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MEASURING SOIL MOISTURE AND CONTROLLING THE WATERPUMP VIA CELL PHONE USING WIRELESS SENSOR NETWORK

V. Hariharan* & Dr. A. Chandrasekar**

* PG Student, Department of Computer Science and Engineering, St. Joseph's College of Engineering, Chennai, Tamilnadu

** Head of Department, Department of Computer Science and Engineering, St. Joseph's College of Engineering, Chennai, Tamilnadu

Abstract:

Water plays an important role in the field of agriculture. For farmers to start cultivation, two factors have to be measured Soil Fertility, Moisture content of soil, after which seeds are sown. Inconvenience in switching on a water pump installed in a remote farm is a common problem faced by farmers. Many circuits have been developed to solve this problem. Most of them are precious and microcontroller-based. There are various techniques to check the productivity of crop by measuring soil fertility. One of which is automated motor pumping by detecting whether soil is wet or dry and fertilizer level. Our system makes use of two devices such as Hygrometer which is used to measure the soil moisture and fertilizers level and GSM which is used to access worldwide to control the water pump and soil sensor. Here, we use a cell-phone based remote controller for controlling it. By making a call to the GSM that is attached to the controller, the water pumps the fertility tank valve and the soil sensor can directly be activated.

Index Terms: GSM Modem, Relay, Arduino UNO R3, Soil Sensor, Pumping Motor, Solenoid Valve & Soil Test Kit

1. Introduction:

In Indian economy basically depends on agriculture. They know the government has promoted a free supply of electricity for farmers to run their motors and pump for irrigation purpose. For farmers to start cultivation, two factors have to be measured Soil Fertility, Moisture content of soil, after which seeds are sown. We consider the problem of inconvenient in switching on a waterpump and installed in a remote farm is a common problem faced by farmers. Many circuits have been developed to solve this problem, but everyone is not efficient and easy handy. Most of them are expensive and microcontroller-based systems. There are various techniques to check the productivity of crop by measuring soil fertility and monitoring soil moisture evolution using a wireless network. Continuously sampling moisture levels with these soil moisture sensors incurs high maintenance and energy consumption costs, which are particularly undesirable for wireless network. Our main hypothesis is that a sparser set of measurements can meet the monitoring objectives in an energy-efficient manner. One of which is automated motor pumping by detecting whether soil is wet or dry and fertilizer level. Our system makes use of two devices such as Hygrometer which is used to measure the soil moisture and fertilizers level and GSM which is used to access worldwide to control the water pump and soil sensor. And if we using devices soil test kit which is used to measure the nutrient of soil after measuring the value switch on the fertilizer tank by using Solenoid valve. Here, we use a cell-phone based remote controller for controlling it. By making a call to the GSM that is attached to the controller, the water pumps the fertility tank valve and the soil sensor can directly be activated. The pumping motor will pump the water into the field by until the field is wet which is continuously monitor by the microcontroller and fertilizer level is less or more measured to get status by phone will open the fertilizer tank to pass on water flow.

2. An Overview on Some Previous System:

In some of the irrigation system scheduling is achieved by monitoring soil, water status with tension meter under drip irrigation by the automation controller systems in sandy soil. Continuously sampling moisture levels with these soil moisture sensors incurs high-maintenance and energy consumption costs, which are particularly undesirable for wireless networks. By using this sensor, we can find whether the soil is wet or dry. If it is dry, pumping motor will pumps the water. In this system, the main controlling device is microcontroller. The pumping motor will pump the water into the fields by until the field is wet which is continuously monitor by the microcontroller.

3. Block Diagram:

In this architecture diagram proposed in the measuring soil moisture based on wet or dry conditions system, controlling water pumping and maintaining fertilizer tanks with measuring soil nutrients.

