IRRIGATION CONTROL SYSTEM USING PLC

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This report is submitted in partial fulfillment of the requirements for the award for the Bachelor of Electronic Engineering (Industrial Electronics) With Honours.

Faculty of Electronic and Computer Engineering
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FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

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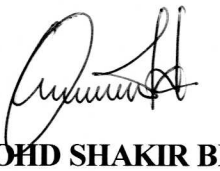
Signature : 

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ABSTRACT

The purposes of this project are to develop an effective irrigation system for paddy field by using Programmable Logic Control (PLC) especially at KEDAH. This project is allowing the water from the main canal to the secondary canal just press the button to open the valve. Consequently, it can save the energy of human. Besides that, the volumes of water that irrigate to the paddy filed are accurate following the specifications. Before that, the irrigation system still control manually which is the human will open and close the valves to flow the water when get the order from headquarter of MADA. Therefore it wastes the time and makes the paddy damage because late to get the enough of water. Besides that, the volumes of the water probability are not accurate effect from the careless of the human itself. The operators are not able to control the water at every block of paddy field that has more than one of the valves. The main objectives this project is to change the manual system to the automatic system to control the volumes of the water based on the specifications from headquarters of MADA to irrigate from main canal to the secondary canal and next to the paddy field. The programmed of the PLC implemented using CX-Programmer as the programming tool has to be develop. The PLC system is used to ON or OFF the motor to control the gate instead of steering the valves. Besides that, the irrigation system can function in two ways either automatically based on the sensor detection or manually depend on switch ON or OFF. The prototype is design to describe the real paddy field and to observe that the PLC is function properly.

ABSTRAK

Projek ini direka bertujuan membina satu sistem pengairan sawah padi yang dikawal dengan menggunakan Programmable Logic Control (PLC) terutamanya di KEDAH. Projek ini membolehkan air dari main canal mengalir ke secondary canal hanya dengan menekan butang untuk membuka dan menutup valve. Ini secara tidak langsung akan menjimatkan masa dan juga tenaga manusia. Selain itu, isipadu air yang diperlukan juga dapat disalurkan dengan lebih tepat mengikut spesifikasi yang ditentukan oleh pihak MADA. Sebelum ini, sistem pengairan di lakukan dengan secara manual dimana tenaga manusia diperlukan bagi membuka dan menutup valve untuk membenarkan air mengalir apabila mendapat arahan daripada ibu pejabat Mada. Ini secara tidak langsung membuang masa dan mengakibatkan padi akan rosak akibat kekurangan air. Selain itu juga, isipadu air yang alirkan oleh operator kebarangkalian tidak tepat akibat daripada kecuaian operator itu sendiri. Operator juga tidak mampu untuk mengawal pengaliran air di semua blok sawah padi dimana terdapat banyak valve yang perlu dikawal. Objektif utama projek ini adalah menukar sistem manual kepada sistem automatic bagi megawal isipadu air yang akan dialirkan dari main canal ke secondary canal dan seterusnya ke sawah padi adalah mengikut spesifikasi yg telah ditentukan oleh pihak MADA. Seterusnya, projek ini juga mampu menjimatkan masa dan juga tenaga manusia kerana terdapat lebih dari satu valve yang terdapat setiap blok sawah padi yang hendak dikawal. Aturcara bagi PLC ditulis berdasarkan turutan air itu mengalir dan seterusnya simulasi dijalankan dengan menggunakan CX-Programmer dan PLC Training Kit bagi mendapatkan output yang dikehendaki. Prototaip direka bagi menggambarkan keadaan sebenar sawah padi dan melihat sistem PLC tersebut beroperasi dengan betul.

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PLC	- Programmable Logic Control
MADA	- Muda Agricultures Development and Authourity
RTU	- Remote Terminals Unit
DID	- Department of Irrigation and Drainage

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CHAPTER 1

INTRODUCTION

1.1 Introduction of the Project

This project is designed to improve the irrigation control system for paddy field usage in KEDAH. Through this project, the productivity of paddy plant can be increased to optimum level. Nowadays, irrigation control systems in Malaysia are based on the human control. Headquarters MADA will decide how much of the volume of water for one time to irrigate the water to the paddy field. Furthermore, the operator of MADA need to open the valve to irrigate the water based on the information from Headquarters MADA. After that, the operator of MADA will measure manually the level of water at the main canal and secondary canal. Next, the operator will open the valve at the secondary canal to let flow the water to the paddy field. The flow of irrigation system for paddy field is shown in Figure 1.1

