DAM CONTROL USING PROGRAMMABLE LOGIC CONTROLLER

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This report is submitted in partial fulfillment of the requirements for the award of
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"I hereby declare that this report is the result of my own work except for quotes as cited in the references."

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Sesi Pengajian : 2008/2009

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To my beloved family and fellowship friend

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ABSTRACT

Dam system provides a very vital role in the economy of a country by providing numerous benefits such as water supply, hydropower, irrigation and flood control. Water supply is very important in our living daily live. Water was being used in our daily routine and also for the agricultural activity. Basically the project is about to design and develop an intelligent system control for the Dam based on MADA (Muda Agricultural Development Authority) irrigation system. The system uses a new method in order to determine and control water level of the Dam in order to avoid flood that causes by the overload water supply from the Dam itself. The system involves the usage of software and hardware combination to make it in a real system. PLC (Programmable Logic Controller) will be used as the core for the system to control the system and communicate with the others devices. Prototype of an actual Dam control based on MADA (Muda Agricultural Development Authority) irrigation system will be developed and controlled using PLC to illustrate the overall system.

ABSTRAK

Sistem empangan memainkan peranan yang penting dalam perkembangan ekonomi sesebuah negara dengan menyumbang pelbagai kebaikkan seperti janakuasa tenaga elektrik,bekalan air, pengairan dan kawalan banjir. Air merupakan salah satu sumber utama yang digunakan dalam kehidupan seharian kita. Penggunaan air tidak terhad kepada kegunaan seharian sahaja malah air juga digunakan dalam aktiviti pertanian. Secara amnya projek ini mengkhususkan kepada merekabentuk serta menghasilkan sistem kawalan empangan yang pintar berasaskan kepada pengairan Lembaga Kemajuan Pertanian Muda (MADA). Sistem ini menggunakan kaedah baru bagi menentukan kawalan paras air di dalam empangan bagi mengelak daripada banjir berlaku yang disebabkan oleh sistem kawalan yang tidak efektif di empangan tersebut. Sistem kawalan ini akan menggunakan kombinasi antara perisian dan perkakasan tertentu bagi mewujudkan keadaan sebenar yang akan berlaku. Pengawal Logik Aturcara (PLC) akan digunakan didalam sistem empangan ini di mana ia merupakan nadi yang akan berkomunikasi dengan peralatan lain di dalam sistem kawalan empangan ini. Prototaip sistem kawalan empangan ini akan dihasilkan berdasarkan sistem pengairan Lembaga Kemajuan Pertanian Muda (MADA) dan dikawal oleh Pengawal Logic Aturcara (PLC) untuk menggambarkan keseluruhan sistem kawalan ini.

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LIST OF ABBREVIATION

MADA	-	Muda Agricultural Development Authority
PSM	-	Projek Sarjana Muda
I/O	-	Input and Output
PLC	-	Programmable Logic Control
GUI	-	Graphic User Interface

CHAPTER 1

INTRODUCTION

1.1 Introduction

Water supply is one of the important elements in our daily lives. Water is used in our everyday routine and it plays and important part in agricultural activities. Basically this project is about designing and developing an intelligent system control for the Dam based on MADA (Muda Agricultural Development Authority) irrigation system. The system uses a new method to determine and control water levels of the Dam in order to avoid flood that causes by the overload water supply from the Dam itself. The system involves the usage of software and hardware combination to make it in a real system. PLC (Programmable Logic Controller) will be used to control the system and communicate with the others devices. Prototype of and actual Dam control based on MADA (Muda Agricultural Development Authority) irrigation system will be developed and controlled using PLC.

1.2 Project Objective

The main objectives of this project are:

i. To build a prototype of a Dam system based on Pedu and Muda Dam.
ii. To control the water flow from the dam to the irrigation systems based on the PLC concept
iii. To design an automatic control water level based on demand needed.

1.3 Problem Statement

Currently Dam control uses human expertise to measure and determine how much water should be release to supply the river. This situation sometimes leads to the human error and it can causes flood when the water is supplied too much into the river nearby from the Dam. In order to overcome this problem this project is been developed whereas machine will decide how much water should be released through the river and the Dam can avoid flood and also can handle situation such as wet season, dry season and average season through of the year.

1.4 Scope of Work

Scope for this project is concentrate to create a prototype of a dam based on MADA (Muda Agricultural Development Authority) irrigation system. Besides that the dam will be used Programmable Logic Controller (PLC) in order to control the overall system for the irrigation system that been develop.

