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# Agriculture System with Intelligence

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**Abstract -** The following project demonstrates how the Internet of Things can be used to monitor crops and for other agricultural uses. Agriculture has always demanded a high level of resourcefulness, professionalism, and effort. Agriculture is now the primary source of food, economic growth, trade, and employment for the majority of the world's population. Agriculturists will face a variety of issues as a result of this. Various agriculturists, farmers, and scientists around the world believe that different approaches and concepts are needed to address these issues.

The Internet of Things (IoT) is one of the fastest-growing fields in a variety of industries, including agriculture. The Internet of Things (IoT) improves the quality of our lives by bringing and encouraging changes in a variety of spheres of activity to make them more convenient, smart, and artificially intelligent. Smart agricultural systems have experienced a cultural shift toward modern agriculture, which is more productive, uses less water, and is even cheaper, thanks to this technology.

The goal of this project is to present an IoT-based Smart Farming System that will aid farmers in obtaining Live Data (Temperature, Soil Moisture) for efficient environmental monitoring, allowing them to boost overall production and product quality. This research proposes an IoT-based Smart Farming System that incorporates Arduino Technology, as well as several sensors and a WIFI module.

***Key Words***: Smart Agriculture, Iot based farming, assist farmers, Aurduino Technology, Monitoring Crops

## 1.INTRODUCTION

Different types of problems faced by farmers motivated us to develop the recommended system, such as: Indian agriculture is in trouble due to a lack of technical know-how about the best and most efficient agricultural practises, and they are still reliant on traditional agricultural methods, which result in lower crop productivity.

So, by utilising emerging technology, crop output can be increased at a low cost. This also alleviates the burden of huge debt on farmers, which they have taken on themselves in order to maintain their livelihoods or obtain strong agricultural harvests. Apart from these concerns, lack of resources exacerbates their situation, preventing farmers from cultivating, and thus the Indian economy is impacted to a major level, as most of the nation's productive lands, which account for a significant portion of GDP, are being destroyed.

So, through this framework, we propose a solution to this problem by bringing automated and systematic farming tactics that enable farmers to cultivate in a productive manner even with limited resources and a higher yield that is guaranteed and efficient.

The goal is to create a model that can handle a variety of information about the crops in question while also carrying out the user's orders for improved crop and resource management. As a result, agriculturists in numerous fields will have a solid and relevant skill. In addition, the use of electronics and internet technologies in agriculture is being promoted for research and further exploration.

The main goal in this field is to optimise productivity by making wise and effective use of the limited and expensive resources available. As a result, it is critical to make extensive use of them. Weather and climatic conditions, land layout, soil parameters, and other factors all have an impact on crops. These elements add to the field's complexity, necessitating new approaches to address it. Technology is frequently advocated in numerous spectrums in order to eliminate complications and achieve better results. It's a tool for balancing and making precise modifications in order to reach specific goals. The use of science and technology to agricultural operations has produced excellent outcomes and has aided humans significantly.

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1) To provide farmers with innovative technology while avoiding the use of manual labour.

2) To reduce water waste and increase crop output by providing perfect conditions.

3) Create a model and link it to an Android app and a cloud server.

## 2. Literature Survey

Our method intends to improve horticulture by effectively leveraging computerization and the Internet of Things (IoT), which uses sensors-based systems to perform field labour such as monitoring sunlight intensity, protecting crops from intruders, detecting wetness, and so on..

We want to provide effective environmental monitoring so that farmers may undertake smart farming and increase their overall productivity and product quality. The Agriculture Stick proposed in this project is built on Arduino technology, with a breadboard interfaced with several sensors that transmit live data to the Blynk App.

This project focuses on the installation of several sensors for measuring environmental elements that are necessary for crop growth. For executing and performing the entire process, it includes a node MCU and various sensors. This system's features include gathering all environmental data and providing precise data to farmers so that they can make the most effective agricultural decisions possible. The device will detect soil moisture, temperature, and humidity, among other things. It can also detect an intruder in the field and conduct automation operations, such as manually switching an electric motor on and off. The proposed system has been tested, and it monitors the readings to produce satisfactory results, allowing the system to be highly beneficial in smart farming.

We used a NodeMCU microcontroller, as well as sensors like as soil moisture, an IR sensor, an LDR, and a relay-connected motor. The NodeMCU is utilised in this project for live streaming of temperature and soil moisture, as well as delivering sensor data to the server via the ESP8266 WIFI module. The data from these sensors is also provided to the mobile app.

The LDR in this project measures the intensity of sunlight and displays a message indicating if photosynthesis is active or not.

