# IOT BASED SMART IRRIGATION SYSTEM

[1]Sanil Rodrigues, [2]Lester Lopes, [3]Garima Tripathi

[1,2]Student, [3]Asst. Professor, [1,2,3]Fr. Conceicao Rodrigues college of Engineering, India,

rods.sanil30@gmail.com, lopeslester@gmail.com, garima@frcrce.ac.in

**Abstract**: **The Internet of Things (IoT) is transforming the agriculture industry and enabling farmers to content with enormous challenges they face. As water supply is getting depleted in today's world there is an urgency of adopting smart ways of irrigation. The project helps to describes how irrigation can be handled smartly using IOT. This project also aims at saving time and avoiding problems like constant vigilance. It is implemented to helps in conserving water by automatically providing water to the plants/field depending on the water requirements.**

***Keywords — Soil moisture sensors, IOT, Arduino, Microcontroller, Wi-fi Module.***

## I. INTRODUCTION

Agriculture is regarded as the basis of life for us as it is the main source of food and other raw materials. It plays vital role in the growth of country's economy. Growth in the agricultural sector is necessary for the development of economic condition of the country. In India majorly of the irrigation system are manually operated one's. These outdated techniques are replaced with newly automated techniques. Our devices are getting smarter each day from smartphones to smart TV to smart car. Everything is now getting connected to Internet. Internet of Things (IoT) describes a network of physical objects that connect to each other through the internet. The system designed is programmed to irrigate at regular time intervals for predefined periods of time. In this technique, soil moisture sensors are being placed at root zone of plant and near the module and gateway unit handles the sensor information and transmit data to the controller which in turns operates the of control the flow of water through the valves.

The proposed system will help the farmers to continuously monitor the moisture level in the field, controlling the supply remotely over the internet. When moisture drops below a certain level, sprinklers would be turned on automatically, thus helping achieve optimal irrigation using Internet of Things.

## II. PROCEDURES FOR PAPER SUBMISSION

### *A. Review Stage*

In A Control System and Remote Measurement for Green house Based on GSM-SMS [4] they introduced a GSM based remote measurement and control system for greenhouse based on server database system connected with base station. Base station is developed by using an Arduino, GSM module, sensors and actuators. Onsite operation, the central station receives and sends messages through GSM module. Parameter values to be measured in base station is set by Server, and later in base stations parameters including the temperature of air and humidity of air.

IND et al. (2013) [5] primarily focuses on reviews in the field of remote observation and control, the technology used and their potential benefits. The paper proposes an innovative GSM/Bluetooth based remote controlled system for irrigation. The irrigation time is set by the system automatically depending on the air temperature and atmospheric humidity reading from different sensors and type of crop the farmer can cultivate or can automatically irrigate the field when unavailable. Information is transferred between designed system via SMS on GSM network. A wireless module is attached with the microcontroller chip which eliminates the SMS charges when the user is present in the field or within the specific range of the system.

In [6], R. Suresh et al. (2014) mentioned about using automatic microcontroller-based rain gun irrigation system in which the irrigation will only take place when there will be intense requirement of water that save a large quantity of water. These systems bring a change to management of field resource where they developed a software stack called Android is used for devices that include an operating system, middleware and key applications. The Android SDK provides the essential tools and APIs necessary to begin developing of applications on the Android platform using the Java programming language. Mobile phones nowadays have almost become an integral part of us serving multiple needs of humans. This application makes the use of GPRS feature of mobile phone as a solution for irrigation control system.

In IOT SMS alarm system based on SIM900A [7], an IOT alarm system based on SIM900A module of SIMCOM Company was designed for greenhouse. This system can gather environmental parameters such as air temperature and air humidity Adding to it, with the use of AT command,

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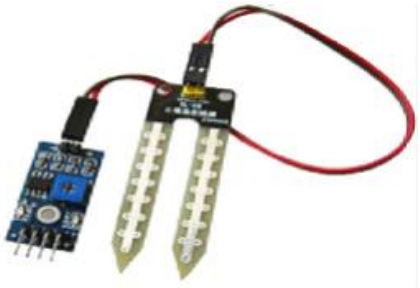
this system can also realize SMS automatic sending and receiving, environmental parameters over-run alarm and insufficient balance alarm. Through the system setting, the alarm message helps to sent to the user-specified mobile phone automatically irrespective of users' location is. This system is a typical application of IOT in the agriculture has got some satisfactory results in the actual operation performed.

