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Automization of Agriculture Irrigation System Using Raspberry Pi and Android Apps

Sadolkar Nilesh Shamrao, B.E. Shinde

M.E Student (VLSI AND EMBEDDED SYSTEM), Department of Electronics and Telecommunication, SCOET, Pune, India[1]

Assistant Professor, Department of Electronics and Telecommunication, SCOET, Pune, India[2]

ABSTRACT: The greenhouse based modern agriculture industries are the recent requirement in every part of agriculture in India. In this technology, the water level and temperature of plants are precisely controlled Due to the variable atmospheric circumstances these conditions sometimes may vary from place to place in large farmhouse, which makes very difficult to maintain the uniformity at all the places in the farmhouse manually. The atomization of agriculture system is used to control the whole farmhouse through raspberry Pi and android apps. The another think is to calculate the value of PH, Humidity and Soil condition displayed on 16X2 LCD display and android apps. It is observed that an android phone-control the Irrigation system, which could give the facilities of maintaining uniform environmental conditions are proposed. The Android Software Development Kit provides the tools and Application Programmable Interface necessary to begin developing applications on the Android platform. Mobile phones have almost become an integral part of human life serving multiple needs of humans. This application makes use of the GPRS [General Packet Radio Service] feature of mobile phone as a solution for irrigation control system.

KEYWORDS: Raspberry PI, PH, temperature, soil, humidity, water level sensor, 16X2 LCD display, android app, Arduino software.

I. INTRODUCTION

Drip irrigation is artificial method of supplying water to the roots of the plant. It is also called micro irrigation. In past few years there is a rapid growth in this system. The user communicates with the centralized unit through internet. The centralized unit communicates with the system through SMS which will be received by the IOT with the help of the smart phone. The sends this data to Raspberry Pi which is also continuously receives the data from sensors in some form of codes. After processing, this data is displayed on the LCD. Thus in short whenever the system receives the activation command from the subscriber it checks all the field conditions and gives a detailed feedback to the user and waits for another activation command to start the motor. The motor is controlled by a simple manipulation in the internal structure of the starter. The starter coil is indirectly activated by means of a transistorized relay circuit. When the motor is started, a constant monitoring on soil moisture and water level is done & once the soil moisture is reached to sufficient level the motor is automatically turned off & a massage is send to subscriber that the motor is turned off. The another think is to display the value of temperature on 16X2 LCD display. The PH sensor is used for measure the contents of water. the humidity sensor used to check the presence of water in air.

II. METHODOLOGY

Atomization of agriculture system using raspberry Pi and android apps will be made in the following steps:

1. Complete layout of the whole setup will be drawn inform of a block diagram for each node.
2. The temperature sensed by sensor is displayed on LCD
3. The soil condition is checked by moisture sensor, depending upon the soil condition & water level, water pump motor is turned on or off.
4. The motor thefting can be prevented by Raspberry Pi controller by informing the farmer by sending SMS & buzzer alarm.
5. The humidity sensor checks the presence of water in air and value displayed on LCD display.

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6. The PH sensor checks the contents of water.
7. The status of the whole farm can be checked & updated wirelessly with help of internet using smart mobile phone android app technology.

III. SYSTEM DESIGN AND IMPLEMENTATION

A. *PROPOSED AUTOMATION OF IRRIGATION SYSTEM.*

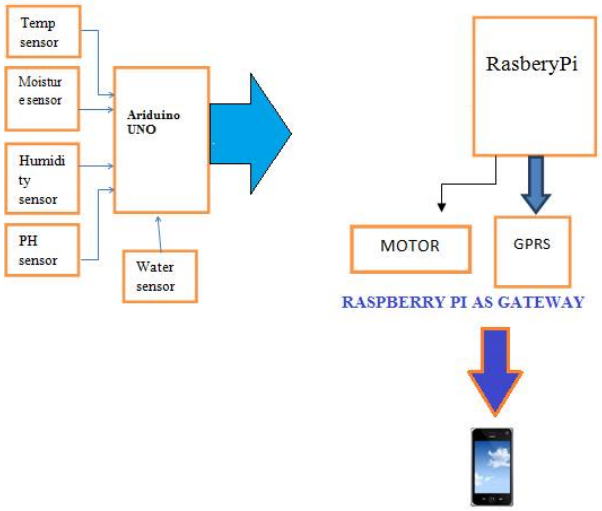

Figure 1.Proposed Automation of Irrigation System.

