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Web Based Automatic Irrigation System Using Raspberry Pi Processor on Embedded Linux

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ABSTRACT:

This paper focus on a smart irrigation system which is cost effective and a middle class farmer use it in farm field. Today we are living in 21st century where automation is playing important role in human life. Automation allows us to control appliances automatic control. It not only provide comfort but also reduce energy, efficiency and time saving. Today industries are use automation and control machine which is high in cost and not suitable for using in a farm field. So here we also design a smart irrigation technology in low cost which is usable by Indian farmers. The objectives of this paper were to control the water motor automatically and select the direction of the flow of water in pipe with the help of soil moisture sensor. Finally send the information (operation of the motor and direction of water) of the farm field to the mobile message and g-mail account of the user.

Keywords:

Remote Monitoring, Raspberry Pi, GSM technology, Temperature sensor, Humidity sensor, DC motor.

I.INTRODUCTION:

In our country Agriculture is major source of food production to the growing demand of human population. In agriculture, irrigation is an essential process that influences crop production. Generally farmers visit their agriculture fields periodically to check soil moisture level and based on requirement water is pumped by motors to irrigate respective fields. Farmer need to wait for certain period before switching off motor so that water is allowed to flow in sufficient quantity in respective fields.

This irrigation method takes lot of time and effort particularly when a farmer need to irrigate multiple agriculture fields distributed in different geographical areas. Traditionally farmers will present in their fields to do irrigation process. But nowadays farmers need to manage their agricultural activity along with other occupations. Automation in irrigation system makes farmer work much easier. Sensor based automated irrigation system provides promising solution to farmers where presence of farmer in field is not compulsory. A small processor programmed for control a electromagnetic valve and also compare to electromagnetic valve operate motor to start watering. Really INDIAN farmers need cheap and simple user interface for controlling sensor based automated irrigation system. Now a day's internet is widely used.

Using internet farmer know about the agriculture field irrigation status. This helps farmers to know the status of farm field watering direction through a message whether the farmer is far away from field know the status of water motor is ON or OFF and direction of watering. The RASPBERRY-Pi is use for send messages through internet correspondence to the microcontroller process. For experimentation we have abstracted number of soil moisture sensor used in different direction of the farm fields. The soil moisture in each direction of field is sensed by sensor node and the sensed data is sent to microcontroller node through wireless networking device. On receiving sensor value the controller node checks it with required soil moisture value. When soil moisture in a particular field is not up to required level then controller node switch on the motor to irrigate associated field and the RASPBERRY-Pi process all data and notification

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SMS is send to registered mobile phone which is registered in RASPBERRY-Pi. The RASPBERRY-Pi is monitoring with a screen to see the current status of the irrigation and use for change the setting of user required.

II. RELATED WORK:

2.1 BLOCK DIAGRAM:

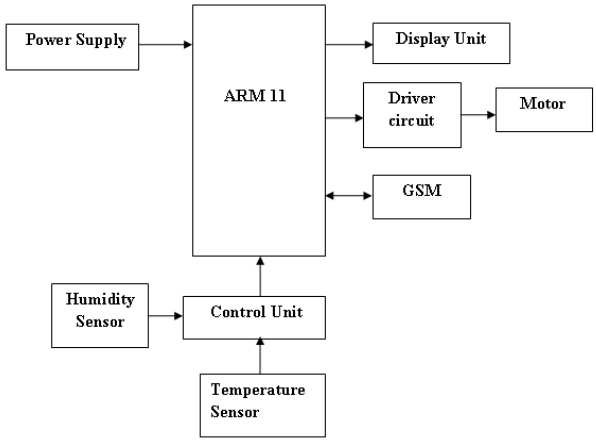

Figure-1: Block diagram

2.2 EXISTING METHOD:

Villages are the backbone of our nation. The farmers strive hard day and night to yield very good results in their farm. They know the entire process how to produce a farm, when to provide water to the farms etc. When it is the time to water the farms, they just stop their current works then and there and rush to the farms to start the pump sets to water the farms.

