



**Government College Of engineering, Karad**  
**Smart Irrigation System With Field security**  
**And Weather Forecasting System**

*Research paper*

**SMART AGRIOT**

**A Study on Smart Irrigation System Using IoT for Surveillance of Crop-Field And Security**

**System For field with Weather Forecasting System**

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## Abstract

Irrigation System In India, husbandry plays an important part for development in food product. In our country, husbandry depends on the showers which aren't sufficient source of water. So the irrigation is used in husbandry field. Internet of Effects (IoT) is a corner in the elaboration of technology. IOT plays an important part in numerous fields, one of that's Agriculture by which it can feed billions of people on Earth in future. The ideal of this paper is aiming to overcome this challenge, the whole system is micro control grounded and can be operated from remote position through wireless transmission so there's no need to concern about irrigation timing as per crop or soil condition. Detector is used to take detector reading of soil like soil humidity, temperature and decision timer is controlled by stoner (planter) by using microcontroller. The data entered from detectors are transferred to google firebase garçon database using wireless transmission. The irrigation will be automated when the humidity and temperature of the field is reduced. The planter is notified with the information regarding field condition through mobile app periodically. This system will be more useful in areas where there's failure of water and will be worth effective with satisfying its conditions. Advanced Weather Vaticinating system Climate conducts a fully critical function in numerous crucial product sectors .e.g. husbandry. Climate change with high charging these days, which is why old rainfall vaticinations are getting near and less important and continue to be annoying. Miles are thus veritably important to embellish and modify the rainfall cast model. The rainfall is one of the loftiest natural walls in all corridor of our lives in the world, we need to look at the rainfall including temperature, rain, moisture and other protection. The purpose of our artwork is to format effective rainfall vaticinations. High Position Farming Security The major end to develop the husbandry security is to give the volition for the ancient security models in the world.

**Keywords:** IOT, Smart Irrigation, weather forecasting, Sensors, Google firebase communication, ,security, application

## Introduction

### SMART IRRIGATION SYSTEM

In India, where 60-70 frugality depends on husbandry, there's a great need to contemporize the conventional agrarian practices for the better productivity. Due to unplanned use of water the ground water position is dwindling day by day, lack of rains and failure of land water also results in diminishment in volume of water on earth. Currently, water deficit is getting one of the big- emprise problems in the world. We need water in each and every field. In our day to day life also water is essential. Agriculture is one of fields where water is needed in tremendous volume. Wastage of water is the major problem in husbandry. Every time excess of water is give to the fields. There are numerous ways to save or to control destruction of water in husbandry. The ideal of the system is to a) conserve energy & water coffers b) handles the system manually and automatically c) detects the position of water. Due to the climatic changes and lack of perfection, husbandry have redounded in poor yield as compared to population growth. Irrigation is substantially done using conduit systems in which water is pumped into fields after regular interval of time without any feedback of water position in field. This type of irrigation affects crop health and produces a poor yield because some crops are too sensitive to water content in soil. A smart irrigation system, negative to a traditional irrigation system, regulates supplied water. The feedback medium of a smart irrigation system is a humidity detector and temperature and moisture detectors. A large husbandry field presents is with different part of areas, hence, humidity dimension at a single locating in the field doesn't make important sense. Accordingly, what's needed is a distributed number of detector bumps and scattered pumping units to pump water to those specific locales covered by the detector units. An automated irrigation unit, in confluence with a low cost humidity detector, is proposed in this paper.

## WEATHER FORECATING SYSTEM

Weather soothsaying is a vaticination on conditions of atmosphere depending on position and time. Every area will have their different prognostications related to the condition of rainfall which makes enough easy for the growers to know how and what to do when. The relationship between rainfall and husbandry has, thus, needed the need for accurate vaticination of the rainfall; to enable growers to make an informed decision that won't bring losses to them. Temperature, sun, and downfall have major goods on the crops. For beast, temperatures and acceptable water and food are essential. The cast of the rainfall event helps for suitable planning of husbandry operations. It helps to decide whether to shoulder or withhold the sowing operation. To wash the crop or not, when to apply toxin and whether to start complete harvesting or to withhold it are the major factors for which soothsaying is a must-have.

