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Internet on Things Based Farm Watering System

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ABSTRACT: In India the rural areas are not so advanced in new farming techniques. The peoples in rural area are still doing farming by old ways though they are facing problems with water, electricity and labour work. The new advanced farming is not possible for all peoples due to its economically high cost. This is a small try to solve everyday problems of such farmers. The agriculture automated water control system proposed here is based on internet of things (IoT) and ESP8266 Module. It is low cost system as it involves esp8266 Module and some sensors. The farmers can control function of water pump from anywhere through an android device or internet.

KEYWORDS: Internet of Things (IoTs), ESP8266 Module, android device, new farming techniques, soil moisture sensor etc.

I. INTRODUCTION

Though new farming techniques are innovated they are not used by all farmers because of their high cost implementation and maintenance. Thus, farmers are likely to go for an ordinary farming. The main problem in such farming is the water supply for the crops. In some cases farmers have to be present in the farm to see the proper water supply and to switch off the motor pump. At some places farmers are anxious to go to farms in night due to fear of carnivorous animals like tiger. In such cases it is very helpful if the farmer can handle all these things from the home or from anywhere through internet. The system proposed here is basically designed for this purpose. It uses soil moisture sensor, esp8266 as an interface for internet of things (IoTs). The internet of things (IoTs) where sensors and devices transmit data directly to the internet has become an enabling technology eco-system with several application areas [1].

II. RELATED WORK

Many automated systems are developed for farming. Most of them are designed for Green House and irrigation system. Mr. Nerella Ome and Mr G. Someswara Rao [1] have developed a system to monitor the weather conditions at a particular place by Internet of Things (IoTs) based sensors to cloud system using ESP8266 and ArduinoDue. In this system the sensors directly transmit data to internet which is also stored there in cloud for future use. A smart irrigation system using internet of things is developed by Mr. Babanna Kumbar [2]. This system is based on Wi-Fi module which directly connects the system to internet. The water supply for irrigation system is controlled by using two solenoid valves. The system is monitored and controlled by MQTT server through internet.

K. Priyanka Gandhi *et al.* [3] proposed an embedded system for monitoring and automatic controlling a green house in a field. IoT technology is used to collect the data from the sensors and is used for e-farming applications in real-time. In this system water supply through sprinklers is controlled according to the collected data. “Solar powered wireless monitoring system of environmental conditions for optimized irrigation in agriculture” is developed by Paolo Visconti and PatrizioPrimiceri [4]. The sensor circuits communicate with the central processing unit present on the Wi-Fi module and the data is collected by a tablet or smart phone with the help of appropriate app. The entire system works on solar power generated by a small PV solar panel.

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III. IMPLEMENTATION OF THE SYSTEM

The system is divided in to three parts viz Sensor circuit, IoTs interface module with relay circuit for water pump, and solar power supply. The solar panel provides power required to run sensor circuit and processing unit i.e. ESP2866 module. The sensor circuit uses soil moisture sensor and solar panel for DC power supply.

Block diagram of the system:

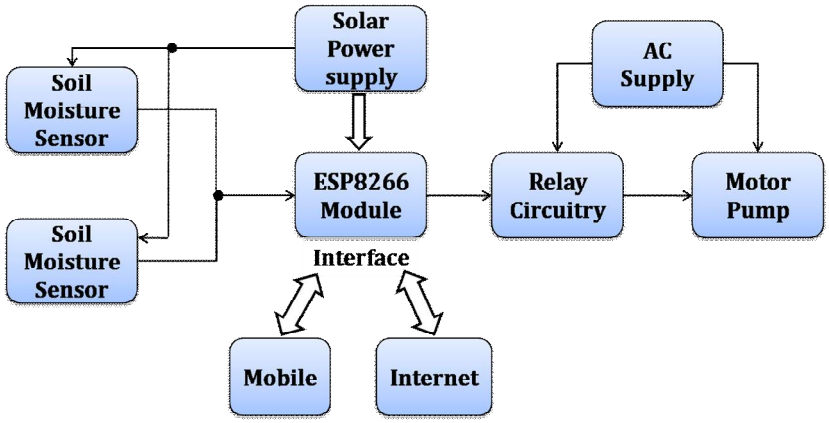

Figure1. Main Systems block diagram

Solar Power Supply:

