

Automatic Parameter Monitoring and Analysis of Irrigation System in Agriculture

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Abstract—Agricultural irrigation is highly important in crop production everywhere in the world. In India, where 60-70% economy depends on agriculture, there is a great need to modernize the conventional agricultural practices for the better productivity. The main aim of our method is to develop a system that monitors environmental conditions in agriculture field such as soil pH, moisture, temperature, humidity, & Nitrogen, Phosphorus, Potassium & also maintaining appropriate level of moisture in the soil. Plants are sensitive to water level as water deficiency or excess water is harmful to plants, so according water requirement of plant drip irrigation is used. Nitrogen (N), Phosphorous (P), Potassium (K) is one of the important macronutrient which helps for plant growth. Nutrient availability changes with the pH of mineral soil. In the proposed method ARM 7 and front end GUI is used for displaying the values of each parameter. Do the analysis of proposed method by plotting graph of different parameter with respect to time. By observing graphical analysis Farmer can provide nutrient and water through drip Irrigation for improving, Increasing the crop production

Index Terms—ARM Controller, Temperature, Humidity, Moisture, pH sensor, pH_Ec sensor.

I. INTRODUCTION

Agricultural irrigation is highly important in crop production everywhere in the world. In India, where 60-70% economy depends on agriculture, there is a great need to modernize the conventional agricultural practices for the better productivity. So drip irrigation is best method to saving the water. Due to unplanned use of water the ground water level is decreasing day by day, lack of rains and scarcity of land water also results in decrement in volume of water on earth. Therefore, efficient water management plays

an important role in the irrigated agricultural cropping systems. The very small amount of water is useful for all living organisms and it's the human being who is mainly responsible for wastage of water. One major reason is that an unnecessary wastage of water in agriculture field due to unawareness of farmers about sufficient supply of the water. Irrigation is an artificial application of water to the soil. In the field of soil environmental monitoring, real-time monitoring the temperature and humidity of soil can correctly guide agricultural production and improve crop yield.

The main aim of system is to measure different parameter such as Temperature, Humidity, Moisture, pH, Nitrogen, Potassium, and Phosphorus. The large amount of water is saved using this technology. The water and micronutrient is supplied through drip irrigation. The micro nutrient is the important fertilizer. This fertilizer play an important role in crop production. This system reduce water, no man power is required and save the electricity. The effective management of water and fertilizer is done by this system. By using this system increase the crop production.

II. OBJECTIVES

The objective is to design such a system which will

- Conserve energy, water resources and man power in agricultural sector.
- Handle the system automatically as well as manually.
- Detect different parameter of soil like moisture, temperature, humidity, pH and nitrogen. Potassium, Phosphorus
- Build a system which enhances crop productivity.
- To design, build and test the system which will be economical, efficient and effort reducing of the farmer.
- With the characteristics of low cost, low power consumption, flexibility, friendly interface

III. METHODOLOGY

Maintaining appropriate level of moisture in the soil is the main aim of the system. Plants are very sensitive to water level, water deficiency can be hazardous to the plants or

excess water is also harmful to plants. Hence the system is designed such that it will help to maintain appropriate moisture level according to the plant requirement. The system senses the soil moisture, atmosphere humidity and temperature and depending on the sensed data the system will take the corrective action whether to start or stop the valve of the drip irrigation system. The valves are controlled by using relay and the relay is drive by using ULN 2003. The system also detects the nitrogen, Phosphorus, Potassium present in the soil by using pH_EC sensor. A setup is built which helps to measure the nitrogen, Phosphorus, Potassium in the soil and which is sensed by the sensor. Nitrogen (N), Phosphorous (P), Potassium (K) is one of the important macronutrient which helps for plant growth. Hence it is necessary to monitor the nitrogen, Phosphorus, Potassium content of the soil. Depending on the nitrogen, Phosphorus, Potassium content present in the soil suggestions are given to the farmer whether it is according to requirement or not. pH of the soil is also detected. It is also one of the important factor which affects the nutrient availability for plants. Hence pH of the soil is monitored. Depending on the pH value suggestions are given to the farmer whether is according to the requirement or not. The system is interfaced with keypad. Keypad is used to set the threshold points depending where the system is installed. So that system can be used under any conditions. All the sensed data from the soil is send to LCD for displaying purpose. The data from controller is send to personal computer (PC) through serial communication using UART 0. The data fetched on PC can be used for analysis purpose and the database is also maintained. Thus the system will help to monitor, control and analyses.

