

# IOT Based Smart Irrigation System (Internet of Farming)

<sup>1</sup>Rajiv R Bhandari, <sup>2</sup>Khushbu S. Bafana, <sup>3</sup>Nilam P. Bafna, <sup>4</sup>Divya S. Bhansali, <sup>5</sup>Ujwala J. Pagar

<sup>1</sup>Assistant Professor, <sup>2,3,4,5</sup>Students

Department of Computer Engineering,  
SNJB's Late Sau K. B. Jain College of Engineering, Chandwad, Nashik

## Abstract

India is the country of agriculture which plays an important role for development of country. In India there are near about 80% people who work as farmers. The irrigation plays important role in Indian agriculture field. The existing system was providing option of missed call and message alert, but the drawback of this previous system was if it did not have any network in mobile it will not work until and unless the network is available or if the mobile get damaged then user need to re-install the complete system again, which was cost consuming. The main purpose of this system is to improve the agriculture by enhancing the technology using Wireless Sensor technology. The proposed system will be based on android application which will help the farmer to manage the farming resources. Android, Wireless Sensor networks and IOT plays a major role in Smart agriculture. In our smart irrigation system we are using Medicine, Fertilizer, Pesticides and Water in liquid form. Our system consists of three techniques to spread the combination of liquid in farms. Main feature of Android application are as follows: Drip system, Sprinkler and Drone system. Our proposed system consists of an android application for automatic ON/OFF of motor, which will reduce human efforts. With the help of application we will check whether electric supply is present or not. If not then the control and working of the system will be transferred to solar panel. Our system provides an alarm system for automatically motor ON /OFF in absence of user. Sometimes android mobile may get damaged so there is alternative option that is SMS base system. Farmer wants to keep all their results so they can have access to database anytime they want by using this application.

**Keywords:** Internet of thing, Irrigation, Wireless Sensor Network, Drip system, Drone, Sprinkler, Relay, Solar panel

## Introduction

### Overview

Generally farming or agriculture is considered as the biggest task for farmer's life. Organizing such farming requires considerable hard work planning of time. It is really a hectic job to manage a agriculture like irrigation system. On the top of that planning for successful vegetable crops can make a farmer crazy for about 3-4 months. To easy this job farming agriculture irrigation system is an android application and sprinkler an automatic motor on/off without miscall, which can assist people and also provide the solution with respect as their problem smart agriculture is a multidisciplinary approach. With focus on increasing productivity example. Vegetables crops.

### Need of system

- As we know it takes a lot of time and effort to transport substances over long distances, You don't want to spend hours with the suppliers.
- It should be cost effective and quality of substances should be maintained.
- You don't need to worry about the cost and spreading substances and motor on/off.
- Your farm planning experience should be enjoyable and unstressfully.
- We can provide the alternative solution when mobile application can be damage and electric city is not present.

### Working

Problem regarding medicines, fertilizers, pesticides In liquid form and automatic motor on/off farmer observed during agriculture management can be overcome by android application named as irrigation system. This application can depend on some components in following way.

The medicine is science and practice of treatment and prevention of disease and promotion of crops health. We can provide one tank for medicine .This tank is connected to the water tank. After few days when crops will not able to grow, Medicine can be provided in liquid form for their growth.

### Fertilizer

Fertilizers are help for farmers feed our growing population .Plants require 17 essential nutrients in soil to survive and to grow .Fertilizer is applied with more control to match crop need and protect the environment .We can provide one tank for fertilizer .This tank is connected to the water tank. It can be provided to roots.

### Pesticides

Pesticide used for destroying insects or other organisms harmful to cultivated plants. Chemical substance designed to kill growth of pests that damage with growth of vegetable crops. We can provide one tank for pesticides .This tank is also connected to the water tank. It is given for maximum 4 to 5 sec. It should not touch the root so we can use sprinklers system.

### Drip System

In drip irrigation, water and other substances are flow b to the plants via pipes having small holes or spaced along the pipe. The water, fertilizer and medicine tank can be provided by separate pipes. Then these three pipes are connected into one pipe and this one pipe can be connected to the Drip System.

