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Water Management in Agricultural Field using IoT

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Abstract - *The name agriculture represents all entities that came under the linear sequence of links of food chain for human beings. As we know in present era there is need of soil ,humidity and temperature monitoring system which is based on the technology of Internet of things .Now farmer don't know the current status of their soil moisture and in that case some time there crops will die, Similarly some time due to extra water level those crops are under danger condition and the quality of soil is decreases or it becomes salty so the production is going to decreases so to avoid this type of issue there is need of soil moisture and environmental temperature monitoring system. It is useful to the farmer can take a decision for their crops .Now a days one of the important applications of IOT is Smart Agriculture. Smart Agriculture reduces wastage of water, fertilizers and increases the crop yield. Here a system is proposed to monitor crop field using sensors for soil moisture, humidity and temperature. After monitoring these parameters the irrigation system can be automated if soil moisture is low.*

Key Words: Soil moisture sensor, IOT, Arduino Kit, Arduino IDE.

1. INTRODUCTION

Now a days world is trending towards new technologies. Many more R&D activities are done in the field of agriculture, automobile industries and IT industries for the automation .For the automation various technologies are used like IoT, Big data analysis, Hadoop, data mining etc. In the current paper we focused on agricultural development using IoT. Hence automation must be implemented in agriculture to overcome problems which occurred in agriculture.

The farmers are facing a number of challenges to increase the productivity of the crops without affecting the product quality in the agriculture domain. Atomation agriculture systems aim to

1) minimizing the cost by managing the agriculture resources

2) reduce the time and efforts

3) Conserve the water and energy.

Which are the most important resources in agriculture and their availability in farming areas is one of the existing challenges by implementing IoT to conserve power, and the automatic irrigation methods instead of the traditional scheduled irrigation methods to conserve the water reduce the time and efforts design a user friendly interface assist farmers to monitoring and controlling their farms remotely from anywhere and anytime.

Internet of Things (IOT) term represents a general concept for the ability of network devices to sense and collect data from agricultural field, and then share that data across the Internet where it can be perform analysis and gives interesting patterns of the results for various interesting purposes. The IOT is comprised of smart machines interacting and communicating with other machines, objects, environments and infrastructures. Now a day's every persons are connected with each other using lots of communication way. Where most popular communication way is internet so in another word we can say internet which connect peoples.

1.1 Literature Survey

The new scenario of decreasing water, drying up of rivers and tanks, unpredictable environment, present an urgent need of proper utilization of water. To cope up with this use of temperature and moisture, sensors are placed at suitable locations for monitoring the crops. After research in the agricultural field, researchers found that the yield of agriculture is decreasing day by day. However, use of technology in the field of agriculture plays an important role in increasing the production as well as in reducing the man power. Some of the research attempts are done for betterment of farmers that provide systems which use technologies helpful for increasing the agricultural yield. By using IoT sensors sense data from agricultural field and accurately feed the data into the repositories. This idea proposes a novel methodology for smart farming by linking a smart sensing system and smart irrigation system through wireless communication technology. It acquire the soil moisture, Humidity, temperature from various locations of field and as per the need of crop water motor is enabled .It proposes an idea about how automated irrigation system was developed to optimize water use for agricultural purposes.

1.2 System Overview

The project consists of four major components; Arduino Kit, WaterScout SMEC 300 Soil Moisture/EC/Temperature Sensor, Relay.

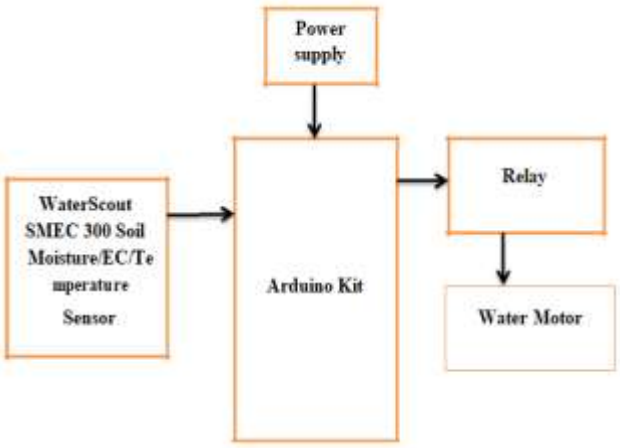
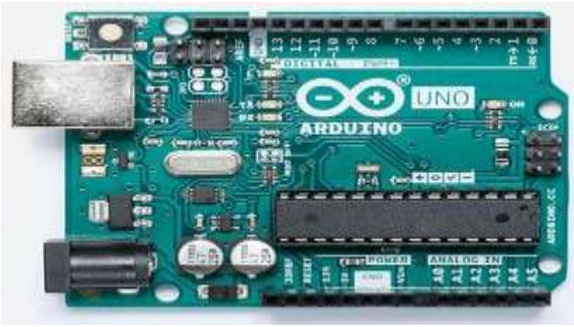


Fig-1: Block diagram of System

2. Description of the components

1. Arduino Kit:

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board. The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board – you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, python making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the microcontroller into a more accessible package.



2. WaterScout SMEC 300 Soil Moisture/EC/Temperature Sensor:

Identify situations where soil salinity is an issue or where certain moisture and temperature conditions facilitate soil-borne diseases.

Features:

- Capacitance-type soil moisture sensor
- Carbon ink electrodes provide large measuring surface for electrical conductivity (EC)
- Easy, 1-step EC calibration process.
- Can be read with the FieldScout® Soil Sensor Reader (Item 6466) or WatchDog® 2000 and 1000 Series Stations
- Connect up to 4 sensors per station (see the SpecSheet in "Manuals / Literature" for specific station limits)
- WaterScout Calibration Device (Item 6470CAL3V) required unless using Soil Sensor Reader (Item 6466) Specification:
- Standard Interface: WatchDog station, FieldScout soil moisture reader
- Range: VWC: 0% VWC to saturation, EC: 0 to 10 mS/cm, Temp: 33 - 175°F (0.5 - 80°C)
- Resolution: VWC: 0.1%, EC: 0.01 mS/cm, Temp: 0.1°F (0.1°C)
- Accuracy: VWC: 3%, EC: ± 2%, Temp: ± 1.4°F (0.8°C)
- Cable Length: 6 ft (1.8 m) and 20 ft (6 m) standard, extendable up to 50 ft (15 m)
- Power Requirements: 3V @ 6 to 10 mA
- Output: Analog voltage, time division multiplexed
- Sensing Area: 2.25 in. x 0.75 in.

3. Relay:

Relays are switches that open and close circuits electromechanically or electronically. Relays control one electrical circuit by opening and closing contacts in another circuit. As relay diagrams show, when a relay contact is normally open (NO), there is an open contact when the relay is not energized.

4. Software used:

a)Python:

Python is an interpreted high-level programming language for general -purpose programming. Created by Guido van Rossum and first released in 1991, Python has a design philosophy that emphasizes code readability, and a syntax that allows programmers to express concepts in fewer lines of code, notably using significant whitespace. It provides constructs that enable clear programming on both small and large scales.

3. CONCLUSION

The sensors are successfully interfaced with Arduino Kit. Implementation of such a system in the field can definitely help to improve the yield of the crops and aids to manage the water resources effectively reducing the wastage and increasing soil quality.

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