IV. PROPOSED SYSTEM

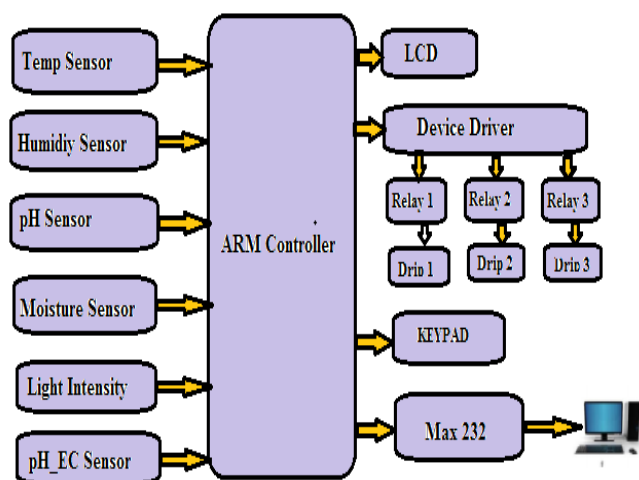


Fig 1. Block Diagram of System.

This system required following sensors to measure the various parameter

A. Humidity Measurement

Humidity is one of the necessary parameter of any agriculture field .There are several type of humidity sensors, we use P-HS-230 sensor to detect humidity in environment. The output of humidity is proportional to output voltage. At 30% relative humidity, the output is 990 mV, while at 80% relative humidity; the output is 2640 mV, i.e. 2.64 V. The output of the sensor is connected to the ARM processor at pin no.35, this output of sensor is analog and applied to ARM processor.

B. pH Measurement

A pH scale measure is truly, a particular meter that measures the generated voltage of a pH scale electrodes. Here Alpha pH scale five hundred Transmitter with pH scale conductor (EC100GTSO5B) the necessity of such measure is associate degree electronic equipment with high input electrical resistance and has the gain of voltage-pH conversion. The quality pH scale probe generate voltage regarding 59mV per pH scale .So a pre-amplifier is needed with high input electrical resistance input and with gain = 16.7 to offer 1 V per pH scale.

C. Moisture Measurement

Tensiometer with electrical device (Soil wet sensor) is employed that having wet Tension vary 0-100 Centibar, Output 4-20 mA , Power needs 12 to 24 VDC ,Current Consumption 20 mA soap.

D. Temperature device

LM36 sensor is used for measurement. LM36 is the temperature device accustomed sense the temperature from field .It having Linear + 10mV/°C multiplier ,Calibrated Directly in ° Celsius (Centigrade) ,0.5°C Ensured Accuracy (at +25°C) ,Rated for Full -55°C to +150°C vary, Operates from 5 to 30 V.

E. pH_EC sensors

This sensor is used to measure nitrogen, Phosphorus, Potassium. The use micro-sensors for in-field observation of environmental parameters is of nice interest, notably semiconductor-based micro-sensors, owing to their several benefits over standard sensors like tiny size, robustness, low output resistance and fast response. They will more be integrated in electronic equipment and multiple sensors within the same substrate and consequently they will be

enforced in compact probes for specific applications e.g., in place observation, or on-line or on-the-go measurements. The sensors area unit victimization ion Selective Field impact Transistors based mostly micro-sensors, for environmental applications and area unit useful for measure primary macronutrients in soil. Selected target ions embody measure potassium, phosphate and nitrates. Needed samples area unit in tiny volumes and such sensors are often integrated in compact flow cells for continuous measurements. NPK micro-sensors area unit sanctioning preciseness agriculture to help in (1) abstraction information assortment, (2) preciseness irrigation, (3) variable-rate technology (automated fertiliser) and (4) provision information to farmers.

