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FARMING AUTOMATION USING PLC

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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.*

Keywords: *PLC, Solenoid valve, pump, level switch, Relay pad, etc.*

I 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.

II PROPOSED SYSTEM

As we select a particular crop in the SCADA, all the parameters are loaded on the PLC. Eg if we select capsicum, Days of crop = 90, Irrigation Interval = 24hrs, required temperature = below 40'C gets loaded on PLC. PLC will send commands all the modules. Initially, Water is drawn from the source (e.g. Well, Dam, Reservoir) by motor and is stored in the water tank. To fill the tank with sufficient amount of water, a level sensor is provided. Level sensor senses the water level in the tank. If the level in the tank is below a Mid level, level sensor signals the PLC and motor is turned on. When the water level is reaches high level, motor is automatically turned off. The water in the tank is always maintained at the High level. The amount of water given to the field is determined my theMid level which is adjustable.

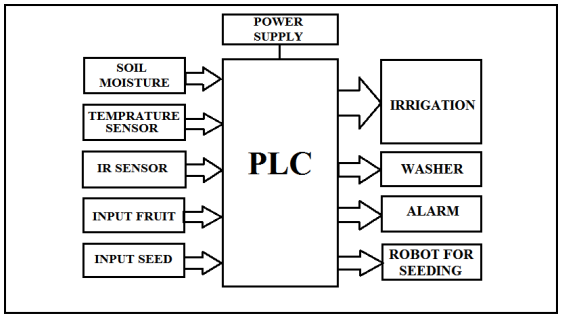

Fig. processing system

- **PLC (programable logic controller)**

It is a digital computer used for the automation of various electro-mechanical processes in industries. These controllers are specially designed to survive in harsh situations and shielded from heat, cold, dust, and moisture etc. PLC consists of a microprocessor which is programmed using the computer language.The program is written on a computer and is downloaded to the PLC via cable. These loaded programs are stored in non – volatile memory of the PLC

Fig.PLC Controller

Humidity Sensor

Humidity measurement determines the amount of water vapor present in a gas that can be a mixture, such as air, or a pure gas, such as nitrogen or argon. Humidity sensors relying on this principle consists of a hygroscopic dielectric material sandwiched between a pair of electrodes forming a small capacitor. Most capacitive sensors use a plastic or polymer as the dielectric material, with a typical dielectric constant ranging from 2 to 15. In absence of moisture, the dielectric constant of the hygroscopic dielectric material and the sensor geometry determine the value of capacitance.

Soil moisture sensor

In the soil moisture sensor we check conductivity of the soil for this purpose we insert two probes in the field. If the field is wet then conductivity is more and resistance is less. If the field is dry then conductivity is less and resistance is high. To measure the conductivity we use one NPN transistor circuit. Emitter of the NPN transistor is connected to the input of ADC and collector of the transistor is connected to the positive supply 5volt. Base is biased through positive voltage through 100 ohm resistor in series with the conductivity probe. Emitter voltage is also set by the one variable resistor 10 k. One point of the 10 k ohm resistor is connected to the positive point and third point of the 10 k ohm resistor is grounded. Centre point of the 10 k ohm resistor is connected to the emitter of the transistor and go through the input of ADC IN2. As the base voltage is change according the resistance of the field, ADC input is also change.

4.4 Soil Moisture Sensor:

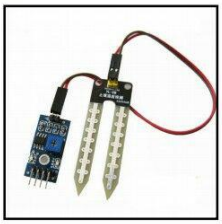

Fig: 4.4.1 Soil Moisture Sensor

Fig.soil moisture sensor

Relay

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.

- **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.

ADVANTAGES

1. Automated farming with less human efforts.

2. Multiple types of farming in single area including protection of farm.

CONCLUSION

1. The system increases the crop productivity and reduces farmer's workload.
2. There is efficient usage of water.
3. The time consumed is less there by giving more throughputs.

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