



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**DEVELOPMENT OF A FLOOD MONITORING AND  
EARLY WARNING SYSTEM BY USING LABVIEW  
SOFTWARE**

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electrical Engineering Technology (Robotic and Automation) with Honours.

by

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SYSTEM BY USING LABVIEW SOFTWARE

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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 Electrical Engineering Technology (Robotic and Automation) with Honours. The member of the supervisory is as follow:

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## **ABSTRACT**

The idea of this project is for development of flood monitoring and an early warning system by using LabVIEW software, this system is to allow the residents to get an early information on flooding before it becomes critical. This project will show that the water level by graph and at the same time it will keep monitoring until there is a drastic change in water level so in LabVIEW software so from there as programmed it will make the decision to alert people about the water level by message system whether it's on normal level or the danger level 1 or danger level 2 so that it can help the residents to make early preparation to evacuate.

## ABSTRAK

Idea projek ini adalah untuk membangunkan system pemantauan banjir dan sistem amaran awal dengan menggunakan perisian LabVIEW, sistem ini adalah untuk membolehkan penduduk untuk mendapatkan satu maklumat awal mengenai banjir sebelum ia menjadi kritikal. Projek ini akan menunjukkan paras air dan pada masa yang sama, ia akan terus memantau sehingga terdapat perubahan drastik pada air itu dan ianya akan di paparkan di perisian LabVIEW dari situ seperti yang telah diprogramkan itu akan membuat keputusan kepada penduduk untuk berjaga-jaga tentang paras air oleh itu satu mesej akan di hantar kepada penduduk sama ada ia berada pada tahap normal atau bahaya ARAS 1 atau bahaya ARAS 2 supaya ia boleh membantu penduduk untuk membuat persediaan awal untuk berpindah.

## DEDICATION

### **This thesis is dedicated to:**

My beloved parents Ramalingam Vethiyo and Thanaletchumi Thambusamy. To my brothers and sisters R.Thambyraj and R.Patmawathy A big appreciate to my supervisor, Ts Ahmad Muzaffar Bin Abdul Kadir, my lecturers, my friends, Kalaiselvan Batumalay, Karthik Manikam, Kalliarasan Chandrasekar, Subramaniam Palanisamy, Kumarisswaran Kallidass, Fatin Najwa bt Zakaria and to all my friends and thank you for your idea and support so that the report can be completed successfully.

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## TABLE OF CONTENTS

	<b>PAGE</b>
<b>TABLE OF CONTENTS</b>	<b>x</b>
<b>LIST OF TABLES</b>	<b>xiv</b>
<b>LIST OF FIGURES</b>	<b>xv</b>
<b>LIST OF APPENDICES</b>	<b>xviii</b>
<b>LIST OF SYMBOLS</b>	<b>xix</b>
<b>LIST OF ABBREVIATIONS</b>	<b>xx</b>
<b>LIST OF PUBLICATIONS</b>	<b>xxi</b>
<b>CHAPTER 1      INTRODUCTION</b>	<b>1</b>
1.1      Background	1
1.2      Problem Statement	2
1.3      Objective	4
1.4      Scope	4
<b>CHAPTER 2      LITERATURE REVIEW</b>	<b>5</b>
<b>2.1                  Past related work.</b>	<b>6</b>
2.1.1      Monitoring of Water Level Variations in Rivers and Flood Alert System Using Wireless Sensor Networks.	6

2.1.2	SMS Based Flood Monitoring and Early Warning System.	10
2.1.3	SMS Flood Alert System	12
2.1.4	Real Time Monitoring of Water Level Variations in Rivers and Flood Alerting System using Arm7.	15
2.1.5	Urban Flash Flood Monitoring, Mapping and Forecasting via a Tailored Sensor Network System	19
2.1.6	Water Monitoring System Using Arduino with LabVIEW	20
<b>2.2</b>	<b>Device Components</b>	<b>23</b>
2.2.1	Arduino	23
2.2.2	Global System for Mobile Communications (GSM)	27
2.2.3	Sensor	30
2.2.4	Server	34
<b>CHAPTER 3</b>	<b>METHODOLOGY</b>	<b>38</b>
3.1	Introduction	38
<b>3.2</b>	<b>Implementation of the Project Process</b>	<b>39</b>
3.2.1	Planning the Project Process	39
3.2.2	Flowchart Project Process.	42
<b>3.3</b>	<b>Hardware Implementation</b>	<b>45</b>