The proposed system consists of the Wireless Sensor Network for acquiring climate data locally. In WSN various weather monitoring sensors are placed inside the field, sensors include soil moisture ,water level sensor , humidity sensor, temperature sensor. Using this information, irrigation requirement is calculated remotely at central computer and control irrigation controller module wirelessly. Wireless Senor Unit (WSU) consists of a Radio Frequency transceiver, soil moisture sensors, a microcontroller, and power sources. Several WSUs can be deployed in-field to configure as a distributed sensor network for accurate irrigation control.

Each unit is based on the microcontroller raspberry Pi that controls the ZigBee module and processes information

B. *THE PROPOSED AGRICULTURE AUTOMATION SYSTEM FUNCTION*

The proposed agriculture automation system function has ability to control the following components in users.

1. Temperature and Humidity
2. Soil sensor
3. Water level detector
4. Motor on/off and alarm
5. PH sensor
6. Software design
7. Android apps

IV. IMPLEMENTATION SETUP

Each WSN consist of Moisture sensor ,humidity, Temp, Ph sensor water level Sensor which to be interface with PIC18F4520 controller .A data from sensor process by PIC controller and sent to central base station through Zigbee module .All the WSN node are connected to Moisture content in the soil will be measured by the sensor, if the sensor detects the soil as dry this information send to rasberyPi as a base station this data process by rasberyPi and send over GPRS unit to famer mobile application then he takes decision to ON /OFF farm Motor .Both the

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above information is given to the microcontroller which exchanges data with the server to provide information to the farmer.

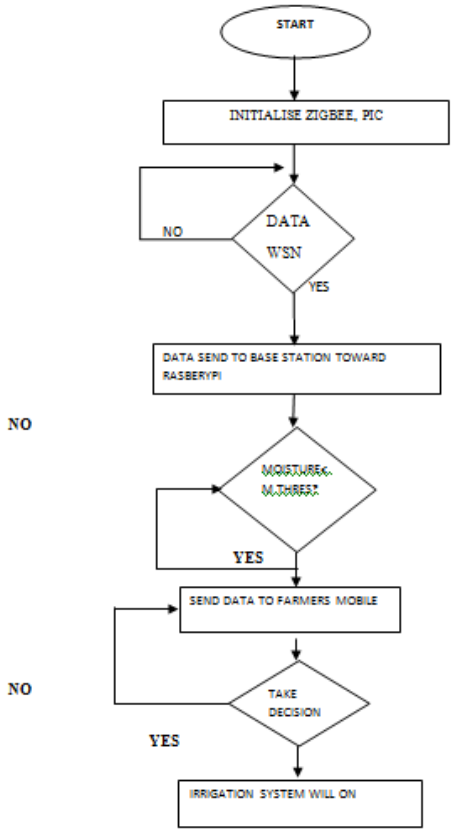

Figure 2. Implementation setup

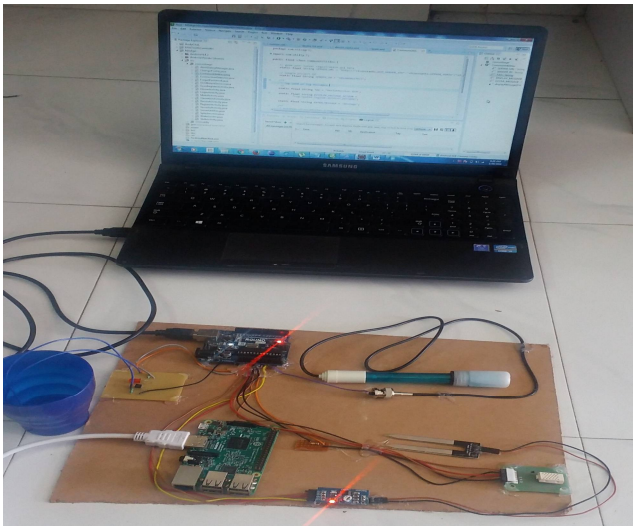

Figure 3.Proposed Hardware Automation of Irrigation System.

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V. HARDWARE DESCRIPTION

1. Temperature Sensors: Temperature sensors are devices used to measure the temperature of a medium. There are two kinds of Temperature sensors contact sensors and non-contact sensors. However, the three main types are thermometers, resistance temperature detectors and thermocouples. All three of these sensors measure a physical property
(i.e. volume of a liquid, current through a wire),which changes as a function of temperature.