### Sprinkler

An **Irrigation sprinkler** is a device used for spreading the water and other substances similar to natural rainfall. It is then sprayed into the air through sprinklers so that it breaks up into small water drops which fall to the ground. We are sprinkler can be used for water, Pesticides. Pesticides and water tanks can be connect to the Sprinkler. With the help of sprinkler in farm we can provide the Pesticides and water.

### Solenoid value

A solenoid value is an electrochemically operated value. The value is controlled by an electric current through a solenoid n the case of two part value the flow is switched on or off in case of three part value the outflow is switched between the outlet parts. Solenoid value can be connect the water, medicine, fertilizer, water and Pesticide.

### GSM (GLOBAL SYSTEM MOBILE COMMUNICATION)

GSM is a cellular network, which means that cell phones connect to it by searching for cells in the immediate vicinity. GSM networks operate in a number of different carrier frequency ranges, with most 2G GSM networks operating in the 900 MHz or 1800MHz bands. Regardless of the frequency selected by an operator, it is divided into timeslots for individual phones.

The system GSM 800 version can be used .The hole system is depended on GSM model and is supported to automatic motor. By using this system the water can be directly transferred from well to field and other substances tank to field..

### Motor

An electric motor is an electrical machine that converts electrical energy into mechanical energy. The reverse of this is the conversion of mechanical energy into electrical energy and is done by an electric generator, which has much in common with a motor.

### Objective

- Design and development of Android based mobile application.
- Develop an application which will easily manage the farm work.
- Develop such an application which will also reduce the hard work ,the time required for managing farming.
- Develop such an application which will work according to the user's plan.
- User decides the theme and can choose the option for spreading substances.

Without any man work, motor can be automatic on with the help android application.

## II. Literature Survey

Many number of base papers are available related to this kind of invention and technology but we have referre only a few of them.

| Paper Name  | Year | Techniques Used   | Finding   |
|---|------|---|---|
| Manish R. Joshi et al introduce about the A survey of SMS based Information Systems                       | 2015 | "SMS based information retrieval systems". It could be considered as the most favorable outcome of mobile technology. Users can able to send a command/ query from their handsets also access the database, knowledge base, web based data from the service   | <p>Advantages:</p> <ol style="list-style-type: none"> <li>1.It is fast and Speedy</li> <li>2. Work time required is less.</li> </ol> <p>Disadvantages:</p> <ol style="list-style-type: none"> <li>1.Sometimes, due to range and network problem error occurs in the connection.</li> <li>2. Discharged battery also leads to connection problem in the system.</li> </ol> |
| R.R. Agale et al introduce Web Based Intelligent Irrigation and Security System Using Internet of Things, | 2017 | Work on automated irrigation and security system to increase Agriculture production. This system consider the water level in water tank as well as soil moisture level for automated irrigation. It consists of buzzer for the security purpose, which operate on the basis of PIR sensor object detection  | <p>Advantages:</p> <ol style="list-style-type: none"> <li>1.System can detect soil moisture or temperature automatically.</li> <li>2.its provide oat sensor for automatic switch ON/OFF.</li> </ol> <p>Disadvantages:</p> <ol style="list-style-type: none"> <li>1.sometimes it is difficult to connect with database(mysql)</li> </ol>                                   |
| BabannaKumbar, et al Smart Irrigation System Using Internet of Things                                     | 2016 | The system using the concept of IoT. The project uses a Wi-Fi module(ESP8266-12) which connects the system to internet. This system was work on wifi concept which is connected on internet in this system the module control a motor and two solenoid valves for supplying water to led on water level indicator and sensor the a whole sys is monitored and control by mtqq server (our mtqq android app)   | <p>Advantages:</p> <ol style="list-style-type: none"> <li>1.It is small, compact, Lightweight, easily programmable and installable and have enough GPIO pins to use them.</li> </ol> <p>Disadvantages:</p> <ol style="list-style-type: none"> <li>1.When the water is present only then it will detect the temperature and soil moisture</li> </ol>                       |
| A.M.Ravishankkar et al IoT based approach For plant irrigation via android smart phone                    | 2017 | IOT based approach for plant irrigation provides a nonhuman intervention irrigation system. Soil Moisture measurement gives the information gives the information about moisture content in the soil. Depending on the value it is sent an information about whether the plant needs water or it does not need. User Interface for remote control provides the irrigation details about various plants. It will be helpful for the farmers who are new to the agriculture or particular crop. Then the user, according to the information which he received in the application can decide whether to TURN ON the motor or not | <p>Advantages:</p> <ol style="list-style-type: none"> <li>1. No restriction on size of data.</li> <li>2. Irrigation details are provided.</li> <li>3. No requirement for pairing up.</li> <li>4.Easy to implement</li> </ol> <p>Disadvantages:</p> <ol style="list-style-type: none"> <li>1. More Band width is required.</li> </ol>                                      |
| "IOT based Smart irrigation system(IOF)"<br><br>Our System  | 2018 | To design a Mobile application for smart irrigation system Which provide Medicine, Fertilizer ,Pesticides, Water in liquid form using Internet of things(IOT) and Wireless sensor network. Also design android based application for automatic motor ON/OFF.  | <ol style="list-style-type: none"> <li>1. Less pesticides and fertilizer or medicine are required by plants</li> <li>2.Automatic motor ON/OFF with help of mobile application</li> <li>3.Require less man power</li> <li>4. Completely customizable.</li> <li>5.proper utilization.</li> <li>6.System will automatically work in absence of user.</li> </ol>              |