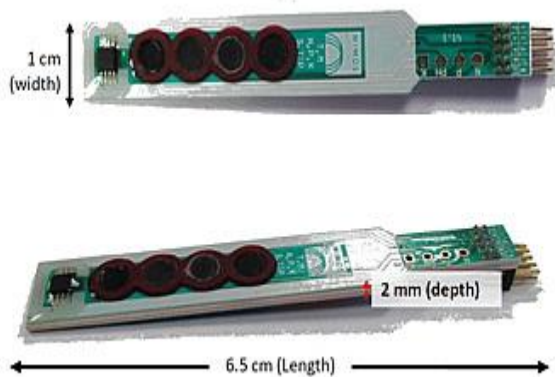


Fig 2.pH_EC sensor

F. Light Intensity Measurement

For Intensity measure, LDR is employed. LDR is light Dependent device. As light will increase, the resistance decreases, and contrariwise. During this project, I actually have designed a resistance network using LDR and a resistance. Because the intensity changes, the voltage drop across the LDR conjointly changes, and thus potentials proportional to the sunshine intensity. Electronic equipment amplifies this modification in potential.

VI. DATA SHARING SYSTEM

In information Sharing System we have a tendency to area unit progressing to used for transferring the information from one node to a different node during this data sharing system we have a tendency to area unit progressing to sence the assorted parameter and with the assistance this parameter the wired communication system can on/off the valve. The

dominant of ON/OFF valves is depend upon the parameter like soil temperature, Humidity, LDR, NPK device etc.

V. RESULTS AND DISCUSSION

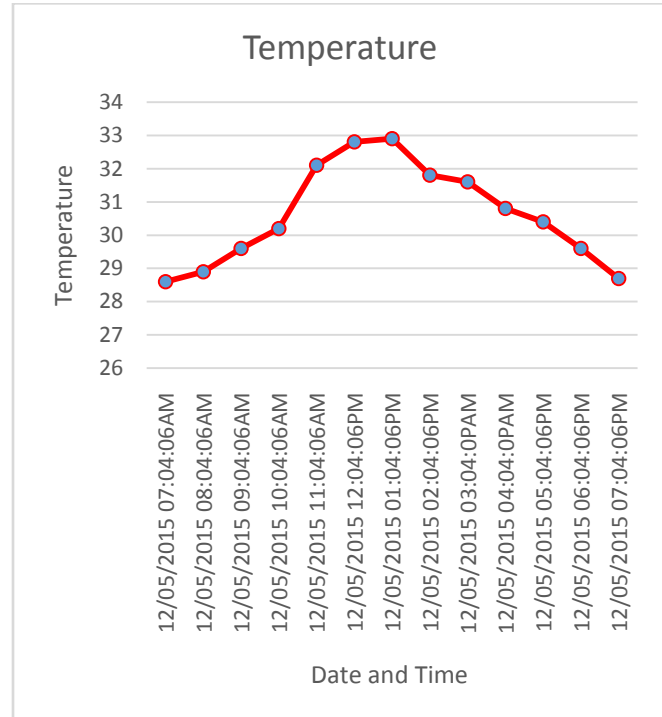


Fig.3. Graph of Temperature.

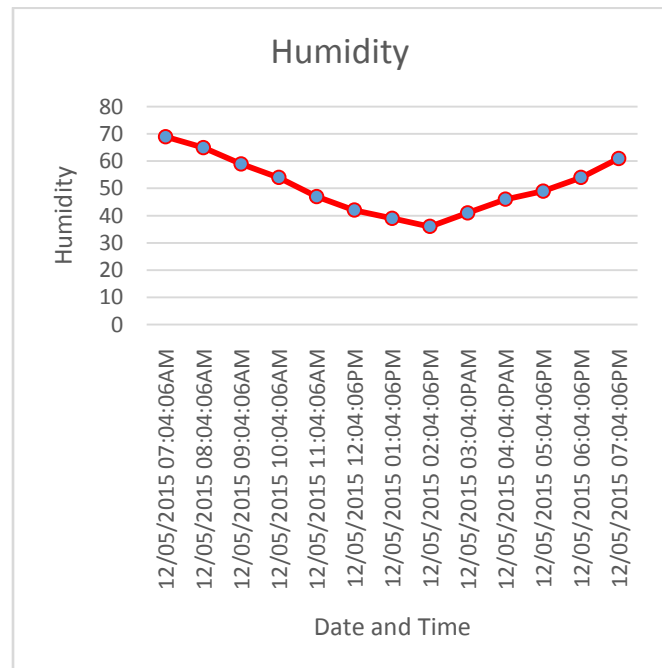


Fig. 3. Graph of Humidity.

