# Garden Monitoring System and Controlling Pesticide Using IoT

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**Abstract:** Plant provides the majority of the fundamental desires for survival however humans are unable to produce plant with its basic desires like water, non-polluted chemical element and as a result plants are unable to survive. An IOT based smart garden monitoring system and controlling pesticide which sense the requirement of the plant and provide it with water as the soil loses its moisture. Different soils have different fertility and moisture level so we have soil and moisture sensor used in this to detect this problem. In our country there are six different seasons and each day have different temperature and humidity level so to check the temperature and humidity for the better health and survival of plant temperature and humidness detector are these values are displayed in mobile app through firebase which gives the live data. Sensors and Raspberry Pi is connected where different sensors can denote their values. In this way it manages to perform its operations automatically. The main plan is to mix the ideas of Image process techniques and net of things to induce the desired results. These plants are also affected by disease due to various pests or any other deficiency. The tomato plant is monitored by image processing where yellow curl disease is identified and pesticides are sprayed along with water in an adequate amount to avoid further spreading of the disease.

**Keywords:** IOT (Raspberry pi), humidity and temperature sensor, moisture level, Pesticides, Firebase.

## 1. INTRODUCTION

Gardens are common in most of the houses in India. In urban cities individuals grow plants in pots on their balconies or in small area. Maintenance of those gardens is finished in AN pseudoscientific technique. IOT makes human life simpler and in such manner this can be done. Many times the potted plants in our homes are patterned in associate degree untimely manner. Sometimes we have a tendency to tend to water the plants quite they need. Too little water similarly as an excessive amount of water is harmful for the plants. If the water provided is a smaller amount or in larger amount, plants are unable to develop and become susceptible to damage the growth of the plants. On the other hand if watered too much, the plants are prone to get rots and other diseases. Plants need certain quantity of daylight, water and temperature to grow.

## 2. MOTIVATION OF THE PROJECT

India's population is reached beyond 1.2 billion and the population rate is increasing day by day then after 25-30 years there will be serious problem of maintaining garden. Today, the people are affected by the shortage of rains and inadequacy of water. That's why, to full-fill this want we have a tendency to square measure actuated to develop this project. The main objective of this paper is to supply AN automatic irrigation system thereby saving time, cash & power of the people. The traditional farmland irrigation techniques require manual intervention. [1]

## 3. LITERATURE SURVEY

In GSM Based Automated Irrigation Control using Rain Gun Irrigation System mentioned about using automatic micro-controller based rain gun irrigation system in which the irrigation will take place only when there will be intense requirement of water that save a large quantity of water. These system brings a change to management of field resources where they developed a software stack called Android is used for mobile devices that include an operating system, middle-ware and key applications. The golem SDK provides the tools and arthropod genus necessary to

start developing applications on the golem platform victimization the Java artificial language. Mobile phones have virtually become associate degree integral a part of USA serving multiple wants of humans. This application makes use of the GPRS feature of itinerant as an answer for irrigation system. These systems lined lower vary of agriculture land and not economically reasonable. The System Supports Excess Amount of water in the land and uses GSM to send message and an android app is being used they have used a methodology to overcome underneath irrigation, over irrigation that causes natural action and loss of nutrient content of soil they need additionally secure that Micro-controller used will increase System Life and lower the facility Consumption. There system is just limited to the automation of irrigation system and lacks in extra ordinary features.