## SECURING THE FARM

Ranch Our design is giving protection to the ranch from slapdash creatures, catcalls and fire. To deal with these problems, we're using two detectors videlicet IR (propinquity) detector, DHT 11 temperature and moistures sensor. However, it gives active high signal as affair to arduino, If any slapdash hindrance tries to come in the range of IR detector. Also it'll start startling the buzzer.

## 1. Literature Survey

### Automated Irrigation System using google firebase as a server and an android application as a receiver.

Automated Irrigation system using Arduino with ESP01 and as a microcontroller having main thing is that optimize use of water for husbandry crops. This system is composed of distributed wired detector network with soil humidity and temperature detector in Gateway units are used to transfer data from detector unit to base station, shoot command to selector for irrigation control and manage data of detector unit. Rendering algorithm used in system for controlling water volume as per demand and condition of filed. It's programmed in microcontroller and it sends command through firebase to control water volume through stopcock unit. Whole system is powered by solar energy. Communication is full duplex take place through cellular network. Andriod operation manage the irrigation through nonstop monitoring, irrigation scheduling programming, real time temperature and moisture data, status of the water position of individual factory. Grounded on the readings taken by the detectors microcontroller takes applicable action for the irrigation. When the water position of the factory is below threshold value set by the stoner, also the faucets will open and shops will be doused. When maximum position is reached, t he faucets will be closed and water inflow will be stopped.

### Crop Monitoring System based on IOT

The posterior section introduces the Wi Fi technology. Wired Sensor network crop monitoring operation is useful to planter for perfection husbandry. The operation monitors the whole ranch from remote position using Internet Of Effects (IOT). Tree grounded protocol is used for data collection from detector to microcontroller through google firebase as a intermediate garçon. The soil data is collected by the soil humidity detectors and sends to the microcontroller through google firebase. also microcontroller takes applicable action and sends the accurate instruction.

**Weather Prediction :** Climate conducts a fully critical function in numerous crucial product sectors,e.g. husbandry. Climate

change with high charging these days, which is why old rainfall vaticinations are getting near and less important and continue to be annoying. Miles are thus veritably important to embellish and modify the rainfall cast model. those prognostications affect the country's fiscal system and people's lives. A system of information and statistics analysis algorithms has been used that includes a wooded area used for rainfall soothsaying. The rainfall is one of the loftiest natural walls in all corridor of our lives in the world, we need to look at the rainfall including temperature, rain, moisture and other protection. remarkable. The purpose of our artwork is to format effective rainfall vaticinations. Earth's climate will change over a long period of time and also what kind of impact it'll have on the lives of unborn generations. Our prophetic nature of end-of- life climates offers an excellent desire to give information as a way to allow colosseum insurers to make an informed want for the future of the world. Our approach greatly enhances the model in a positive way to govern the state of staff inconsistencies and inequalities and performs its function of directly prognosticating the rainfall

### Components Used

#### 1) Arduino Microcontroller

Arduino is an open- source electronics platform grounded on easy-to- use tackle and software. Arduino boards are suitable to read inputs – light on a detector, a cutlet on a button – and turn it into an affair – cranking a motor, turning on an LED. A microcontroller is a small computer on a single intertwined circuit. In ultramodern language, it's a system on a chip. It contains one or further CPUs along with memory and programmable input/ affair peripherals. Microcontrollers are



designed for bedded operation. There are used in automatically controlled products and bias, similar as machine machine control systems,

Arduino microcontroller were the Arduino board can communicate at colorful baud rates. A baud is a measure of how numerous times the tackle

can shoot 0's and 1's in a alternate. The software used by the arduino is Arduino IDE.

