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PLC Based Smart Irrigation System

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Abstract: ***Agriculture has been the most essential practice from absolute starting point of the human progress. Customary strategies that are utilized for water system, for example, overhead sprinkler and surge compose, aren't that much effective. They bring about a considerable measure of wastage of water and can likewise advance infection, for example, parasite arrangement due to over dampness in the dirt. Computerized water system framework is fundamental for protection of the water and by implication suitability of the ranch since it is an essential product. Around 85% of aggregate accessible water assets over the world are exclusively utilized for the water system reason. In up and coming years this request is probably going to expand on account of expanding populace. In automation system water availability to crop is monitored through sensors and as per need watering is done through the controlled irrigation. The relatively endless capacities of storage and preparing, the fast versatility makes distributed computing an alluring answer for the extensive sum of information produced. The main objective of this project is to reduce wastage of water by controlling water supply.***

Keywords: ***Open PLC, SOAP box, irrigation system, LM35***

I. INTRODUCTION

Cultivating is the purpose behind the human species as it is the rule wellspring of sustenance and it accepts basic part in the improvement of country's economy. It is like manner gives huge plenteous work opportunities to the all-inclusive community. The farmers are so far using ordinary methodologies for agribusiness, which achieves low yielding of harvests and natural items. So the trim yield can be upgraded by using customized contraption. There is need to execute current science and advancement in the agribusiness for extending the yield. By using IoT, we can expect the extension in progress with insignificant exertion by watching the capability of the earth, temperature and stickiness checking, rain fall watching, fertilizers viability, checking limit point of confinement of water tanks and besides burglary area in cultivating regions. The blend of standard methodologies with latest advances as Internet of Things and Wireless Sensor Networks can provoke agrarian modernization. The Wireless Sensor Network which accumulates the data from different sorts of sensors and send it to the essential server using remote tradition. The reap yield is declining an immediate aftereffect of irregular rainstorm rainfalls, water lack and uncalled for water utilization. India's huge wellspring of pay is from agribusiness region and 70% of farmers and general people depend upon the agriculture. In India most of the water framework structures are worked physically. Water framework essential depends upon soil properties like moistness and temperature and the kind of yield which is produced in the earth. Advances have been made for compelling usage of water for water framework reason

In today's world many of the industries are getting automated using PLC and thus it has become a main part of the industries. Continues monitoring and controlling of industries are required due to the large amount of production. PLC is a device which is connected with equipment in the industry and it will transfers the data to PC via long cables and a person seating in the control room on PC can monitor and control the industry. There are five important languages which are used for the programming of the PLC. Out of these five languages, ladder diagram is the most widely used language and is simple as compared to other languages. Ladder diagram has been used for the programming of this PLC.

II. LITERATURE SURVEY

The operation of PLC is independent of environmental changes such as change in temperature, humidity, wind, rain etc. The system will be capable of detecting the moisture level and accordingly it will control the water pump or sprinkler. This system will improve overall use of water resources .And it will also improve quality of the crop. It will be help full to save water at the same time the system consume minimum power. PLC FL005 has built in real time clock. So it can be programmed according to the user's requirements. The respective software is windows based. [1]

Over 60 per cent of the country's population, compromising several million small farming households depends on agriculture as a principle income source and land continues to be the main asset for livelihood. By the use of Drip Irrigation we can save water and

fertilizer provided to the crops. By automating it we can save more water and increase our economy with increase in production and reduction in man power. As the timings provided for agriculture are very inconvinient also due to lack of rains and scarcity of land reservoir. There is improper supply of water to the land which affects the production. Thus it is necessary to find an automatic system which can provide required water to the farm depending on the crop water demands and the electricity availability timings. This project is concentrated on developing an automatic drip irrigation system using plc which is operated on two modes namely timer mode and sensor mode as per the convenience of farmer. [2]

In this work an adaptive irrigation controller was developed and tested in a 2000m2 corn field. A rather inexpensive PLC was used as the heart of the system making hourly measurements of air temperature at a height of 1.5m. These temperatures were registered and used by the PLC to calculate daily reference Evapotranspiration from a corn-field. These values were then converted to ETc, using the methodology and Kc values originally proposed by FAO56. The program then used this information to calculate the exact depth of water needed daily by the crop to ensure maximum production. The irrigations were carried out using a drip system, with drippers spaced at 0.2m and a flow rate of 1ls-1. The first year results were satisfactory indicating a 12% water saving, along with some increase in crop yield, when compared to irrigation with a fixed water depth using a standard irrigation controller. It was observed that in the particular case of corn, the use of Crop Coefficient values is very important, as it leads to significant water saving at the beginning and end of the growth season. It was also found that the heat flux from the soil influenced the temperature gradient in the canopy. The soil served as a heat sink during the day, helping to keep the lower part of the canopy slightly cooler. The temperature difference between the upper layer and the lower layer of the canopy reached 2.2ºC in some cases. At night the soil released heat, helping to increase the temperature of the same lower part of the canopy. This heating effect was responsible for temperature differences of 1.6ºC between the upper and lower part of the canopy. [3]