### III . Problem Statement and scope of the system

#### INTRODUCTION

To manage the farming considering various factor like the medicine, fertilizer, pesticide, uploading the alarm for water, sending the message to the gsm system regarding the substances. The system aims to find the solution to various method to manage the farming.

#### PROBLEM DEFINITION

To design a Mobile application for smart irrigation system which provide Medicine , Fertilizer ,Pesticides ,Water in liquid form using Internet of things(IOT) and Wireless sensor network. Also design android based application for automatic motor ON/OFF.

#### SCOPE

The scope the system is defined on the basis of various functionalities provided by the system. The scope can be explained as:

- Mainly in villages
- Farming field

#### BLOCK DIAGRAM AND ITS DESCRIPTION

- In following fig 1 working of the proposed system:
- The architecture shows the combine working of all the modules.
- Firstly the system will be used by farmers (users).
- The users will provide the inputs to the system. User has to first sign-in in the system.
- Here, we will be using four tanks, each separately containing water, medicines, fertilizers, pesticides.
- The other three tanks are connected to water tank. So that pesticides can be sprinkled all over the farm with the help of Sprinkler and Drone system.
- Then with the help of Drip and Drone system, Water, medicines, fertilizers will be spread in the farm in liquid form.
- As our system requires water supply in high demand, so through river or dam we pull water into well and then is filled in the water tank. After checking the water levels of river and well, water from the tank is then finally supplied to the farm with the help of GSM system and Wi-Fi.
- We will be operating motor automatically with the help of GSM and Wi-Fi. We are providing the timer in this system. When the alarm will buzz at given set timer, the system will check whether electric supply is available or not. If electric supply is available then motor will be automatically switched ON. And when electric supply is not available then system will automatically switch to solar supply and motor will be switched ON for particular required time.

#### Algorithm to the solar system

- Suppose if any person has to start the motor at 4 o'clock and if the person is busy or has just forgotten to switch ON the motor then with the help of timer system motor will start automatically by setting the time in timer so that motor will get automatically on/off.
- This whole system can be operated with the help of mobile and android application.
- If android app is not working (that means any network issue, mobile damage, application crash etc.) then by using another mobile we will be able to send the message with special code to motor and all operation. Message can be send through any number of mobile phones with different mobile numbers for performing all the operations. Security is provided by using special key. So thus motor switches on / off according to our needs and availability.
- This whole system can be operated with the help of user-friendly mobile application.