2. Humidity Sensor: This sensor checks the presence of water in air. The amount of water vapor in air can affect the plants growth. The presence of water vaporal so influences various physical, chemical, and biological processes.

3. Raspberry Pi controller: Raspberry Pi controller is used to control and interface the Sensors, Motor and internet. This is a low-power, high-performance controller

4. Water Level sensors: This sensor detects the level of substances that flow including liquids, slurries, granular materials and powders. Fluids and fluidized solids flow to become essentially level in their containers (or other physical boundaries) because of gravity whereas most bulk solids pile at an angle of repose to a peak. The substance to be measured can be inside a container or can be in its natural form (e.g., a river or a lake).
The level measurement can be either continuous or point values. Continuous level sensors measure level within a specified range and determine the exact amount of substance in a certain place, while point-level sensors only indicate whether the substance is above or below the sensing point. Generally the latter detect levels that are excessively high or low.

5. PH sensor: the PH sensor is used to calculate the content of water and it is displayed on LCD display.

6. Motor pump theft detector: This sensor checks the presence of the motor and if motor is absent then ARM activates the buzzer alarm and sends SMS to the farmer's mobile.

7. Android system: Android is that it offers a unified approach to application development and their applications should be able to run on numerous different devices, as long as the devices are powered using Android. These applications written in Java programming.

VI. RESULTS

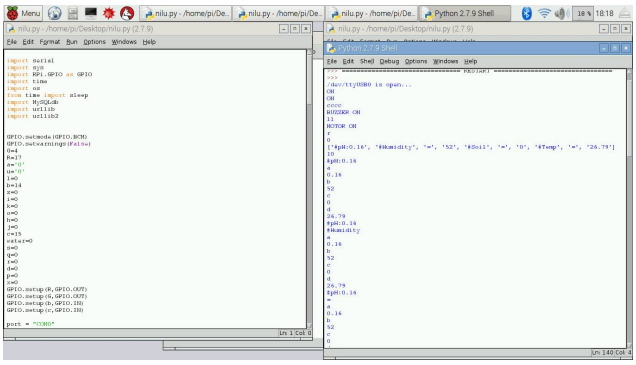

Figure 4 :- snapshot of node data received on raspberry-pi

After the feasible results obtained for monitoring and controlling of farm which is displayed in LCD display and A hardware kit has been developed and put it on the farm environment. The kit consists of a power supply unit, various sensors, and the Raspberry Pi controller unit. The output from the sensors is continuously given to the controller. The feasible results obtained for monitoring and controlling of farm which is displayed on LCD display and android app. In the real application the entire kit it is fixed on the farm. When the parameters like temperature,

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humidity, PH, soil wetness and other conditions such as if soil is dry then automatically motor turns on and checks for water level reached at farms. If it is at maximum level then raspberry Pi automatically turns off motor to pump water, which is continuously monitored and controlled by controller.

VI. CONCLUSION

Irrigation has been the backbone of human civilization since man has started agriculture. As the generation evolved, man developed many methods of irrigation to supply water to the land. In the present scenario on conservation of water is of high importance. Present work is attempts to save the natural resources available for human kind. By continuously monitoring the status of the soil, we can control the flow of water and thereby reduce the wastage. By knowing the status of moisture and temperature through internet with the use of moisture and temperature sensors, water flow can be controlled by just sending a message from our mobile. Conservation of water and labor: Since the systems are automatic, they do not require continuous monitoring by labor. System and operational flexibility As desired, any valve can be controlled along with the pump and increases the efficiency of water use.If water is stored in tanks at irrigation lands, one can get the status of the water level, temperature sensor and moisture content in soil through SMS generator by microcontroller present at the irrigation land. The PH sensor is use to continuously finding the content of water it is used for plant growth. The proposed system is very use full for regular monitoring of farm status without visiting manually, and saves time and also use full to monitor hilly areas and remote areas, which were hard to visit manually. The system not only saves the energy consumption significantly, but also reduces a large number of inputting on the human and material resources in the management. Applying embedded technology and wireless transceiver technology using mobile to the rapid deployment system of the incident detection of emergency food storage environment without complicated connections, it enhances the system's flexibility, small size, low cost and good effective, so it is easy to install and migrate.

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