#### 2) Relay Module



#### 3) Solenoid valve :



#### 4) Buzzer



#### 5) AC motor for main water supply



#### 6) ESP 01 Wi FI Module

Wi Fi is a high-speed, low-power microwave wireless link technology, designed to connect phones, laptops and other porta- ble equipment together with little or no work by the use. Unlike infra-red, Wi fi does not require line-of-sight positioning of connected units. The technology uses modifications of existing wireless LAN techniques but is most notable for its small size and low cost shown in Figure 2. The fundamental strength of Wi fi technology is the ability to simultaneously handle data and voice transmissions, which provides of innovative solutions.

The ESP8266 ESP-01 is a Wi-Fi module that allows microcontrollers access to a Wi-Fi network. This module is a tone- contained SOC (System On a Chip) that does n't inescapably need a microcontroller to manipulate inputs and labors as you would typically do with an Arduino, for illustration, because the ESP-01 acts as a small computer. Depending on the interpretation of the ESP8266, it's possible to have up to 9 GPIOs ( General Purpose Input Affair). Therefore,

we can give a microcontroller internet access like the Wi-Fi guard does to the Arduino, or we can simply program the ESP8266 to not only have access to a Wi-Fi network, but to acts as microcontroller as well.



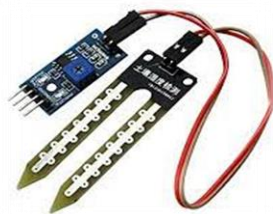
## Sensors :

In this system three sensors are used in order to obtain the data about the soil and environmental condition, soil moisture sensor and temperature and humidity sensor, IR sensor.

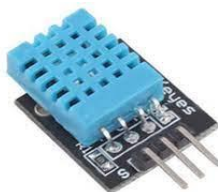
### 1) Soil Moisture Sensor

Soil humidity detectors measure the volumetric water content in soil. Since the direct gravimetric dimension of free soil humidity requires removing, drying and importing of a sample, soil humidity detectors measure the volumetric water content laterally by using some other property of the soil, similar as electrical resistance, dielectric constant, or commerce with neutrons, as a deputy for the humidity content.

This detector has two examinations through which current passes in soil, also read the resistance of soil for reading humidity position. We known that water make the soil more prone to electric conductivity performing lower resistance in soil where on other hand dry soil has poor electrical conductivity therefore more resistance in soil.



### 2) DHT 11 sensor



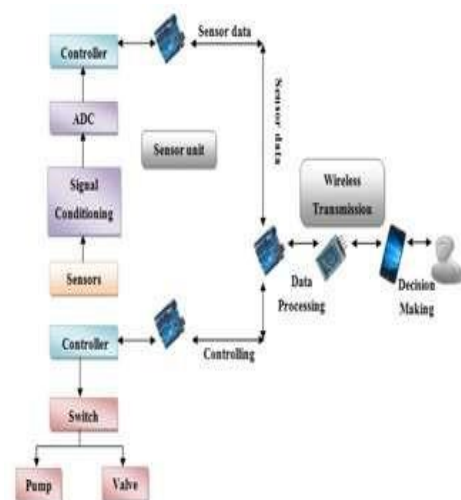
### 3) IR sensor

## Proposed System: 1)

### 1) Irrigation system

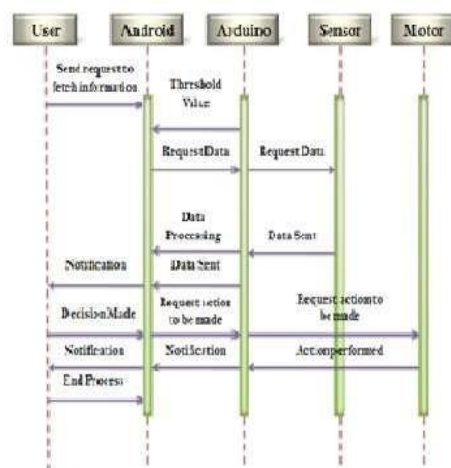
**Irrigation** can be automated by using detectors, microcontroller, WiFi, android operation as shown in Fig. 3.. The low cost soil humidity detector and temperature and moisture detector are used. They continuously cover the field. The detectors are connected to arduino board. The detector data attained are transmitted through wireless transmission and are reached to the stoner so that he can control irrigation