## 4. PROBLEM STATEMENT

The current problem is that the monitoring operations are done by humans. Many people grow garden and they are not maintaining it due to their work and surroundings. People leave their garden without growing any plants. In order to overcome this problem and also to prevent the plants from any infection affected due light, insects, deficiency or any other factor. This leads to increase in errors which could prove to be matter of concern in the future growth of the crops. It leads to an irregular crop yield in a particular land which is not desirable. Nowadays, diseases in plants are common despite of pest control. These diseases are identifies based on the visible symptoms such as color spots on leaves, streaks on leaves etc. As there is progress of the disease, the visible symptoms are also increased. With the machine-controlled technology of irrigation, the human intervention can be minimized. Whenever there is a change in water content of soil the moisture sensors sense the change and gives an interrupt signal to the app. This moisture's data i.e. the notifications will be sent on the cloud using IOT which can be accessed by app. The System can unceasingly send the info on the cloud. The person can control the irrigation system through the Android App. In India almost every farmer uses insecticides and pesticides so as to protect his crops from diseases and pests. They interpret weather on the basis of their experience and when they find a proper time for disease and pest to attack on crop, they spray pesticides to protect their crop from disease and pest attack. Although these chemicals are saving their crop, but soil fertility is decreasing day by day. Inhaling these chemicals may lead to liver disorder, asthma, cancer, etc. Agriculture is one of the most ancient activities of man in which innovation and technology are usually accepted with difficulty, only if real and immediate solutions are found for specific problems or for improving production and quality.

## 5. SENSORS WITH RASPBERRY PI

Fig 1 represents the devices which converts the electrical signals into digital signals are known as sensors. The different types of sensors incorporated in this system are listed below.
1. Humidity sensor is used to measure the humidity content of the soil.
2. Temperature device is employed to live the temperature of the soil.
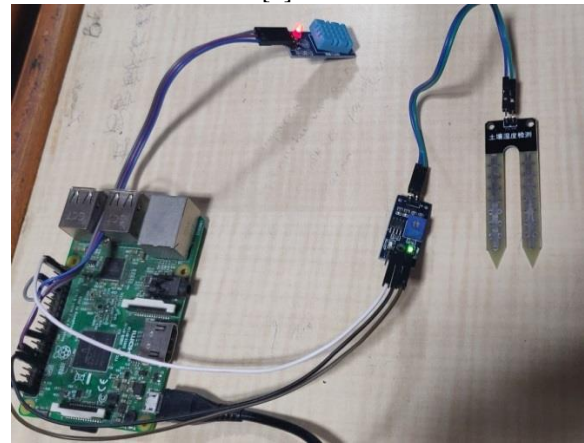3 Moisture sensing element is employed to live the wet content of the soil. [2]



Fig 1 Sensor connectivity

## 6. BLOCK DIAGRAM

Fig 2 represents the block diagram for sensor connectivity where different sensors are connected with Raspberry pi. It has a mobile app where live data's are stored in firebase.
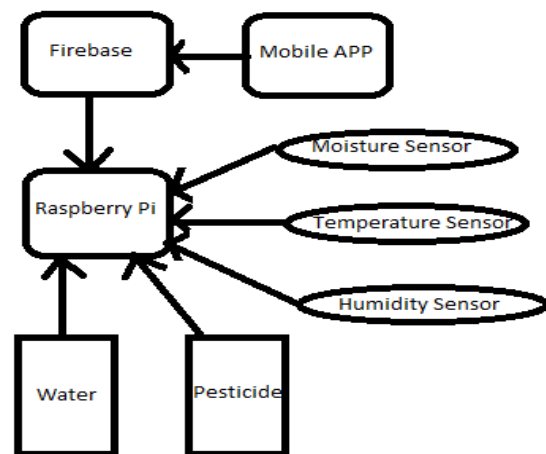


Fig 2 Block diagram for sensor connectivity
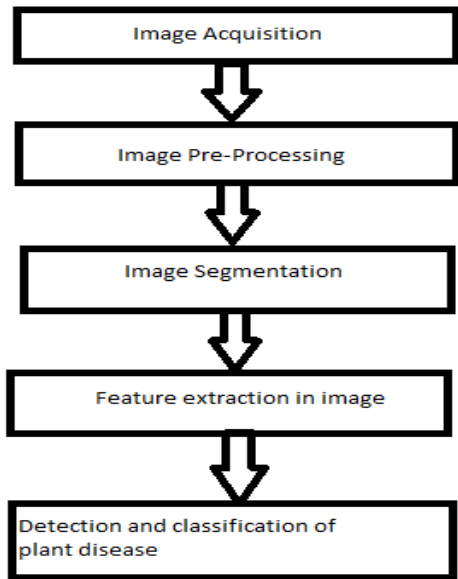Fig 3 represents the block diagram for image processing.