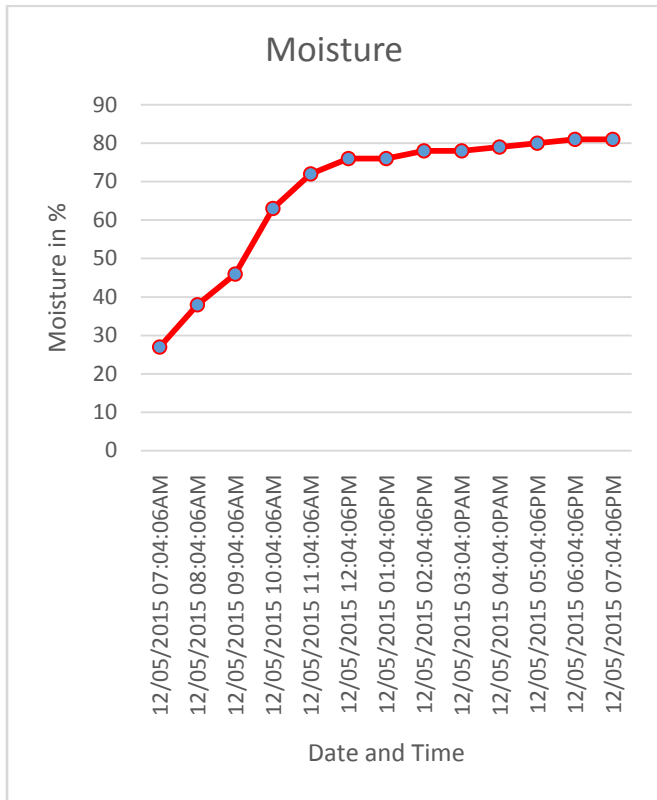


Fig. 4. Graph of Moisture.