*B. Final Stage*

This system combines hardware and software components. The hardware part consists of different components like sensors, Arduino board, Wi-Fi Module whereas the software part consists of a Web based application connected to the Arduino board and other hardware components using Internet of Things (IoT). The web-based application consists of signals and a database in which readings are displayed from sensors and are inserted using the hardware. The improvement in field irrigation system using wireless modules is a key solution to achieve water conservation as well as improve irrigation process. This research tries to automate the process of irrigation on the field by monitoring the moisture of the soil relative to the plant being cultivated and the adaptively sprinkling water to simulate the effect of rainfall.

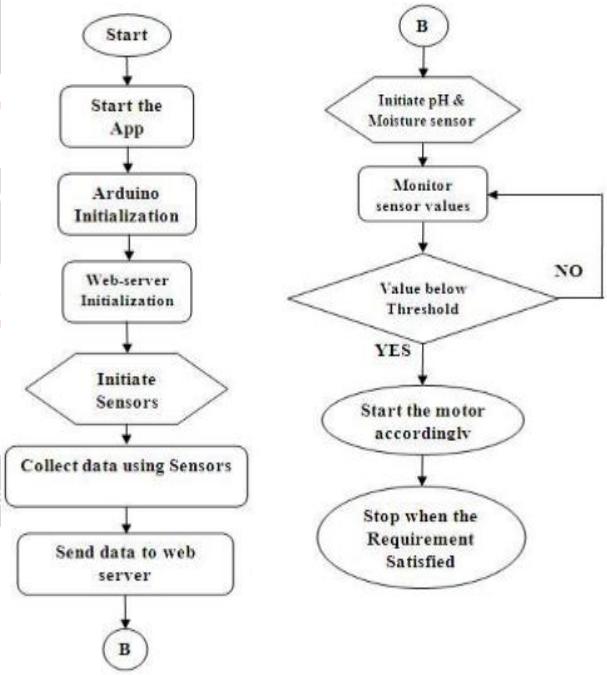
A. Moisture Sensor: The Soil Moisture Sensor is used to measure the volumetric water content in the soil. This makes it best for performing experiments in plants by having regular information about the amount of water currently present in soil and accordingly providing water to the plants for proper nourishment. This also includes constant checking of moisture content in soil and sending the readings to the android application. If the moisture content is less than the threshold value (which is pre-fed into the Arduino board), a prompt message is sent to the device and automatically a sprinkler connected to the Arduino will start sprinkling water on the affected area.



B. pH Sensor: The pH sensor checks the alkalinity and acidity of the soil. It is very important to maintain a hydroponic nutrient solution at a pH level where the nutrients are consistently available to the plant. If the content of the soil solution is too acidic or too alkaline it can cause even lock up in such a situation which restricts certain elements essential for growth from being absorbed by the root structure. Deficiencies in the required elements become apparent in the plants growth and can leads to plant death at many times. Additionally, the pH of the water we drink is crucial to our health as well.

C. Arduino: Arduino is an open source computer hardware and software company, project and user community. It is usually suggested as the best board to get started with electronics and coding.

*C. Algorithm*




## III. PROPOSED ALGORITHM

**Flowchart**

**Algorithm:**

It states the Proposed system undergoes.

Step 1: Start the process.

Step 2: Initialize power is supplied to the Arduino, in order to activate the sensors.

Step 3: Check the moisture level. (less than or more than)

Step 4: If the moisture level is more than the threshold value than no need to irrigation and jump to step 8.

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Step 5: If the moisture level is less than the threshold value than, start the irrigation.

Step 6: Initialization of pump by opening the valve.

Step 7: Close the valve after the process complete, and system jumps to original state.

Step 8: Stop the Process.

## IV. CONCLUSION

This project presents the design of an IoT based automatic irrigation system. The proposed System can reduce the efforts of farmers and provides high yields. It also conserves water for irrigation by locating the sensors at right position above the soil level. this work has shown that the plants can still sustain at low moisture level when the temperature is moderate. Analysing more than one parameter has made this system an efficient for managing the field.

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