The Soil Moisture Sensor detects moisture content in the soil and informs us whether or not water is required. The purpose of the infrared sensor is to identify the presence of someone in a specific region of a farm. The sensors are connected to the microcontroller (NodeMCU) and supplied with power. The values from the sensors are read by NodeMCU on a serial monitor, and the information is sent to the BLYNK app by this microcontroller.

The soil moisture data is obtained from the Nodemcu, which is "ON" when the soil is dry (soil moisture voltage is high) in order to run the watering apparatus, and "OFF" when the soil has sufficient water (soil moister voltage is lower).

When the moisture level in the soil falls below a specified threshold, the relay turns on, causing the motor to turn on automatically, and when the moisture level rises above the threshold, the relay turns off, causing the motor to turn off automatically.

## 3. DESCRIPTION OF COMPONENTS

### 3.1 ESP8266 WIFI Module:

The ESP8266 is a low-cost Wi-Fi microchip that includes a full TCP/IP stack as well as a microcontroller. Using Hayes-style commands, this little module allows microcontrollers to connect to a Wi-Fi network and make rudimentary TCP/IP communications.

It is an open source firmware and development kit for creating Internet of Things (IoT) gadgets. It contains software for the ESP8266 WiFiSoC as well as hardware with an ESP-12 module. The kit includes analogue components (A0). The board also features digital (D0-D8) pins. It also aids serial port communications such as SPI, UART, and I2C, among others.

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### 3.2 IR Sensor:

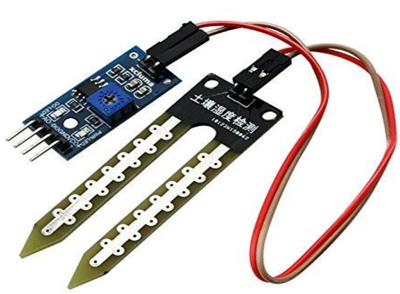
An infrared sensor (IR) is a type of electrical gadget that detects and measures infrared radiation in its surroundings.

When an object approaches the sensor, the LED's infrared light reflects off of it and is recognised by the receiver.

An infrared sensor is an electrical device that emits infrared light in order to detect certain features of its environment. An infrared sensor can detect motion as well as measure the heat of an item. These sensors detect motion as well as measuring the heat of an object. The term "passive IR sensor" refers to sensors that simply measure infrared radiation rather than emitting it.

The sensor has both a digital and analogue output. The existence of an object is indicated via an on-board LED. An infrared LED (transmitter) emits IR light, which is reflected by the object and received by an infrared receiver (Photo Diode).

### 3.3 Soil Moisture Sensor:



The volumetric water content in soil is measured by the Soil Moisture Sensor. A sample must be removed, dried, and weighed for direct gravimetric determination of freee soil moisture. The volumetric water content of the soil is measured indirectly using other soil parameters using the Soil Moisture Sensor. As a proxy for moisture content, such as electric resistance, dielectric constant, or interactions with neutrons.

Soil moisture affects reflected microwave radiation, which is employed in agriculture for distant sensing. The moisture sensor has three pins: one for voltage, one for ground, and one for analogue input. This sensor measures the moisture content of the soil (in volume percent). Because moisture content is measured in percentages, the analogue value must be mapped to a range of 0-100. The electrical resistance of the soil is the attribute exploited by this sensor. This sensor has two probes that allow the current to travel through the soil. After that, it obtains the resistance value in order to determine the water content level. This means that the higher the water content, the better the conduction of electricity, and hence the lower the resistance. When the soil is dry, conduction in the soil is poor, resulting in an increase in resistance. As a result, it employs the property of resistance to determine the amount of moisture in the soil. It can be connected in one of two ways: Analog or Digital mode.

### 3.4 Relay:

A relay is a switch that is controlled by electricity. A set of input terminals for a single or multiple control signals, as well as a set of functioning contact terminals, make up the device. Any number of contacts in various contact forms, such as make contacts, break contacts, or combinations, can be found on the switch.

A relay is an electromechanical device that opens or closes the contact of a switch using an electric current. The single channel relay module is more than simply a relay; it includes components that simplify switching and connection, as well as indicators that display if the module is powered and if the relay is active or not.

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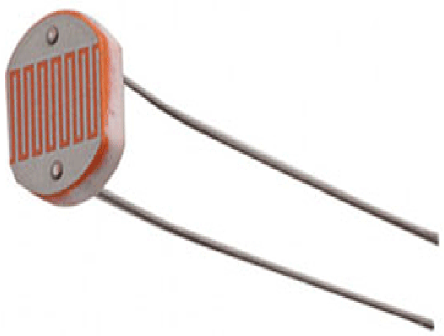
### 3.5 Pump:

It's a cost-effective and portable mini submersible pump that runs on dc 3-6v. It can take roughly 120 litres per hour while consuming very little electricity. The water level should be higher because if the motor is utilised without water, it would overheat and damage the device's components. Controlled fountain water flow, hydroponic systems, and controlled landscape watering systems are just a few examples.

