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"AGRICULTURE AUTOMATION USING PLC"

Niteen Naik[1], Rohit Shinde[2],Ganesh patil[3],Navnath margale[4]

Department of Electronics and Telecommunication

Hon. Annasaheb Dange College Of Engineering And Technology, Ashta

Sangli, Maharashtra, India.

Abstract - *In India, the market is mainly based on agriculture and the climatic environment is isotropic and is not able to make full use of agricultural assets. The main cause is the lack of rains in many parts of India and scarcity of land water. Manual control irrigation techniques lead to many problems like additional water consumption, delayed water supply, additional or insufficient fertilizer consumption, bad quality of fertilizer preparation etc. Agriculture using automation techniques like Automatic water dripping system, Automatic chemical spray system and Automatic chemical preparation system can do agriculture efficiently and lead to increase in crop production and quality.*

Key Words - PLC, Solenoid valve, pump, level switch, Relay pad, etc.

1. INTRODUCTION

The development of precision farming technologies in the 1990s opened up a new way of thinking about mechanization for crop care. It introduced a number of concepts, which although not new, brought about a shift in the thinking and management of variability. With yield mapping and VRT (Variable Rate Treatments) the spatial scale of variability could be practically assessed and treated for the first time since mechanization was first used. Pre precision farming, managers assumed that spatial and temporal variability existed but did not have the ability or tools to deal with it. Since then we have seen the scale of management and hence treatments reduce from farm-scale, down to field-scale, through to sub-field scale with varying expectations and benefits. This technology trend has continued to the point where we now have many smart controllers that allow the scale of treatment to be reduced further, down to the plant and even leaf scale. In doing so, these new methods of introducing smart controllers and automation have enabled the development of new concepts of practical crop management that were not feasible before. We now have levels of automation where we can consider the methods people used before large-scale machinery was introduced and see if these same methods can be utilized today using small smart machines.

1.1. Need of Project

In India, the market is mainly based on agriculture and the climatic environment is isotropic and is not able to make full use of agricultural assets. The main cause is the lack of rains in many part of India and scarcity of land water. The demand for new water saving techniques in irrigation is growing immediately right now. At the present period, the farmers have been using irrigation technique in India through the manual control in which the farmers irrigate the land at the normal interval. This process sometimes consumes additional water or sometimes the water reaches delayed due to which the crops get dehydrated. The effectiveness of the irrigation is determined by a number of different factors, including the type of irrigation system and the conditions at its instance of application. Irrigation is the artificial application of water to the soil usually for supporting in harvesting the crops. In crop production, it is mainly used in desiccated area and in periods of rain water shortfalls.

2. LITERATURE SURVEY

We have gone through past researched work on these types of projects; also we have searched IEEE papers related to our project these are as follows[1]. Comparison in different method.

Agriculture is the backbone of Indian economy. Because without agriculture living is impossible since agriculture produces the main source food for us. But in today's situation the availability of a labor of caring out agriculture activities is rare. The automation in all kind of industries leads to industrial growth. Here agriculture process is automated. In this proposed system all the machines to work on its own with the help of inputs received from the sensors which are monitoring the agriculture land round the clock and a single person is enough to monitor weather everything going normal. The entire process is controlled and monitored by programmable logic controller[1]. The Agriculture process involve seeding, ploughing, irrigation, planting, fertilizing weeding, harvesting. Here three processes can be implemented. Main

objective is even a professional can work in the agricultural field. These manual cultivation for one acre of a land requires money of around Rs. 15000 – 17000 but due to this technique we reduces the cost and is nearly Rs.9000-10000 only and also the yield is high when compared to normal one.

3.CIRCUIT DIAGRAM

3.1 PLC Control Panel

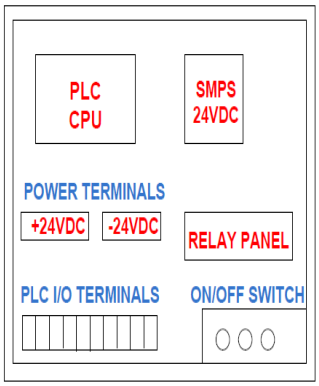

Fig-1: PLC control panel

3.2 Digital Input Connection

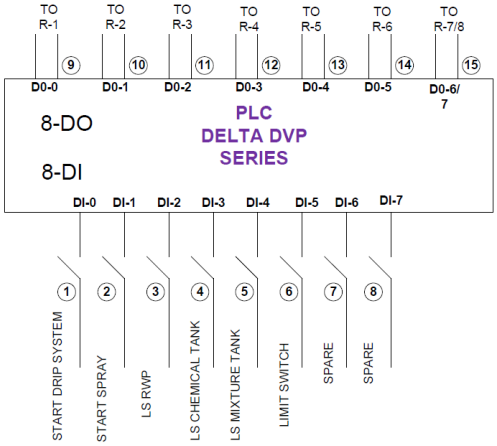

Fig-2: Digital Input Connection

4. EQUIPMENT

4.1 PLC controller

Fig-3: PLC controller

Programmable logic controller (PLC) is a control system using electronic operations. PLCs are designed for multiple arrangements of digital and analog inputs and outputs. Programmable logic controller (PLC) is a

control system using electronic operations. It's easy storing procedures, handy extending principles, functions of sequential/position control, timed counting and input/output control are widely applied to the field of industrial automation's.