1.5 Project Methodology

1.5.1 Flow Chart

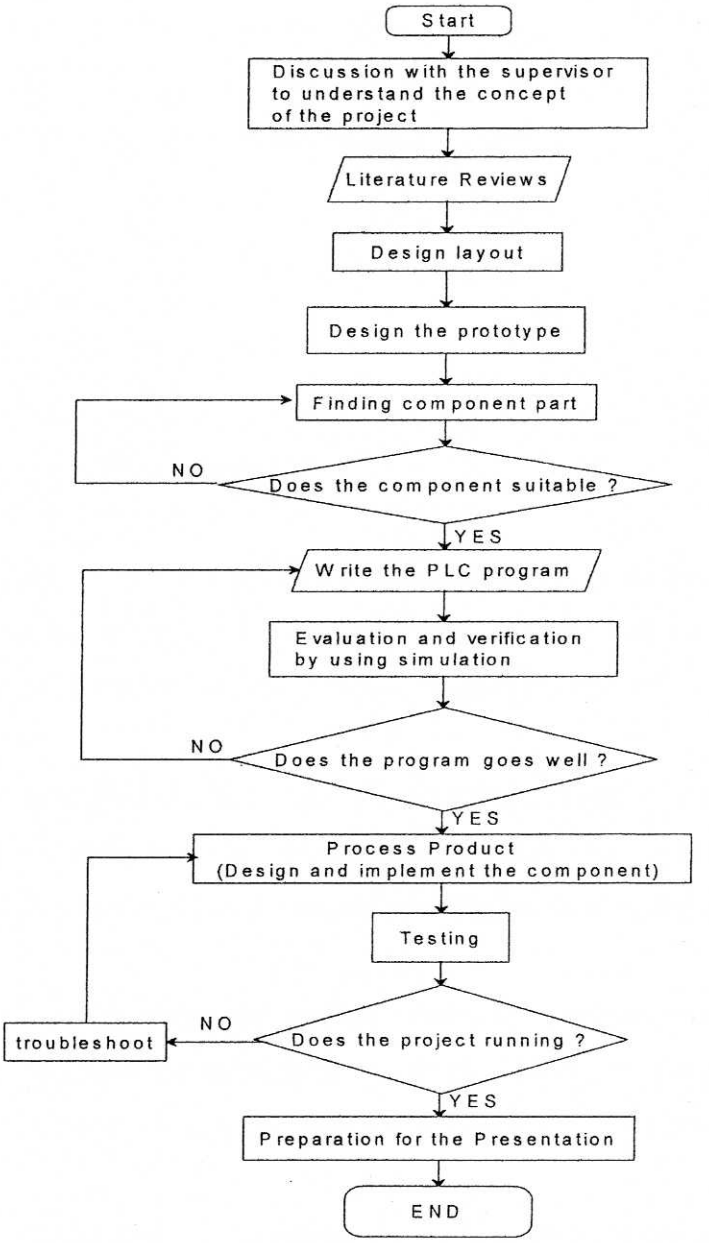

Figure 1.1 Flowchart for the methodology

1.6 Expected Output

At the end of this project the prototype of the Dam can be controlled by the Programmable Logic Controller (PLC).All the water pump for the Dam can produce correct output based on demand water needed and can be controlled automatically depending on the sensor input that being used at each level at the Dam. Moreover, the hardware also can show the output as the simulation result.

1.7 Thesis Outline

This thesis represent by five chapters. The following is the outline for this project in order to understand the whole report.

The first chapters of the thesis will explain briefly about the project background, objective of the project which needs to be achieved, problem statement of the project, scope of works regarding the project and methodology of the project.

Chapter 2 describes the literature review involved gather information of the project in order to complete the whole project. This study is focused on the Programmable Logic Control (PLC) to control opening and closing the valve.

Chapter 3 explains about the project methodology where how the project is implemented. The approach for meeting the goals and objectives and project life cycle phase is described in this chapter, along with the tasks needed to complete it.

Chapter 4 will be describes about the developing of the hardware design for the dam prototype based on MADA irrigation system and all the equipment being used for the hardware design.

Chapter 5 describes the project finding which includes the simulation design. This chapter also discusses and analyze about the project and operation of the software such as the ladder diagram design. Furthermore, the output from combination of software and hardware also included.

Chapter 6 will be the conclusion and suggestion to the project in future undertakings.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In order to execute this project, literature review must be done for the whole system and decide the best inputs, outputs and devices. From literature review, there will be an analysis concerning the advantage and disadvantage for each phase in this project. Equipment and part manuals include information such as dimension, operation and specification.

2.2 A brief on MADA organization history

In centuries, rice has been planted in the plains of West Kedah and Perlis. The changes which occurred during the rotation of the Third Planet, the direction of the wind, plants, habits of several animals and others were observed with total interest by the inhabitants of the countryside. All the changes which occurred were divided into twelve short seasons called in Bahasa Malaysia "bulan piama". The "bulan piama" became a guide to those who cultivated rice fields and also other daily activities. Cultivation of rice fields was done with traditional equipment. Rice was planted just