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

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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)

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March 2008
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sesi pengajian: Semester 2 2007/2008

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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.

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Date : 25 March. 2008
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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.
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<td>MMD</td>
<td>Malaysia Meteorological Department</td>
</tr>
<tr>
<td>DID</td>
<td>Department of Irrigation and Drainage</td>
</tr>
<tr>
<td>BKN</td>
<td>National Security Division</td>
</tr>
<tr>
<td>SMS</td>
<td>Short Messages System</td>
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<tr>
<td>IRBM</td>
<td>Integrated River Basin Management</td>
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<td>VHF</td>
<td>Very high frequency</td>
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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.
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.](image)

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.

![Monsoon rain](image1.png)

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.