Table -1: **Function Specifications**

Items	Specifications	Remarks
Control Method	Stored program, cyclic scan system	
I/O Processing Method	Batch processing (when END instruction is executed)	I/O refresh instruction is available
Execution Speed	Basic commands (several us)	Application instructions (10 ~ hundreds us)
Program Language	Instruction, Ladder Logic, SFC	Including Step instructions

4.2 Relay board

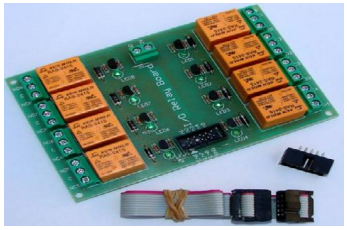

Fig-4: Relay board

A simple electromagnetic relay consists of a coil of wire wrapped around a soft iron core, an iron yoke which provide a low reluctance path of magnetic flux, a movable iron armature, and one or more set of contact. The circuit track on the printed circuit board. When an electric current is passed through the coil is generated a magnetic field that activate in armature.

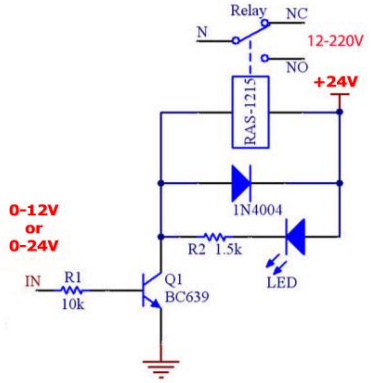

Fig-5: Relay Module

Fig-6: Connect Power 24v To Board

4.3 Solenoid valve

Fig-7: Solenoid valve

A solenoid valve is an electromechanically operated valve. The valve is controlled by an electric current through a solenoid : in the case of two port valve the flow is switched on or off ; in the case of three port valve, the outflow is switched between the two outlet port. Multiple solenoid valve can be placed together on a manifold. Solenoid valve are the most frequently used controlled element in fluidics.

4.4 Level Swich Magnetic Flot Type

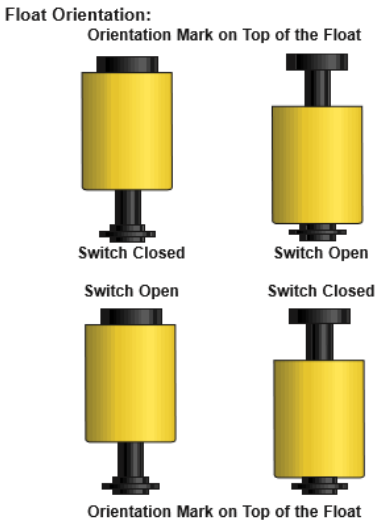

Fig-8: Level Swich Magnetic Flot Type

We are offering a comprehensive range of Float Switch that can be added as an optional extra to the pump to control the water level in a tank and dam by switching the pump on and off electronically on low and high water level positions. It can be connected to the control box from where switching of the pump is controlled.

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5. PROCESS LAYOUT

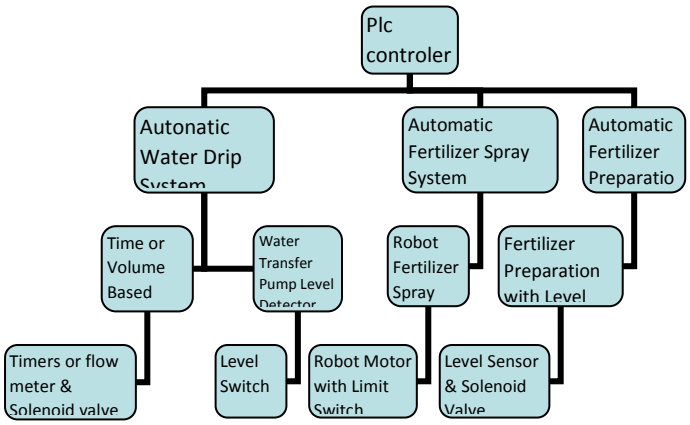

Chart -1: **Process Layout**

5.1 Automatic Water Drip System

The pump carries water from the well the water flows through the pipe which divides the field in two parts and is supplied to the field.one valve is used to control the water supply on one side of the field and another valve on the other side of the field the operation of the valves base on time or volume controlled by using PLC the pump carries water from the well the water flows through the pipe which divides the field in two parts and is supplied to the field.one valve is used to control the water supply on one side of the field and another valve on the other side of the field the operation of the valves base on time or volume controlled by using PLC.

5.2 Automatic Fertilizer Spray System

To make the work more time efficient, accurate, uniform and less costly and for substitution for manual human labor we have used the ROBOT the robot drives to the end and back on the rails in the rows of the crop field it moves automatically to the next row after completed spraying in the first row for continuous operation.

5.3 Automatic Fertilizer Preparation With Level Detection

Another pipe carries water from the well with the help of pump; the outlet of this pipe is given to mixture tank. Chemical tank supplies chemical to this mixture tank when the level of produced fertilizer becomes low immediately new fertilizer is produce for continuous operation.

6.CONCLUSION

The purpose of this project is to perform a proof of concept study on Agriculture automation using PLC.

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