2.3. PROPOSED METHOD:

In this project provides an excellent solution to this existing method. The farmer need not go to the farm to water his field. The system uses humidity sensor and temperature sensor to know the wetness percentage of the farm. Based on the output of the humidity sensor, the system sends the data to the processor, where the processor receives the relevant data and starts the motor to water the farm and as the output of the humidity sensor comes to the normal value, the system stops the motor. This project is implemented with high speed raspberry pi processor.

III. HARDWARE COMPONENTS:

3.1 RASPBERRY PI PROCESSOR:

Figure-2: Raspberry Pi diagram

The Raspberry Pi board involves a processor and snap shots chip, Random Access Memory (RAM) and more than a few interfaces and connectors for external devices. Some of these instruments are main others are optional. It operates in the identical method as a ordinary pc, requiring a keyboard for command entry, a show unit and a vigor give. considering that raspberry Pi board operates like pc it requires 'mass-storage', but a tough disk pressure of the variety observed in a ordinary pc is not relatively in maintaining with the miniature dimension of Raspberry Pi.

3.2 TEMPARATURE SENSOR:

In this project, in order to monitor the temperature continuously and compare this with the set temperature preprogrammed in the microcontroller, initially this temperature value has to be read and fed to the microcontroller. This temperature value has to be sensed. Thus a sensor has to be used and the sensor used in this project is LM35. It converts temperature value into electrical signals. LM35 series sensors are precision integrated-circuit temperature sensors whose output voltage is linearly proportional to the Celsius temperature. The LM35 requires no external calibration since it is internally calibrated. . The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C

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temperature range. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air.

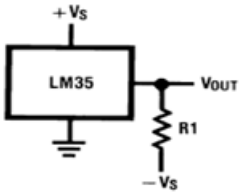

Figure-3: Temperature sensor

3.3 DC MOTOR:

In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion.

3.4 HUMIDITY SENSOR:

Humidity is a term for the amount of water vapor in the air, and can refer to any one of several measurements of humidity. Formally, humid air is not "moist air" but a mixture of water vapor and other constituents of air, and humidity is defined in terms of the water content of this mixture, called the Absolute humidity. In everyday usage, it commonly refers to relative humidity, expressed as a percent in weather forecasts and on household humidistat's; it is so called because it measures the current absolute humidity relative to the maximum. Specific humidity is a ratio of the water vapor content of the mixture to the total air content (on a mass basis).

The water vapor content of the mixture can be measured either as mass per volume or as a partial pressure, depending on the usage. In meteorology, humidity indicates the likelihood of precipitation, dew, or fog. High relative humidity reduces the effectiveness of sweating in cooling the body by reducing the rate of evaporation of moisture from the skin. This effect is calculated in a heat index table, used during summer weather.

IV. RESULTS:

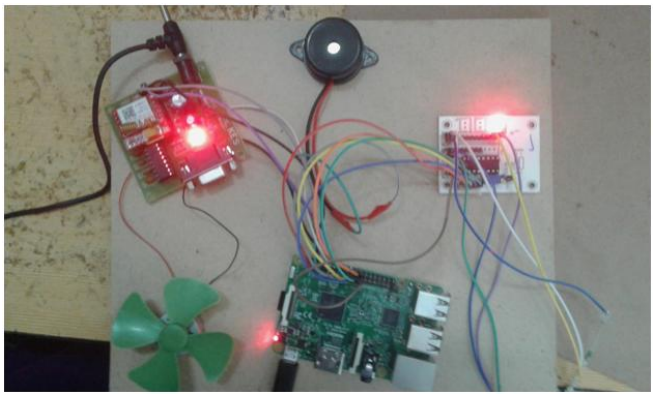

Figure-4: Hardware of the project

V. CONCLUSION:

The project "WEB BASED AUTOMATIC IRRIGATION SYSTEM USING RASPBERRY PI PROCESSOR ON EMBEDDED LINUX" has been successfully designed and tested. It has been developed by integrating features of all the hardware components and software used. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced ARM11 board and with the help of growing technology the project has been successfully implemented.

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