3.3.1	Transmission Part.	46
3.3.2	Power Supply	47
3.3.3	Analog Water Level Sensor	48
3.3.4	Model Architecture.	50
3.3.5	Receiver Part	52
<b>3.4</b>	<b>Software Implementation</b>	<b>54</b>
<b>3.5</b>	<b>Component Description.</b>	<b>61</b>
3.5.1	ARDUINO Uno Board	62
3.5.2	GSM Module SIM900A	67
3.5.3	Analog Water Level Sensor.	70
<b>CHAPTER 4</b>	<b>RESULT AND DISCUSSION</b>	<b>72</b>
4.0	Introduction	72
4.1	Experimental Data	75
4.1.1	Coding for GSM SIM900A	75
4.2	Project Result and Data Analysis	78
<b>CHAPTER 5</b>	<b>CONCLUSION AND RECOMENDATION</b>	<b>87</b>
5.1	Introduction	87
5.2	Conclusion.	87

5.3 Recommendation.

88

**REFERENCES 89**

**APPENDIX 91**

## LIST OF TABLES

<b>TABLE</b>	<b>TITLE</b>	<b>PAGE</b>
Table 3.1:	Showing the material cost for build this project.	40
Table 3.2.:	List of component	61
Table 3.3:	Pin layout of Arduino Uno	64
Table 3.4.:	Type and characteristic of Arduino Uno	65-66
Table 3.5:	Pin description for GSM module Sim900a.	69
Table 3.6:	Pin description for Analog Water Level sensor	71
Table 4.1	Data Generate from LabVIEW	77

## LIST OF FIGURES

FIGURE	TITLE	PAGE
2.1	Block Diagram of system used	7
2.2	Block diagram of wireless sensor	8
2.3	System setup	11
2.4	Block diagram of proposed model	16
2.5	Processing steps of proposed model	17
2.6	Arduino Uno	23
2.7	Disaster flood alert system using ultrasonic sensor	27
2.8	Ultrasound sensor for raw measurement	32
2.9	Basic design of a flood alert system with sensor	34
2.10	Example of user registration to server	35
2.11	Network topology of Digi mesh	36
<b>CHAPTER 3</b>		
3.1	Project planning flow chart	40
3.2	Flowchart of project system	43
3.3	Block diagram of the project system	44
3.4	The transmitting system	45
3.5	The supply port by adapter to turn on project	47

3.6	Connection Water Analog Level Sensor with Arduino Uno	48
3.7	Coding for Analog Water Level Sensor	49
3.8	Plan layout for emergency path to evacuation point	50
3.9	Cut off circuit and emergency light ON	51
3.10	Receiver /output port of the project	52
3.11	Example of Arduino software version 1.8.2	54
3.12	Example of Arduino code editor	55
3.13	Connection between Arduino board with PC using USB cable	56
3.14	LabVIEW 2017	56
3.15	Example LabVIEW 2017 control programming language	57
3.16	Example LabVIEW 2017	59
3.17	Example LabVIEW 2017 data logging and monitoring	60
3.18	Arduino Uno Board	63
3.19	GSM module Sim900a	68
3.20	Ultrasonic sensor HC SR04	70



## CHAPTER 4

4.1	Expected result flow process and initial result	74
4.2	GSM coding for Alert Danger 1	77
4.3	GSM coding for Alert Danger 2	78
4.4	Graph of the Data Generated from LabVIEW	78
4.5	Housing model used in the project	79
4.6	Front panel of the system in LabVIEW 2017 software.	80
4.7	Block diagram of the system in Labview2017 software	81
4.8	System is on and in initial condition	82
4.9	First alert for the user	83
4.10	Alarm Level I triggered	83
4.11	Second alert for the user	84
4.12	Alarm Level 2 triggered	84
4.13	Initial reading of water in calm condition	85
4.14	First warning reading in which alert has triggered	85
4.15	Second warning reading in which alert has triggered	86

## LIST OF APPENDICES

APPENDIX	TITLE	PAGE
Appendix 1	Gantt chart	90

## LIST OF SYMBOLS

<b>A</b>	- Ampere
<b>mA</b>	- Milli Ampere
<b>mAh</b>	- Milli Ampere per Hour
<b>I</b>	- Current
<b>V</b>	- Voltage
<b>V<sub>in</sub></b>	- Voltage Input
<b>V<sub>out</sub></b>	- Voltage Output
<b>V<sub>mpp</sub></b>	- Voltage Maximum Power Point
<b>P</b>	- Power
<b>W</b>	- Watts
<b>AC</b>	- Alternating Current
<b>DC</b>	- Direct Current
<b>I/O</b>	- Input & Output
<b>MHz</b>	- Mega Hertz
<b>L</b>	- Inductor
<b>C</b>	- Capacitor
<b>A</b>	- Ampere
<b>mA</b>	- Milli Ampere