New irrigation electrical control technologies could improve irrigation efficiency, promoting water conservation and reducing the environmental impacts. The objectives of this project were to avoid wastage of water and increase irrigation efficiency by using a PLC based irrigation system with the help of soil moisture sensor. It also improves the traditional irrigation system enabling the irrigation system to have high efficiency and low water usage. The existing irrigation system being tedious, time consuming and very wasteful in water usage. The PLC based sprinkler irrigation system gives the best feature than the traditional one. [4]

Prashant S. Patil and et al states that there should be modernization in the conventional agricultural practices for better results. Here a microcontroller along with various sensors like soil moisture sensor, water flow meter are used to check the water used and provided to the crops. The objective of the system is to: a) Water resources b) Handles the system automatically c) Detects the level of water d) Based on the data available, analysis and prediction will be done e) Builds such system which enhances crop productivity. It states that the system monitors the flow of water and based on the available data it does analysis and prediction.[5]

III.PROPOSED SYSTEM

Irrigation in India to a maximum extent is dependent on the monsoons, which is also a reliable source of water. Depending on the soil type, plants are to be provided with water through a proper irrigation system.

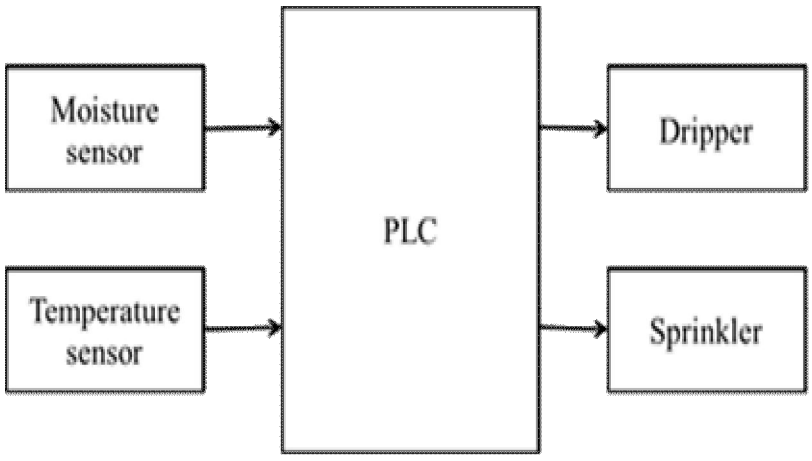

Fig.1 Block diagram of proposed system

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For monitoring environmental condition for particular crop one need monitor and control essential parameters of environment for e.g. temperature, humidity etc. temperature sensor i.e. LM35 measures temperature of environment and gives output in analog format. Moisture sensor detects moisture of soil. Moisture is very important parameter and should control from outside using water motor if moisture level crosses the lower threshold value. Moisture value is a parameter which tells how much water one should pour to crop. Whenever temperature goes above upper threshold value a dripper is automatically turn ON to lower down temperature value. Similarly sprinkler will turn ON when moisture goes below some predefined level.

A. Result

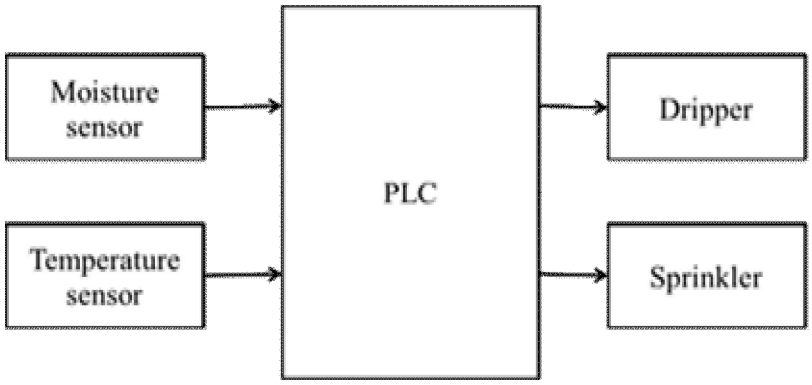

Fig.2 Hardware model

Fig.3 Output on PLC

TABLE I
ANALYSIS OF PROPOSED SYSTEM

Sr. no.	Temperature (C)	Moisture	Dripper	Sprinkler
1	35	0	ON	OFF
2	29	0	ON	OFF
3	40	1	OFF	ON
4	38	0	ON	OFF
5	41	1	OFF	ON
6	42	1	OFF	ON
7	39	1	OFF	OFF
8	30	0	ON	OFF
9	26	1	OFF	OFF
10	39	0	ON	OFF

Here threshold value for temperature is 40°C, following figure shows that when temperature exceeds threshold value sprinkler status become ON and moisture value 0 means soil is dry and 1 means soil is moist