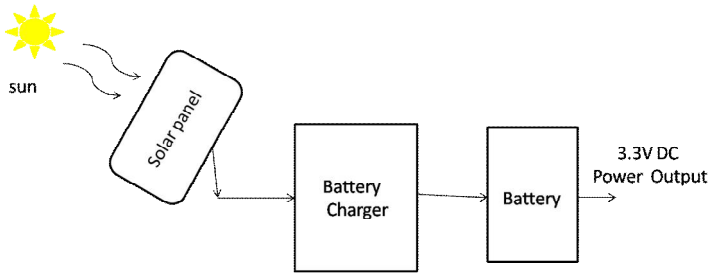

Figure2. Solar power supply with battery

For each sensor circuit separate solar power supply with battery is attached. Whenever there is no solar energy available, the sensor works on the battery supply. The Wi-Fi module also works on solar power supply. This module is placed near to the pump and relay circuit. The motor-pump is switched on and off by using this relay circuit.
The ESP8266 Wi-Fi Module derives a 5V input via a USB cable. The ESP8266 can withstand a maximum of 10V. The 4 channel relays derive a 5V input via jumper wires connected through the two headers i.e. the VCC and the GND. The four relays can be connected independently by connecting the headers to the 4 GPIO pins provided on the ESP8266

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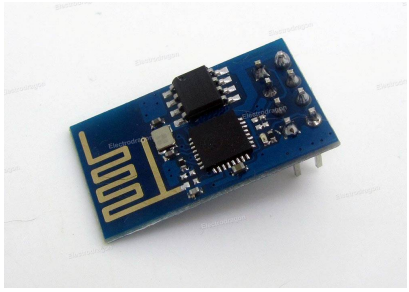
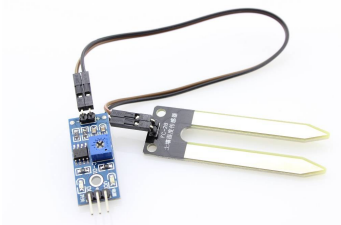
module. The 5V derived by the relays can be used to control the internal electromagnetic switches which can be used to control any connection which ranges to a maximum of 220V.

ESP-8266 Wi-Fi MODULE



The ESP8266 Wi-Fi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. Each ESP8266 module comes pre-programmed with an AT command set firmware. This module has on chip storage capability that allows it to be integrated with the sensors and the other devices through its GPIOs.

Soil Moisture Sensor Module:



The soil moisture sensor module consist of LM393 comparator which gives active low level output when soil is dry and active high level output when soil is wet. This digital output is routed to the Wi-Fi module of sensor.

The ESP8266 chip can be operated in three different modes with regards to power consumption; active mode, sleep mode and deep sleep mode. In sleep mode, the radio module is turned off whereas watchdog timer is active. The Wi-Fi module can be turned on and off by using timer. Whenever the soil gets wet it sends signal to ESP8266 and to smart device. This signal is processed and then proper relay is activated to turn off the water pump. The on and off operation of the water pump can also be automated by using timers.

IV. RESULT AND DISCUSSION

At very low cost and easy way one can put sensors on internet. By using this system the farmers can handle operation of water pump from any place by using smart phone, tablet or internet on PC. Due to solar power supply the whole system becomes wireless.

V. CONCLUSION AND FUTURE WORK

Thus, in the farm, one can detect where the water's availability is low, when to switch on and off the water supply through pump. A small PV panels on sensor keeps them in working in night also by charging the rechargeable battery in daylight. The whole system can be controlled by using smart app on smart phone or PC. In future, it is possible to remove any obstacle came in the flow of water by using small robots equipped with web cameras.

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