. The mobile operation can be designed in such a way to dissect the data entered and to check with the threshold values of humidity, moisture and temperature. The decision can be made either by the operation automatically without stoner interruption or manually through operation with stoner interruption. If soil humidity is lower than the threshold value the motor is switched ON and if the soil humidity exceeds the threshold value the motor is switched OFF automatically. System has two modes named as automatic mode and homemade mode, In case of any failure of automatic mode, stoner can be switched to homemade mode. The detectors are connected to the Arduino board. These tackle communicate through wireless transmission so that stoner can pierce the data through his mobile that has an android operation which can get the detector data from the arduino via Wireless interface.



The Arduino board is programmed using Bedded C in order to control the transmission of detector data and the working of motor according to the decision made. The collaboration of the motor and 3 detectors is maintained by the program fed into the arduino. The detectors continuously shoot data regarding humidity content of the soil. Whichever detector indicates low humidity content to that place faucets are switched on and also water is pumped, if it indicates high humidity content pumping of water is stopped by switching off the faucets. All these are managed by the program that has been written into the Arduino Microcontroller.





The Arduino and the stoner communicate via Wi Fi interface. The range is specific. The threshold values for both soil humidity and temperature and moisture, will be set and stored in the arduino and mobile operation. The detector value varies according the climatic conditions. The soil humidity will be different in summer and downtime seasons and so the temperature and moisture values. The threshold value is fixed after considering all these environmental and climatic conditions. The stopcock will be switched on automatically if the soil humidity value falls below the threshold and vice versa. The planter can indeed switch on the motor from mobile using mobile operation. The irrigation system is automated once the control entered from the mobile operation. Through wireless interface, the decision is transferred to the arduino and consequently the motor switches are operated.

Before the motor is switched on, the water position is checked to insure that bear quantum of water is available forirrigation.However, the motor won't be switched on or only lower quantum water is supplied, If needed quantum of water isn't present. The notifica-tion is transferred to the planter's mobile for farther decision to be made. The planter can also be suitable to switch on and off the motor from the mobile operation.

#### Weather Forecasting :

For this purpose, we are using DHT 11 sensor.\_This sensor collects real time data of temperature and humidity from surrounding to arduino and arduino sends this data to android app. By this information, farmer will get to know about weather situation and can make all required decisions accordingly.

#### Securing the farm :

Our project is giving protection to the farm from stray animals, birds and fire. To deal with these problems, we are using two sensors namely : IR(proximity) sensor, DHT 11 temperature and humidity sensor. If any stray interference tries to come in the range of IR sensor, it gives active high signal as output to arduino. Then it will start alarming the buzzer.