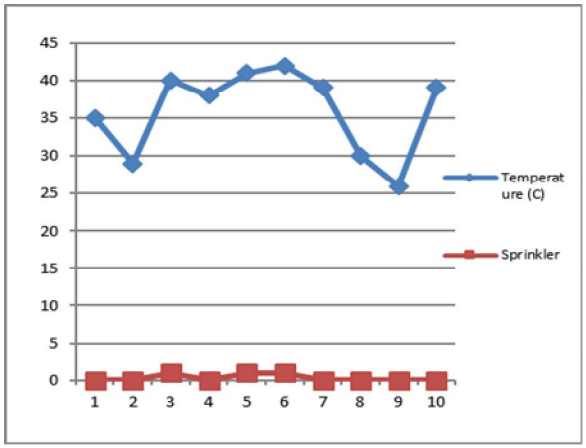

Fig. 4 Fig graphical ON/OFF of sprinkler w.r.t. temperature

IV. CONCLUSIONS

The operation of PLC is independent of environmental changes such as change in temperature, humidity, wind, rain etc. The system will be capable of detecting the moisture level and accordingly it will control the water pump or sprinkler. This system will improve overall use of water resources .And it will also improve quality of the crop. It will be help full to save water at the same time the system consume minimum power. With the rising need to conserve water and electricity, a more advance watering system need to be developed. An economical system that can tell if watering is required based on weather conditions and or other ambient parameters, tells about market rate and helps in selecting perfect crop for particular type of soil. All sensors monitor the environmental condition and according to this conditions raspberry pi takes its decision. The motor will be turned OFF if it's raining outside or moisture of soil is more or adequate.

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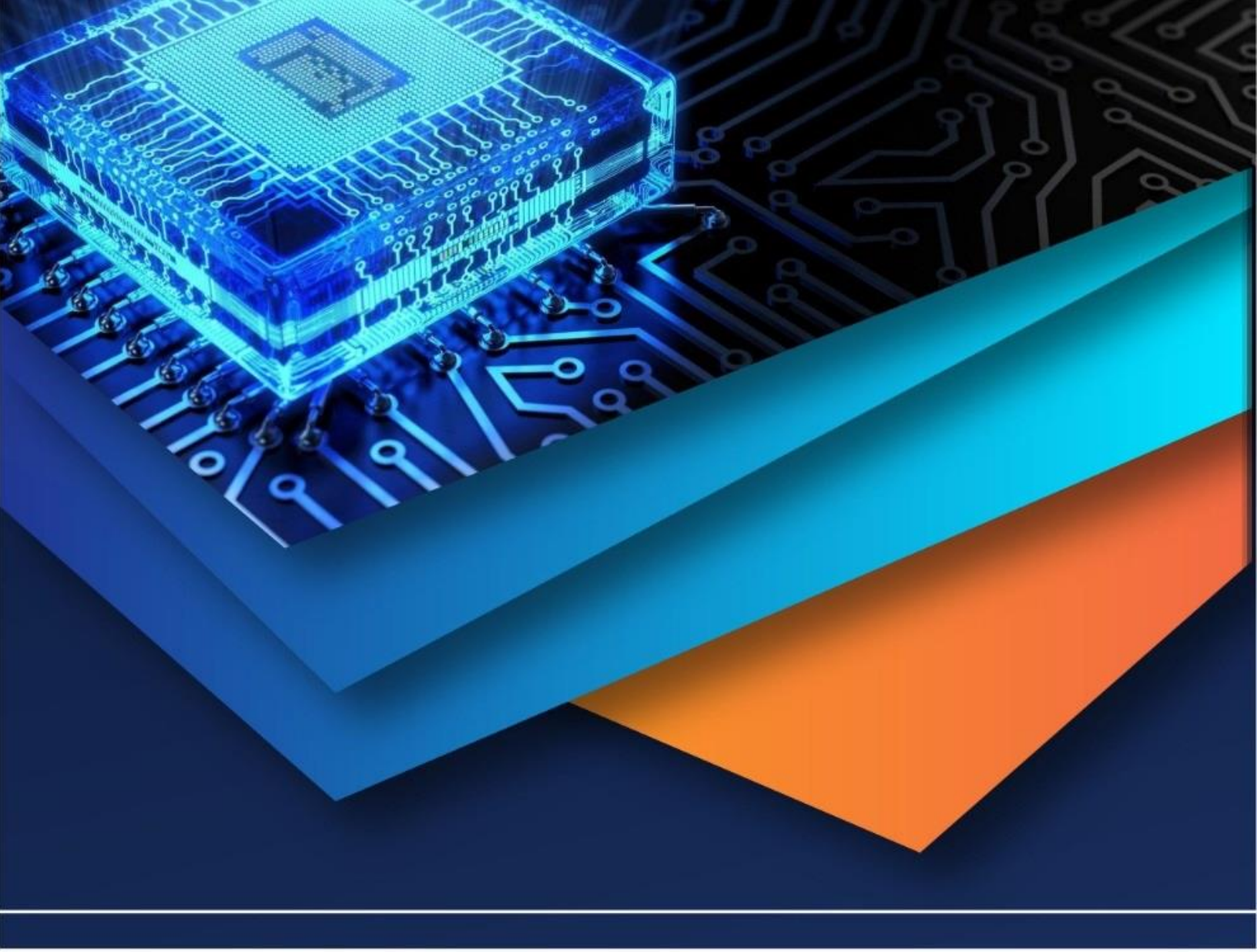

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