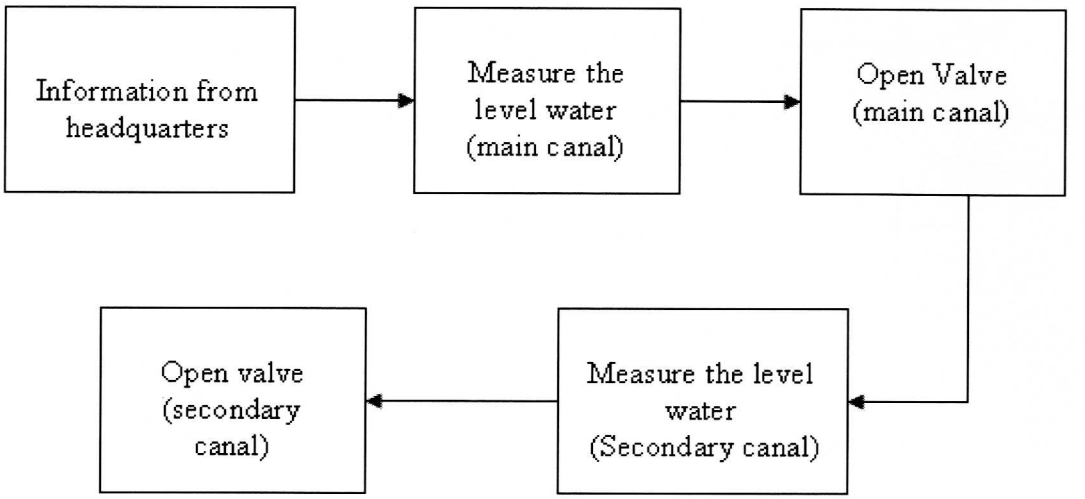

Figure 1.1 Block diagram irrigation system for paddy field

This project concerns of designing an intelligence control system to improve irrigation control by using Programming Logic Control (PLC) concept, thus to replace manual control to automatic control. Having more than one valve at one block of paddy field so by using the PLC, all the valves can be controlled effectively. The operator just need to press the button to control the valves based on the volume of water needed and the water level sensor will detect the water and measure the volume of water then valve will be open to let flow the water to the secondary canal and next to the paddy field.

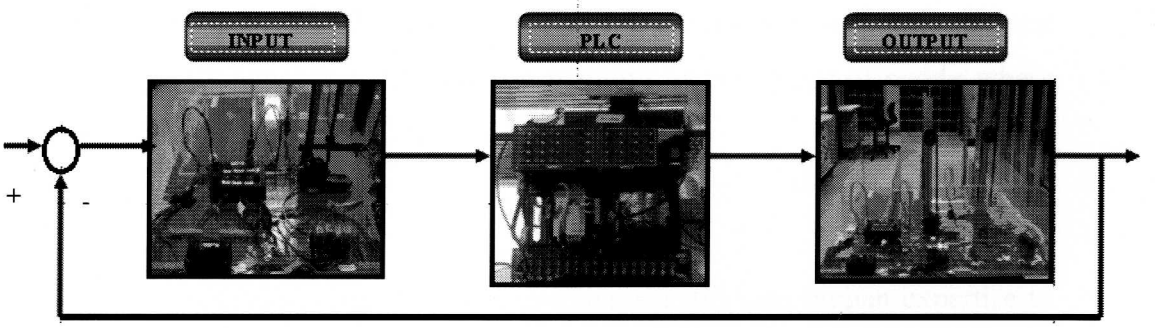

Figure 1.2 Block diagram of Irrigation control system using PLC

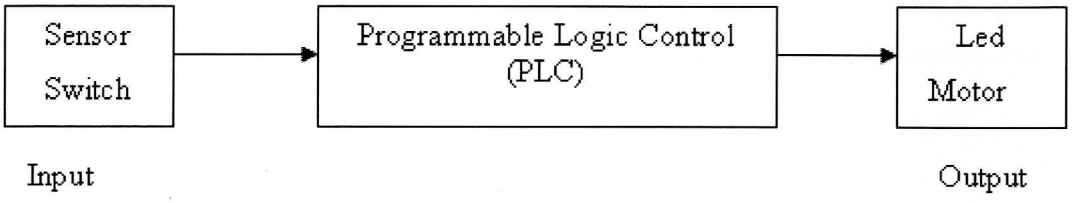

Figure1.3 Block Diagram of PLC

1.2 Project Objectives

The objectives of this project are:

i) To change the manual system to automatic system to control the flow of water to irrigate the water from main canal to secondary canal.

ii) To provide the volume of water are following the specification that determine by headquarters of MADA.

iii) To provide the effectively and systematic irrigation system for paddy field.

iv) To save human energy because more than one valve have to control.

1.3 Problem Statement

This project is purposely designed to improve irrigation system for paddy field in Malaysia, present in KEDAH area. The effectively irrigation will increase the production of paddy hence income with the planting of two crops of paddy where only a single had been planted before.

However, the irrigation control system in Malaysia still uses human expertise to control the valve to irrigate the water to the paddy field. MADA operator will open the valve manually based on the information from headquarters. Sometimes, the volume of the water are not accurate because the careless of human and less energy of human to control the valve and pressure of the water. Overflow and less of the