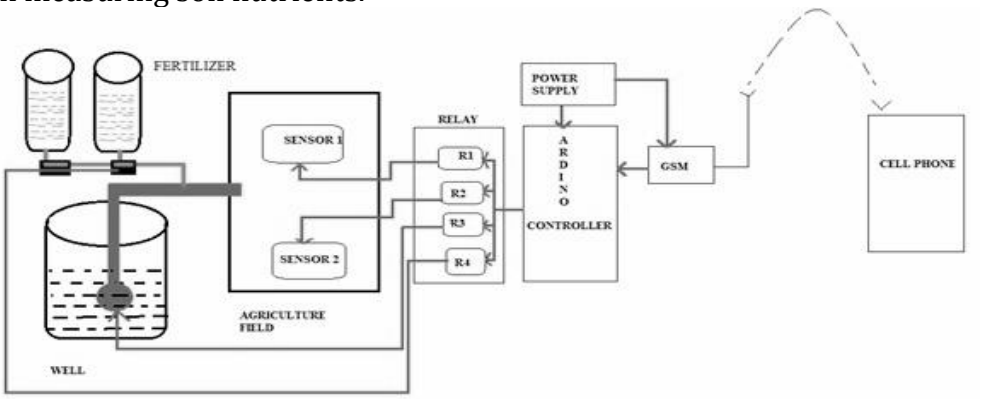

Figure 1: Architecture of the Proposed System

3.1 GSM Modem:

A GSM Modem is a specialized type modems which accept a SIM card, operates over a subscription to a mobile operator, just like mobile phone. GPRS module is a breakout board and minimum system of sim900 Quad-band/SIM900A Dual-band GSM/GPRS module. It can communicate with controller via AT commands (GSM and SIMCOM enhanced AT commands). This module supports software power on and rest. It is used to sending and receiving options available these system and MMS, SMS, Voice controlling are there technologies possible.

Figure 2: GSM Modem Sim900

3.2 Arduino Microcontroller:

Arduino is a single-board microcontroller to make using electronics in multidisciplinary projects more accessible. The hardware consists of a simple open source hardware board designed around an 8-bit Atmel AVR microcontroller, or a 32-

bit Atmel ARM. The software consists of a standard programming language compiler and a boot loader that executes on the microcontroller.

Figure 3: Arduino Microcontroller

3.3 Soil Sensors:

Soil moisture sensor measures the volumetric water content in soil.Since the direct gravimetric measurement of free soil moistures require removing, drying, and weighting of a sample, soil moisture sensors measure the volumetric water content indirect by using some other property of the soil, such as electrical resistance, dielectric constant or interaction with neutrons, as a proxy for the measured property and soil moisture must be calibrated and may vary depending on environmental factor such soil type, temperatures or electric conductivity**.**

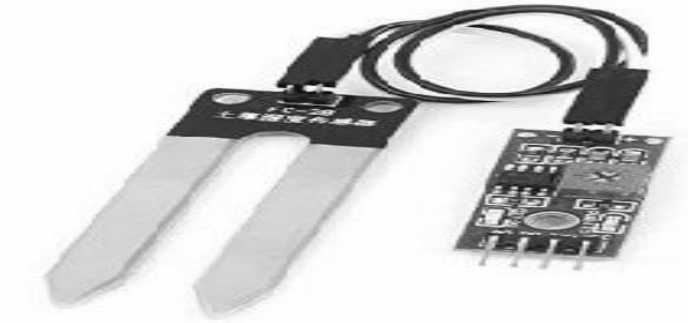

Figure 4: Soil Sensor

3.4 Water Motor:

One sort of pumps once common worldwide was a hand powered water pump, or 'pitcher pump'. It would be installed over the communities' water well that was used by people in the days before piped water supplies.

3.5 Relay Board:

A relay is an electrical operate switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays were used extensively in telephone exchanges and early computers to perform logical operation.

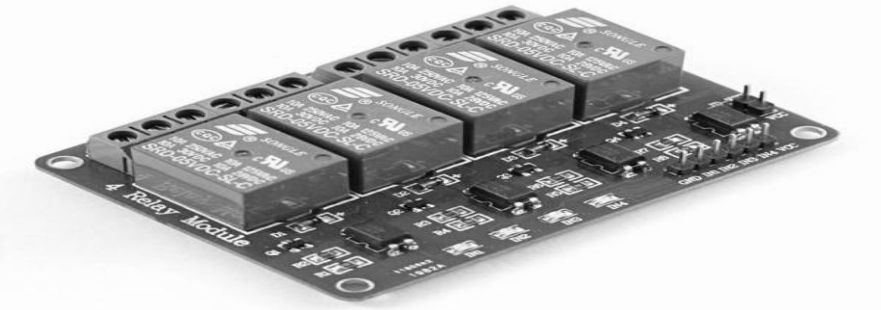

Figure 4: Four Channel Relay

3.6 Solenoid Electric Valve:

It is electric water flow gate valve used to control on water flows. Switch on or off System. If we have on the switch valve has been opened and off mode gate valve is closed.

Figure 5: Solenoid Valve

4. Conclusion:

The Soil moisture and fertilizer content based irrigation system was developed and successfully implemented along with flow sensor. To identify dry or wet state measured the soil after controlling the water pumping via cell phone. Then measured the nutrient of soil measuring soil test kit if soil strength is lesser if we can open the fertilizer tank to passes through water pump to mix with water and fertilizer directly passed on plant or crops.

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