Fig 3 Block diagram for image processing

## 7. IMPLEMENTATION

The implementation methodology includes the modules in which how they are implemented.

### 7.1 Developing App and connecting it with Firebase:

Android studio is the tool used to develop the app. It includes the features like using button, toggle and many more. The app was developed with the features that are useful for noting the temperature, humidity and soil wetness level. The app gives the values of these features and by knowing these they may indicate any alert message to the user. By noticing the alert message the user can automatically on the button which is set in the app. Then the person can supply the water to plants.

This software is compatible with Windows, macOS, and Linux. It consists of varied options that let the users produce robot applications with a stronger computer programmer. It supports programming languages like Java, Kotlin, and Python. It owns robot Virtual Device to run and correct applications in robot studio. In the Garden app, the program for implementation is written in Java and therefore the code for coming up with half is written in XML. Firebase property is additionally tired the implementation half. It consists of varied events for automating the good Garden. This mobile application permits the user to observe and management the good Garden System via domestically or remotely. [2]

Whenever the values the sensor crosses the maximum or threshold value it alerts the user by push notifications and allows the user to take control of the system from the remote location. This methodology is price effective since it's ASCII text file. Fig 4 represents while developing an app the values generated by it is should be noted for the reading and to manage the proper level of these features. The live data's for the soil should be noted for the growth of the plants and to monitor it regularly. These values are used for the alert message and automatically the water supply to plants is done. Firebase could be a mobile and net app development platform in hand by Google. It helps to build better mobile applications.
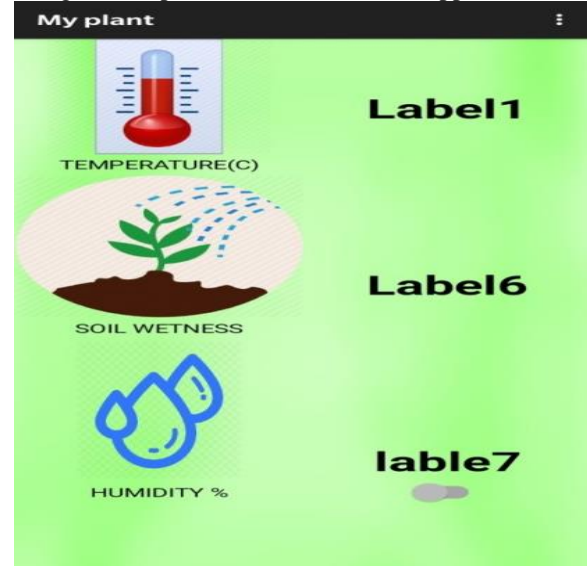


Fig 4 Layout of mobile app

It provides functionalities like analytics, databases, messaging and crash reporting. It is engineered on Google infrastructure and scales mechanically. It is easy to integrate firebase with android, Android, and the web. API's are packaged into single SDK hence it can be expanded to more platforms. It provides a real-time database and backend service. The real-time values from the sensors are uploaded to firebase through raspberry pi. Fig 5 represents the base is integrated with mobile apps for management purpose.
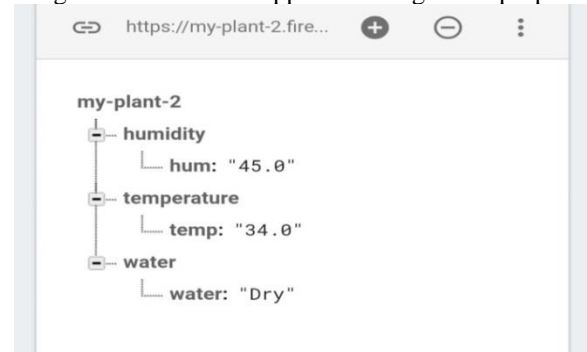


Fig 5 Sample firebase data stored

### 7.2 Sensors connectivity with Raspberry Pi:

The electrical capacitance of a capacitance that uses the soil as an insulator depends on the soil water

content. When connecting this capacitance (made of metal plates or rods imbedded within the soil) beside Associate in Nursing generator to create Associate in Nursing circuit, changes in soil moisture can be detected by changes within the circuit operational frequency. Simple temperature detector exploitation truth Integrated-circuit temperature device with Associate in Nursing output voltage linearly-proportional to the centigrade temperature. It can measure temperature from -55c to +150c. The voltage output will increase 10mV per degree rise in temperature. The humidity sensor SYS-1used for sensing the humidity. It delivers instrumentation quality RH (Relative Humidity) sensing performance during a low price, solder ready SIP (Single In-line Package). Relative humidity could be a live, in percentage, of the vapor in the air compared to the total amount of vapor that could be held in the air at a given temperature.