## LIST OF ABBREVIATIONS

<b>CPU</b>	- Central Processing Unit
<b>GPRS</b>	- General Packet Radio Service
<b>GSM</b>	- Global System for Mobile Communications
<b>SMS</b>	- Short message service
<b>HTTP</b>	- Hypertext Transfer Protocol
<b>IP</b>	- Internet Protocol Suite
<b>MCU</b>	- Microcontroller Unit
<b>MMS</b>	- Multimedia Messaging System
<b>MS</b>	- Mobile Station
<b>NPN</b>	- Negative-Positive-Negative Transistor
<b>NSS</b>	- Network and Switching System
<b>OSS</b>	- Operation and Support Subsystem
<b>PIC</b>	- Peripheral Interface Controller
<b>PWM</b>	- Pulse-Width Modulation
<b>RF</b>	- Radio Frequency
<b>SMS</b>	- Short Messaging System
<b>SMS-G</b>	- Short Messaging System- Gateway
<b>TCP/UDP</b>	- Transmission Data Protocol or User Datagram Protocol
<b>TDMA</b>	- Time Division Multiple Access
<b>TOF</b>	- Time of Flight
<b>USB</b>	- Universal Serial Bus

## LIST OF PUBLICATIONS

# CHAPTER 1

## INTRODUCTION

### 1.1 Background

Natural disasters around the world cause widespread destruction of property, physical injuries and deaths. Even though natural disasters can be unpredictable occurrences, mitigation measures can reduce the severity of damages. The effective preventive strategy can lessen The impact of natural hazards. Thus, information, through data accumulation from reliable sources, is vital. Effective and timely data delivery is required for risk assessment and risk management in the community. Floods are one of the most common natural hazards in the Asian region. Increasing in human activities causes higher risk of flood hazards and their level of impact. Therefore, the integration of spatial data, meteorological and hydrological data acquired through the Internet communication can be operated as an early warning system to reduce potential damage.

This project will briefly discuss about water level monitoring system and an early flood warning system by using LabVIEW. The projects work when a sensor triggered by water for a certain normal parameter the data is collected and will be send to the LabVIEW software for analysis. If the water level is not beyond a danger level the system will continues to monitoring by every 20 second, this is done because to reduce the power consumption for the circuit and it will be in energy saving mode.

In case there is a high water level triggered on the sensors the process of collecting data will still continue and result will be kept on the system. Meanwhile the LabVIEW

software will give instruction to the microcontroller to trigger Global System for Mobile Communications (GSM) to alert the nearby residents to evacuate to evacuation point at the same time there will a delay process for the flood in which there will be a small smart drainage system to divert the over flow of water to other nearby river

## **1.2 Problem Statement**

Flood is a regular natural disaster around the world. It is happening every year during the rainy season. Malaysia is one of the country that will always effected by the flood this is due to the heavy rain during the monsoon season. During normal days, the river water level is low and may not present at all.

However, in heavy rain, this area may flood fast as the river level increase rapidly. The current flood warning system implemented in Malaysia is not widely use is the main reason why the residents does not aware or neither be informed about the rise in dangerous water level which finally will end up with flood. And this is because the water level will increase faster when there is a heavy rain.

Thus the point of monitoring is focused on one location per river. Because of few number of monitoring, several areas that flooded during rainy season happen to received late aid. The assist on early warning of flood thru water level detection a modal developed. By using the Arduino microcontroller, the model embedded with an analog water level sensor ranging sensor that acts to determine the distances of water level. It is also equipped with GSM module when the module received the signal from the

microcontroller. This will alert the nearby the data received by the residents is in a form of Short Message Services (SMS).

The model is built in small size as it able to operate on various sites according the need. This disaster cannot be eliminated, but warning people earlier can avoid its effects. This can help people to escape and avoid any expected harms. Therefore, the goal of early warning is to give people the chance to save their life and their properties.

New technologies produce simple and low cost tools that can be used to solve such problems. In this work, some of these tools are used such as Arduino UNO board what works as a transmitting device. This board has low cost, simplicity in programming and the ability to interface with other devices. Another tool is the GSM shield, which is a ready board deals with GSM networks without additional interfacing circuits. By all the data received, the LabVIEW software could predict the level of flood impact toward the area of this model covered and will send the alert message to the residents.