DEVELOPMENT OF FLOOD EARLY WARNING SYSTEM AT TAMAN MERDEKA, BATU BERENDAM, MELAKA

IZUWATI BT ABD RAZAK

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF FLOOD EARLY WARNING SYSTEM AT TAMAN MERDEKA, BATU BERENDAM, MELAKA

Thesis submitted in accordance with the partial requirements of the
Universiti Teknikal Malaysia Melaka for the
Bachelor of Manufacturing Engineering (Design Manufacturing)

By:

IZUWATI BT ABD RAZAK

B050510076

Faculty of Manufacturing Engineering

March 2008

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN PSM

JUDUL:

Development of Flood Early warning System at Taman Merdeka, Batu Berendam, Melaka

SESI PENGAJIAN: **Semester 2 2007/2008**

Saya **Izuwati Bt Abd Razak**
mengaku membenarkan laporan PSM / tesis (Sarjana/Doktor Falsafah) ini disimpan di Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM) dengan syarat-syarat kegunaan seperti berikut:

1. Laporan PSM / tesis adalah hak milik Universiti Teknikal Malaysia Melaka dan penulis.
2. Perpustakaan Universiti Teknikal Malaysia Melaka dibenarkan membuat salinan untuk tujuan pengajian sahaja dengan izin penulis.
3. Perpustakaan dibenarkan membuat salinan laporan PSM / tesis ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. *Sila tandakan (√)

☐	SULIT	(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia yang termaktub di dalam AKTA RAHSIA RASMI 1972)
☐	TERHAD	(Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)
☑	TIDAK TERHAD	

(TANDATANGAN PENULIS)
Alamat Tetap:
3553, Kg. Darat pak Chan, 21600
Marang, Terengganu.

(TANDATANGAN PENYELIA)

Cop Rasmi:
MOHD FAIRUZ DIMIN
PENSYARAH
JABATAN PROSES PEMBUATAN
FAKULTI KEJURUTERAAN PEMBUATAN
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Tarikh: 20/5/08

* Jika laporan PSM ini SULIT atau TERHAD, sila lampirkan surat daripada pihak organisasi berkenaan dengan menyatakan sekali sebab dan tempoh tesis ini perlu dikelaskan sebagai SULIT atau TERHAD.

UNIVERSITI TEKNIKAL MALAYSIA MELAKA
Karung Berkunci 1200, Ayer Keroh, 75450 Melaka
Tel : 06-233 2421, Faks : 06 233 2414
Email : fkp@kutkm.edu.my

FAKULTI KEJURUTERAAN PEMBUATAN

Rujukan Kami (Our Ref) :
Rujukan Tuan (Your Ref):

08 Mei 2008

Pustakawan
Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM)
Taman Tasik Utama, Hang Tuah Jaya,
Ayer Keroh, 75450, Melaka

Saudara,

PENGKELASAN LAPORAN PSM SEBAGAI SULIT/TERHAD
- LAPORAN PSM SARJANA MUDA KEJURUTERAAN PEMBUATAN (Design Manufacturing): Izuwati Bt Abd Razak
TAJUK: Development Of Flood Early Warning System at Taman Merdeka, Batu Berendam, Melaka.

Sukacita dimaklumkan bahawa tesis yang tersebut di atas bertajuk " **Development Of Flood Early Warning System at Taman Merdeka, Batu Berendam, Melaka.** " mohon dikelaskan sebagai terhad untuk tempoh lima (5) tahun dari tarikh surat ini memandangkan ia mempunyai nilai dan potensi untuk dikomersialkan di masa hadapan.

Sekian dimaklumkan. Terima kasih.

"BERKHIDMAT UNTUK NEGARA KERANA ALLAH"

Yang benar,

.....

NAMA PENUH PENYELIA PSM
Pensyarah,
Fakulti Kejuruteraan Pembuatan

APPROVAL

This PSM submitted to the senate of UTeM and has been as partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering (Design Manufacturing). The members of the supervisory committee are as follow:

……

(Main Supervisor)

(Official Stamp & Date)

DECLARATION

I hereby, declared this thesis entitled **Development of Flood Early Warning System at Taman Merdeka Batu Berendam, Melaka** is the results of my own research
except as cited in references.