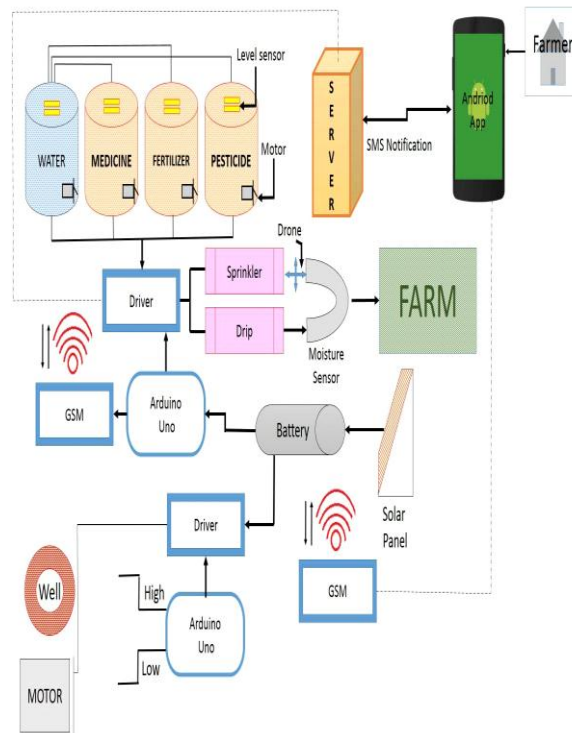


Fig 1: .working of System

#### IV. ADVANTAGES:

##### 1 Less amount of substances:

If we use fertilizer, medicine, pesticides in liquid form then the quantity of this substances required is reduce and their cost as compared to substances in solid form is also reduce.

##### 2 Automatic motor ON/OFF:

Automatically motor ON/OFF with the help of mobile application by using smart irrigation application motor can be on/off anytime and anywhere. This system also save the time. To on/off the motor the presences of farmer is not essential there.

##### 3 Required less man power:

Minimizing man power efforts, water wastage reduce.

##### 4 Farmers can customize as per need:

You can have as many modules as you want in the application, Depending on your substances need such as fertilizer, medicine etc.

##### 5. Proper utilization:

If we use proposed system compared to traditional or existing system we can spread substances to farm and utilize them properly.

#### V. Conclusion

System have designed & developed an Android based mobile application which will easily manage the work of farming and also reduce the hard work & the time require for managing farming. System have designed an application which can communicate with hardware in remote areas such as farm with an android device using GPRS technology. We have provide facilities such as GSM and TIMER functions for operating motor on farm. This will easy the hard work of farmer and keep him up to date with fast growing technology.



- NikeshGondchawar, R. S. Kawitkar, "IoT based Smart Agriculture", International Journal of Advanced Research in Computer and Communication Engineering, vol. 5, no. 6, pp. 2278-1021, June 2016.
- P. Rajalakshmi, S. Devi Mahalakshmi, "IOT Based Crop-Field Monitoring And Irrigation Automation" in 10th International conference on Intelligent systems and control (ISCO) 7–8 Jan 2016, published in IEEE Xplore, Nov 2016.
- TanmayBaranwal, NitikaPushpendra Kumar Pateriya, "Development of IoT based Smart Security and Monitoring Devices for Agriculture" in 6th International Conference - Cloud System and Big Data Engineering, IEEE, pp. 978–1-4673-8203-8/16, 2016.
- Mohamed RawideanMohdKassim, Ibrahim Mat, Ahmad NizarHarun, "Wireless Sensor Network in Precision agriculture application" in International conference on computer Information and telecommunication systems (CITS), published in IEEE Xplore, July 2014.
- Rajiv R Bhandari, K Rajasekhar," Study on Improving the Network Life Time Maximization for Wireless Sensor Network using Cross Layer Approach", International Journal of Electrical and Computer Engineering (IJECE), Vol. 6, No. 6, December 2016, pp. 3080-3086.
- <http://www.journal.bonfring.org/papers/rce/volume6/BIJ-8189.pdf>
- <http://ishitvtech.in/pdf/sajet-vol-3-no10-4.pdf>
- Real time collection of information by Kiranpawar.
- Real time collection of data by Rameshvarkrushi shop.