The implementation of good Garden system victimisation the net of Things has been verified to satisfactorily work by connecting totally different parameters of the soil to the cloud and was with success controlled remotely through a mobile application. The system designed not solely monitors the detector knowledge, like moisture, humidity, temperature and ultrasonic but also actuates other parameters according to the requirement, for example, if the water level in tank is reduced to a minimum price then the motor switch is turned on mechanically to the water level of the tank reaches the most price.

The initial price and therefore the installation of this technique area unit low cost and therefore it will be enforced anyplace. With the event of detector technology, the system can be elevated to the next level which helps the users to utilize their investment in an economic manner. If soil nutrient sensors will be put in, then the system can be modified to supply fertilizers to the garden precisely. This system saves hands and expeditiously utilizes the water resources offered ultimately resulting in a lot of profit. The feedback provided by the system can improve the implementation of the agriculture method.

### 7.3 Image Processing for Disease Identification:

Image process is that the use of pc algorithms to perform image process on digital pictures. As a subcategory or field of digital signal process, digital image processing has many advantages over analog image processing. It permits a way wider vary of algorithms to be applied to the computer file and might avoid issues like the build-up of noise and signal distortion throughout process. Since pictures area unit outlined over 2 dimensions (perhaps more) digital image process is also sculptured within the

kind of three-dimensional systems. That modified within the Nineteen Seventies, when digital image processing proliferated as cheaper computers and dedicated hardware became available.
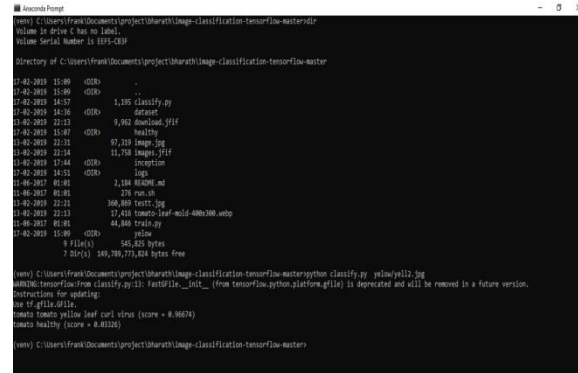


Fig 6 Image processing values for tomato curl plant

Images then might be processed in real time, for some dedicated problems such as television standards conversion. As general-purpose computers became faster, they began to take over the role of dedicated hardware for most the foremost specialized and computer-intensive operations. With the quick computers and signal processors offered within the 2000s, digital image processing has become the most common form of image processing and generally, is used because it is not solely the foremost versatile methodology, however additionally the most cost effective.

## 8. RESULTS AND DISCUSSION

In order to maintain the plants initially an android app was developed and the values are stored in firebase which is by sensing these values from environment. The layout of app in which values are stored. Image processing is done in order to identify the disease in plants. Here, tomato plant is observed and yellow curl leaves disease is identified which is caused by yellow curl virus and the values of healthy plant and infected plant values are displayed.

## 9. CONCLUSION AND FUTURE ENHANCEMENT

The proposed System reduces the Human intervention in farming and gets to be basically critical to create more productive procedures for farming related exercises. In the proposed work, Median Filtering is favored over Manual channel, Smoothing Filter, Oscillation Thresh-old channel since Single outliners are separated in it. For identification of the infected leaves, CNN approach Gradient Descendant calculation is utilized. Accordingly, giving more precise outcomes for a particular disease.

The future work includes the features which can be implemented in the large land area and more productive cropping could be done. The future work also includes identifying most of the types of diseases found on variety of plants. It includes the features that provide many cropping with increased productivity in large land area.

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