Signature : …….
Author's Name : IZUWATI BI NTI ABD RAZAK
Date : 25 March. 2008

DEDICATION

For my beloved mother and father and my lovely husband

and

for all my fellow friends.

ACKNOWLEDGEMENTS

Alhamdulillah, all the praise is to God, Allah S.W.T. because of his permission, I can finish my Projek Sarjana Muda 2 (PSM 2). I got a lot of new knowledge and experience about this final project.

In this opportunity, I would like to express my highest gratitude especially to my supervisor, Encik Fairuz bin Dimin because gave me a lot of support and advice to finished my PSM 1 and 2 and also for the time as he had gave me so much information and guidance to this final project. Not to forget, I also want to say thanks to all UTeM staff and member that have worked hard in order to enable me, teach and show me about this project.

Last but not least, I would like to say thank you to UTeM because give me a change to get an experience and learn more about what I had learn to related my study in PSM 2. And to my family and all my fellow friends who have been helping me and giving tips on how I can work through this PSM 2 and for supporting me in all time through.

Thank you..

ABSTRACT

Flood is the most significant natural disaster in Malaysia from perspective of population affected, frequency, area extent and disruption to socio-economic activities. Apart from implementing structural flood mitigation programmers, DID also carries out non structural flood mitigation measures which include developing and operating the flood warning system in Malaysia. This report outlines the design and development of water level sensor used in the flood warning system. The circuit designed and development and application will be discussed in detail. The report will also describe the current available warning systems in the market.

ABSTRAK

Banjir merupakan bencana alam yang paling tinggi di Malaysia dari perspektif mangsa banjir, kekerapan, had kawasan dan gangguan kepada aktiviti-aktiviti sosio ekonomi. Selain daripada melaksanakan struktur tebatan banjir, JPS juga melaksanakan langkah-langkah tebatan banjir yang tidak berstruktur termasuklah memajukan dan menjalankan sistem-sistem amaran banjir di Malaysia. Kajian ini menerangkan tentang rekabentuk dan pembangunan amaran paras air dalam sistam amaran awal banjir. Rekabentuk dan pembangunan litar serta aplikasi sistem amaran banjir ini akan dibincangkan dengan lebih lanjut. Laporan ini juga akan menerangkan tentang sistem amaran yang sedia ada di pasaran.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS, SYMBOLS, SPECIALIZED NOMENCLATURE

MMD	-	Malaysia Meteorological Department
DID	-	Department of Irrigation and Drainage
BKN	-	National Security Division
SMS	-	Short Messages System
IRBM	-	Integrated River Basin Management
VHF	-	Very high frequency
SCADA	-	Supervisory Control And Data Acquisition

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF THE PROBLEM

1.1.1 Flood in Malaysia and research's place

Malaysia experiences a major flood event every year due to the adverse effects of two monsoon seasons a year. Floods have thus become the most significant natural disaster in the country in terms of the population affected, frequency, aerial extent, financial cost and the disruption to socio-economic activities. Many previous flood control measures have had different levels of success but have generally had little effect in reducing the problem. However, it is now understood that it is neither possible nor desirable to control floods completely.

This project discusses the framework of a proposed flood early warning system for the Durian Tunggal river basin that is cause flooding at Taman Merdeka, Batu Berendam when heavy rainfall and serious flooding example during last year in December 2006.

Flood forecasting and warning system constitutes an effective and economical means to reduce loss of lives, trauma of disaster and property damage. Since 1971, DID have been designated with the task of providing flood forecasting and warning services to the public. Available records showed that flood warning services were first provided for the

flood event of 1925 when floods occurred along the Kinta River in Perak and Klang River in Selangor and Bernam River in Selangor/Perak boundary. It is also known that the flood warning system based on river levels of the Kelantan River at Bradley Steps, Kuala Krai has been used to warn the people of Kota Bharu downstream since early 1900's. The police were reading and transmitting the rainfall and water level information via VHF sets to the Flood Warning and Relief Committee in Kota Bharu.

After the floods of 1971, the flood warning systems of major rivers subjected to severe flooding were reviewed. The major deficiencies identified were inadequacy of rainfall and water level station networks to provide timely and reliable real-time data. Based on this review and its recommendations, telemetric stations, both rainfall and water level, were established at strategic locations to enable the transmission of real-time data to flood operation centers. The review also highlighted the need for more accurate flood forecasting techniques to replace the empirical river stage correlation technique, and recommended the use of mathematical models, which would take into account the rainfall and catchments characteristics as well as river system configurations.