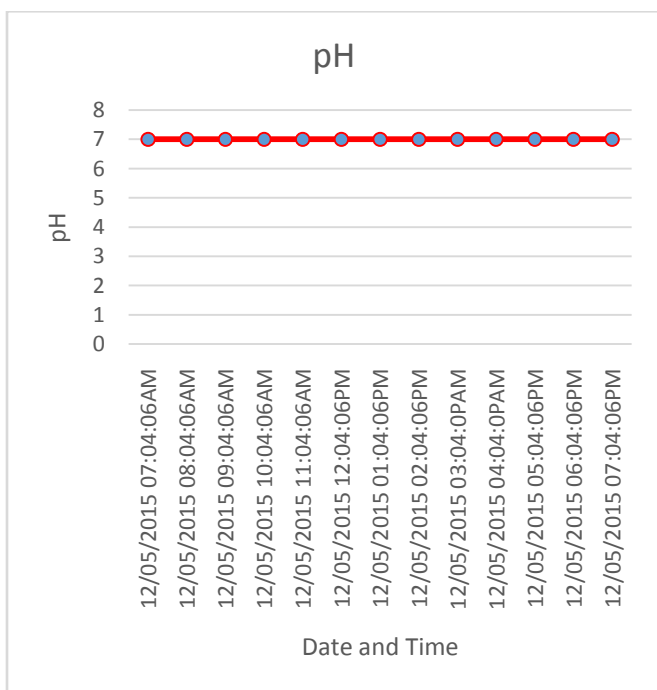


Fig. 5. Graph of pH

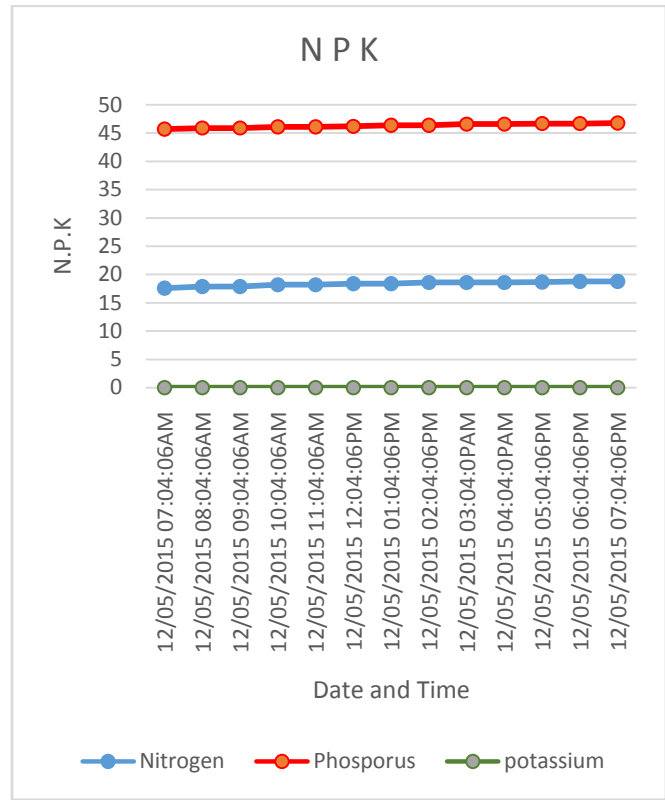


Fig. 6. Graph of N P K.

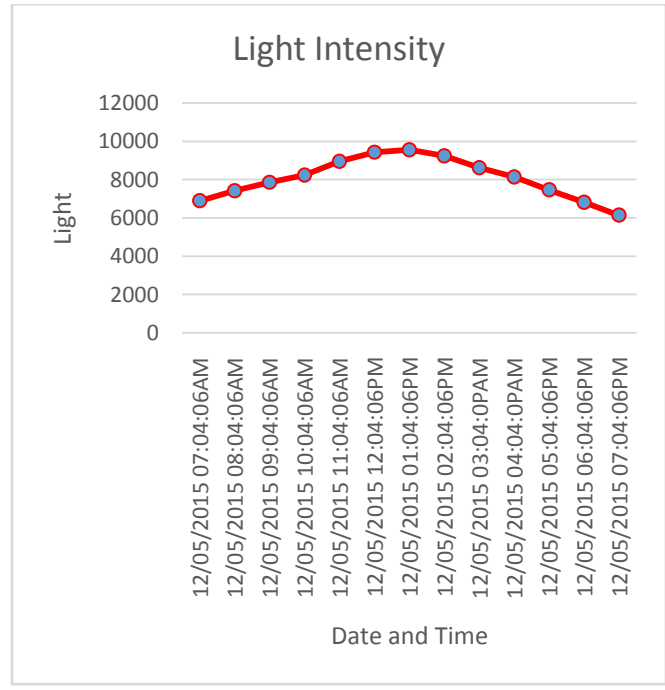


Fig. 7. Graph of Light Intensity.

From above graphical result, Farmer can give idea about his farm. In summer water requirement for plant is more so drip irrigation is useful method to save the water. We can provide nutrient and water through drip irrigation. By using Graphical analysis actually how much nutrient is present in his farm. Proper water and nutrient is supplied time to time the production is increased.

VII. CONCLUSION

This system is helpful to extend the assembly and reduce the man power and save the electricity. This method deals with the planning, optimization and development of a sensible resolution for application to the agricultural watching and management. The projected system utilizes sensing element for small parameter measure (N, P, K), temperature level detection, Motion detection, Humidity, Soil wetness, Soil pH scale for management of Agricultural setting. It enclosed the planning of intelligent drip irrigation network system. After the right measure of N, P, K content from soil it'll become easy to evaluate regarding the chemical combos. By analyzing parameter graphically, so maintaining the appropriate level of water and nutrient is main aim of the system.

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