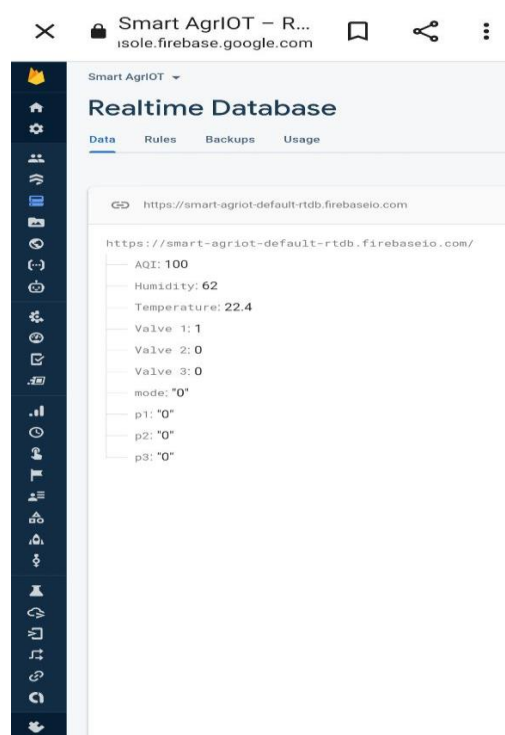
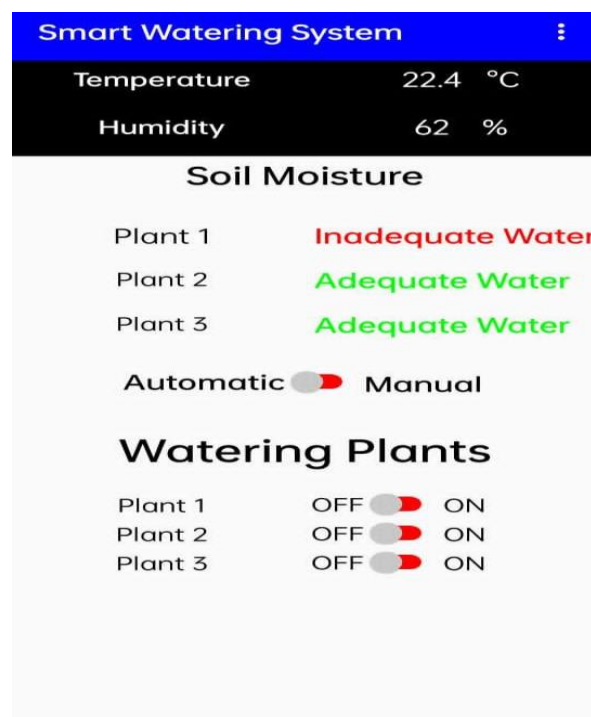
## Android Mobile Application

Android is used to develop mobile operation for automatic irrigation. Android is a mobile operating system developed by Google, grounded on the Linux kernel and designed primarily for touch screen mobile bias similar as smart phones and tablets. Android's stoner interface is substantially grounded on direct manipulation using touch gestures that approximately correspond to real- world conduct, similar as swiping, tapping to manipulate on- screen objects, along with a virtual keyboard for textbook input (13). The detector data and threshold value are stored in original memory of the mobile. The stoner can read

the detector data, and can set the system into automatic mode so that the system automatically switches motor depending on the detector data and preliminarily set threshold value. Also the stoner can set the system to homemade mode and he himself can decide the switching of the valves. The real time data of temperature and humidity is shown in the mirror so that user can get the real time information about weather parameter in his farm.

In the app, on the top, we get the real time data of temperature and humidity. In the below window, we can see the actual water status of the plants. There are two operating modes.

In the manual mode, user can decide that to which plant should be watered. The manual watering can be done by the SWITCHES.



## **Pros :**

1. Automatic farming system.
2. No human Interference.
3. Water saving.
4. Advanced protection system of farm
5. Can control and monitor farm from any corner of the world.
6. Real time weather forecasting.
7. System can be extended for n number of plants.

## **Cons :**

1. Requires continuous maintenance.
2. Power consuming.

## **Future scope**

1. We can also test the soil quality and can predict beneficial crop for sowing.
2. By using camera module, we can monitor health status of the plant and can protect plants from any external disease or virus.
3. By monitoring the soil nutrients, we can provide all the required nutrients through fertilizers.

## **Conclusion :**

The automated irrigation system enforced was plant to be doable and cost effective for optimizing water coffers for husbandry product. This irrigation system allows civilization in places with water failure thereby perfecting sustainability.

The irrigation system helps the planter by making his work tidily. As the demand for water increases, along with the need to cover submarine territories, water conservation practices for irrigation need to be effective and affordable. As multiple detectors are used water can be handed only to the needed area of land.

This system reduces the water consumption to lesser extent. It needs minimum conservation. The power consumption has been reduced veritably much. The crop productivity increases and the destruction of crops are veritably important reduced. With the help of advance security precious husbandry products can be defended. Due to rainfall soothsaying system bedded in ranch, stoner can get accurate rainfall condition of ranch.

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