

## Systematic Irrigation application - Lawn Care

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**Abstract** - In this competitive world, it becomes necessary to capture and monitor the usage of water. The Project aims at autonomous monitoring of irrigation system in the small-scale plantation with a view to eradicate manual work. Hence, our system will monitor humidity and temperature value. With help of this information, the right of releasing water from the pump is decided and fed to a micro controller system with Wi-Fi module which supervises and controls the whole irrigation system. The objective of this Lawn Care application is to monitor the moisture content of soil and control water supply.

**Key Words:** Internet of Things (IOT), Soil moisture Sensor, Microcontroller, Ultrasonic Sensor.

### 1. INTRODUCTION

Water is the most essential source in our day to day life. Its use has been growing at more than twice the rate of Population increase in the last Century. Surface and ground waters support a variety of human uses including drinking, irrigation of crops and landscape, industrial process, domestic applications and in small scale Plantation like Lawn. Newly Planted lawns need more frequent irrigation than established lawns. Irrigation is the method in which amount of water is supplied to Lawn at regular intervals of time whenever needed. Irrigation has other uses too. For Example Protecting Plant from Frost, suppressing the growth of weed in grain fields and Preventing Soil Consolidation. Smart Irrigation is sustainably managed, accountable, responsible and Trusted Irrigation. Smart Irrigation aims to minimize their environmental Footprint through efficient water use. This allows them to reinvest in new and improved technologies which ensures sustainable and responsible irrigation over time. The irrigation System can supply water efficiently. By using Internet technology and sensor network technology we can control water wastage and to maximize the scientific technologies in irrigation methods. Hence, it can greatly improve the utilization of water and can increase water productivity.

The Internet of Things is a technology where in a mobile device can be used to monitor the function of a device. The Internet of Things is concerned with interconnecting communicating objects that are installed at different locations that are possibly aims to minimize their environmental Footprint through efficient water use. This allows them to reinvest in new and improved technologies

which ensures sustainable and responsible irrigation over time. The irrigation System can supply water efficiently. By using Internet technology and sensor network technology we can control water wastage and to maximize the scientific technologies in irrigation methods. Hence, it can greatly improve the utilization of water and can increase water productivity. The moisture level of the soil is detected using the soil sensor and the value from the sensor is given to the microcontroller. This microcontroller is also connected to the relay unit to switch ON/OFF the pump motor and a sensor to detect the water level. The pump motor is used to pump water from the tank, and the water is supplied to the soil. The application is used to switch ON/OFF the pump motor and a water level is displayed in it.

### 2. LITERATURE SURVEY:

As we went through some relevant papers, we found that the soil is one of the natural resource whose pH property is used to determine the degree of acidity. This Ph value in the soil affects the plant growth. The pH value of the soil is determined by capturing the image using Pi camera [1]. Automatic Irrigation System on Sensing Soil Moisture Content is to create an automated irrigation mechanism which turns the pumping motor ON/OFF is detected only by the moisture content of the soil [2]. Automatic irrigation system using wireless technology can provide efficient system capable of conserving resources and human effort [3].

### 3. HARDWARE REQUIREMENTS:

#### 3.1 SOIL SENSOR:

Soil sensor is used to detect the moisture content of the soil. It consists of two probes which are used to measure the volumetric content of water. The two probes allow the current to pass through the soil and then it gets the resistance value to measure the moisture level. The working voltage of soil sensor ranges from 3.3V-5V.

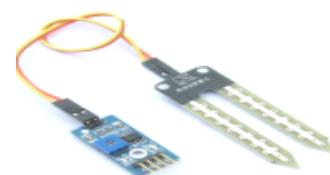


Fig -1: Soil Sensor

### 3.2 ULTRASONIC SENSOR:

It measure distance by using ultrasonic sound waves.The sensor head emits an ultrasonic wave and receives the wave reflected back from the target.Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception.



**Fig -2:** Ultrasonic sensors

### 3.3 THE AMICA ESP8266 Wi-Fi MODULE:

It is a self contained System on chip with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The Arduino Microcontroller is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.



**Fig -3:** Microcontroller

### 3.4 A DC MOTOR:

DC Motor converts direct current from Electrical Energy into Mechanical energy. This motor is used in household appliances such as vacuum cleaner, cordless power tools such as air compressor, drill and screwdriver and cordless garden tool and in toys. DC motor's speed can be controlled over a wide range, using either a various supply voltage or by changing the strength of current in its field windings.



