is investigated. All measurements taken were in an arbitrary unit which indicated the capacitance of the sensor. From the investigation done on the capacitive flood sensor, it is described that the flood sensor is easy to implement, low cost and has a high sensitivity and reliability of the results.

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# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 Overview**

This project is focused on the investigation of low cost capacitive flood sensor operation and optimization based on Arduino microcontroller. The Arduino microcontroller used is the Arduino Uno microcontroller board. Based on the CapacitiveSensor library implemented into the Arduino Uno microcontroller, this project used FR-4 PCB as a flood sensor where the library turned two of digital pins on the Arduino Uno microcontroller board which connected to the FR-4 PCB into capacitive flood sensor. The system of this project is operated under three different modes to indicate the safe, caution and dangerous condition. The project is then tested under two different methods which used single and parallel-plate capacitor respectively to investigate the performance of the sensor itself. The parameters measured are included the sensitivity of the sensor, the relationship between capacitance with the gaps between plates and water depth levels, the sensitivity error and also the offset error of the sensor. Before the investigation on the capacitive flood sensor is conducted, some review from the previous research is done. The usage of different microcontroller, sensor and implementation of alert system in the flood sensor system are compared with this project. The comparisons are made to analyze the limitations occurred from the previous research. This project introduced and proposed to design the low cost capacitive flood sensor system in order to overcome the limitations from the previous research. Moreover the background of the project is mentioned to give a big idea of whole project. The issues related to the project are identified and the objectives and the scope of the projects are stated.