For the periods from 1971 to 2000 (30 years) and 2001 to 2005 (5 years), a total of RM 1.642 billion and RM 1.790 billion respectively had been spent on structural flood mitigation measures. However, under the Ninth Malaysia Plan (2006-2010), the allocation for structural flood control works has escalated to RM 3.834 billion. It is estimated that the cost of future river improvement and flood mitigation works for the next 15 years will amount to more than RM 17 billion.

Figure 1.1: The area normally affected by flood

To date, DID has established about 335 telemetric rain-gauges and 208 telemetric water level stations in the vicinity of 40 river basins for real time flood monitoring. At these stations, three critical flood levels are designated, namely Alert, Warning and Danger. In addition, 400 river observation points are provided with manual flood gauges and more than 250 siren stations has been established. At this moment, the real time information of rainfall and river water level is published on-line via the *Info-Banjir* webpage and could be directly accessed by government officials and the public. Moreover, *short messages system* (SMS) is also provided to give an alert to relevant officers in-charge of government agencies such as police, army, Malaysia Meteorological Department

(MMD), JPA3, DID, and National Security Division (BKN) at Prime Minister Department.

But at research's area, Taman Merdeka Batu Berendam, it still has a seriously flooding especially flash flood example during last year in December 2006. A part people respectively cannot manage to property rescue because the water increase too fast. It is because Melaka River which situated near the Taman Merdeka had overflowed till to the residential area and drain water also had overflowed caused floods become to worse. If flash flood occurred, inhabitants could not expect water will rise up quickly. This is because water from the drain could not flow nicely into the river. These resulted flash floods deteriorate.

Figure 1.2: Melaka River location near the Taman Merdeka

Flash floods occur when the rate of infiltration is low and heavy rains occur over a short period of time. They are upstream floods with very little lag time (lag times may be only

a few hours). Because they come with little warning, flash floods are the most dangerous to human lives.

Figure 1.3: Location of Taman Merdeka, Batu Berendam, Melaka.

From the figure above, it showed that Melaka River about 1km from main road of Taman Merdeka. Melaka River is flow from the Durian Tunggal Dam and 14ft – 22ft only from the sea level. This dam is constructed to retain flood water in order to protect areas downstream of the dam. Construction of storage dam solely for flood control purposes is generally economically not viable and frequently utilised for other purposes such as water supply. In addition, dams constructed for hydro-electric purposes also have a portion of their capacity allocated for flood detention.

Flooding along rivers is also a natural event. Some floods occur. Water fills river basins too quickly, and the river will overflow to its banks. Often the land around a river will be covered by water for miles around.

1.2 STATEMENT OF THE PROBLEM

1.2.1 Flood Statistics and problems

Since 1971, the Department of Irrigation and Drainage (DID) has been designated with the task to implement structural flood mitigation works. Flood mitigation plans have been developed for 17 major river basins and 27 towns. Based on these plans, various structural and non-structural measures have been proposed and implemented in stages. Such measures include improving river channel sections, building of flood bunds, ring bunds, by-pass flood ways, use of mining ponds for flood attenuation and construction of flood retention dams to regulate flood flows and minimize flood occurrence.

Floods cannot be totally prevented through structural measures due to technical and economic reasons. Consequently flood forecasting and warning service constitutes an effective and economical means to reduce live loss and property damage. Since 1971, DID have been designated with the task to provide flood forecasting and warning services such as:

1.2.1.1 Wood marker

This method only effected to the people who saw this wood marker. If heavy rain on the night, people could not find out actual situation on that time. Wood marker is a manual method from government to know the rise level water at the

area which always flooding and is only act as water measurement only by visual check

1.2.1.2 Monsoon rain

Near the resident's house Taman Merdeka, government was built up a monsoon rain along the road in Taman Merdeka near the stream. But this method did not effect to the flooding from happen.

Figure 1.4: Monsoon rain

1.2.1.3 Stick gauge

Stick gauge is a one of the success method from Department of Irrigation and Drainage. Sometimes when flood flow with rapid, this stick gauge was flow. It can be the big problem to the people.