**Fig -4:** DC Motor

### 3.5 RELAY UNIT:

It is a switching device as it works to isolate or change the state of an electric circuit from one state to another. A useful property of relays is that the circuit powering the coil is completely separate from the circuit switched on by the

relay. Relay Unit are used where the safe low-voltage circuit controls a high-voltage circuit.



**Fig -5:** Relay Unit

### 3.6 BATTERY (9V):

Battery is used with extremely low power consumption devices that can be expected to last approximately for 6 years.



**Fig -6:** Battery

## 4. SOFTWARE REQUIREMENTS:

### 4.1 FIREBASE:

It is the real-time database and provides backend as a Service. The Firebase data is representing JSON objects. If we open the application from Firebase dashboard, then we can add the data manually by clicking on the + sign. It allows us to build more flexible real-time application easily with minimal effort.

### 4.2 ANDROID STUDIO:

The version used in this project is Android Studio 3.1.4. It provides the interface for users to create applications and to handle much of the complicated file management. The Programming language used in this android studio is Java. It may be either used in Kotlin Language. If we use java, it will be installed separately on the system. Android Studio will give access to Android SDK or Software Development Kit. It enables to run your code, either through an Emulator or through a piece of hardware connected to system.

### 4.3 JAVA:

Java has been developed by Sun Microsystems and it is high-level programming language. It was originally designed for developing programs for handheld devices for creating web applications. The programs are not compiled into executable files and they are compiled into byte code which the JVM (Java Virtual Machine) then executes at runtime.

#### 4.4 ARDUINO SOFTWARE:

Arduino software is open-source electronics platform based and easy to use hardware and software. The Arduino Software also known as Arduino Integrated Development Environment (IDE) contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus.

#### 5. OVERVIEW:

The "Systematic Irrigation application - Lawn Care" consists of two main functional units such as control unit and sensing unit. The control unit consists of microcontroller to store the sensor values and control their operations. The sensing unit consists of the soil moisture sensor to sense the soil condition and ultrasonic sensor to measure the water level of the tank. The AmicaESP8266 microcontroller which is capable of connecting to the Wi-Fi, stores the sensor values and update into the database. A User can monitor the soil condition of the lawn whether it is dry or wet through the Lawn Care application. If the soil is dry, check for the water level in the tank and then switch on the motor button in the application to supply water to the Lawn. If the soil is wet enough close the application. By using this system, the user can access the details about the condition of the field anywhere at any time.

#### 6. METHODOLOGY:

The automation of the irrigation system becoming increasingly important, as water resources must be used efficiently and small scale planting must also be increased. The system is used to automatically turn the valves ON or OFF according to the plants water requirement. The system is used for the application's sensing, monitoring and control.

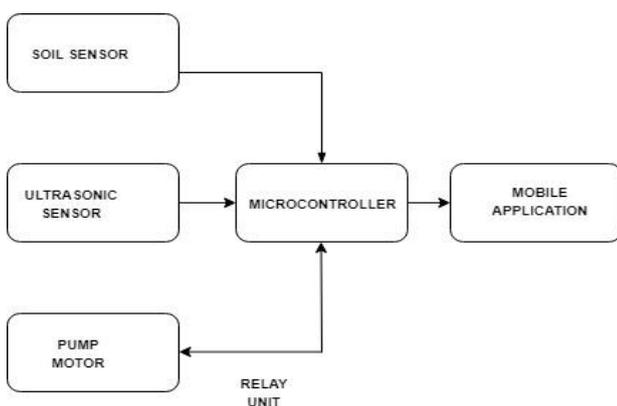


Fig -1 Block Diagram

#### 7. PROPOSED SYSTEM:

Nowadays in this busy world people are facing a lot of problems due to lack of water resources. In order to help the people to overcome the difficulties, Smart Irrigation system has been introduced in the Lawn. In our application soil

moisture, sensor is connected to arduino micro controller. The sensed values from the sensors are stored to firebase. Depending on the soil condition, the pump will be automatically switched ON or OFF by the relay circuit. The user will be intimated about the soil condition through Wi-Fi module and also gets updated. The Proposed System of our project will be highly beneficial for Small scale Plantation such as Lawn and gardening, etc. The Systematic Irrigation has been developed and controlled through Lawn Care application and can access the details about the soil condition of Lawn anywhere at any time.

#### 8. CONCLUSION:

In order to optimize water resources for agricultural production, the implemented automated irrigation system was found to be feasible and cost effectively. This irrigation system allows cultivation in areas with water shortages to improve sustainability. Due to the updating of soil condition user can fetch the water to soil at anytime, anywhere using Wi-Fi module.

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