### 3.6 LDR:

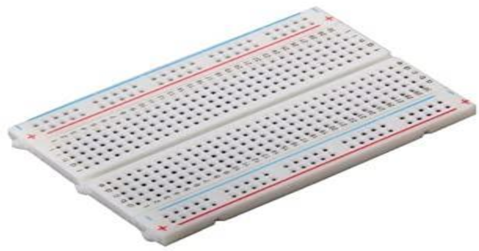


Light-sensitive devices, also known as photo resistors, are commonly used to detect the presence or absence of light or to quantify the intensity of light. LDRs are nonlinear devices with a sensitivity that varies with the wavelength of the light applied.

A photo resistor is an analogue component at its core. To form a variable voltage source, they're commonly combined with a series fixed resistor.

An LDR's operating principle is photoconductivity, which is nothing more than an optical phenomena. When light is absorbed by the substance, the substance's conductivity improves. When light shines on the LDR, the electrons in the material's valence band rush to the conduction band.

### 3.7 Breadboard:



A breadboard is a piece of equipment that connects integrated circuits and registers. It aids in the testing and construction of circuit connections. Many holes (horizontal and vertical) on the breadboard are used to insert registers and IC chips.

The breadboard's goal is to allow you to quickly connect components such as resistors, LEDs, and capacitors so that you may test your circuit before permanently glueing it together.

## 4. SOFTWARE REQUIREMENTS

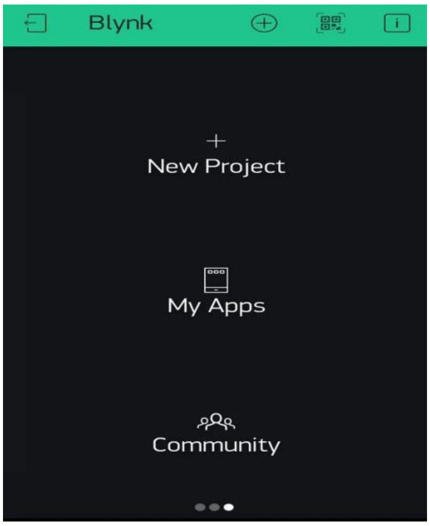
### 4.1 SETTING UP ARDUINO IDE:


The Arduino Integrated Development Environment (IDE) is a cross-platform application written in C and C++ for Windows, Mac OS X, and Linux. It is used to write and upload programmes to Arduino compatible boards, as well as third-party development boards from other vendors..

he IDE environment is made up of two primary components: an editor and a compiler. The editor is used to write the required code, while the compiler is used to compile and upload the code to the appropriate Arduino module.

-Both C and C++ are supported in this environment.

## 4.2 SETTING UP BLYNK APP:




It was created with the Internet of Things in mind. This software offers the ability to control gear remotely and also displays sensor data. This tool also aids in the visualisation and storage of data. There are three main components to this platform:

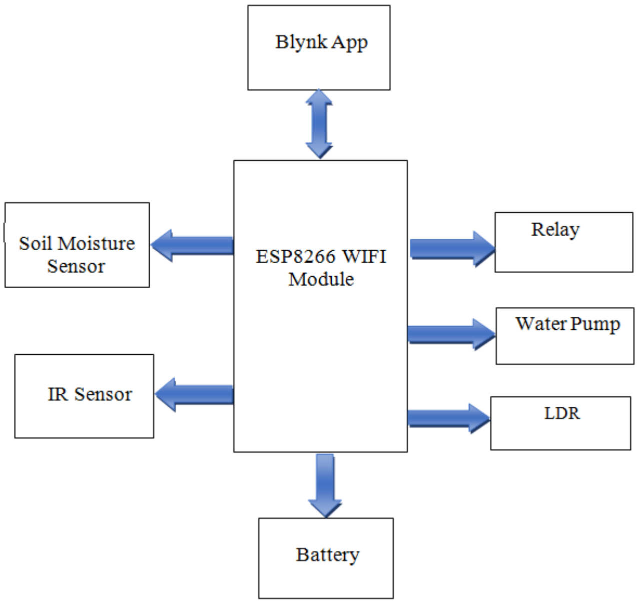
1) Blynk app- Amazing project interfaces can be made with the help of various widgets.

2) Blynk Server- Creates a network between the smartphone and the hardware.

3) Blynk Libraries- All incoming and outgoing commands are handled, and communication between the server and the process is possible.

## 5. WORKING PRINCIPLE

### 5.1 BLOCK DIAGRAM

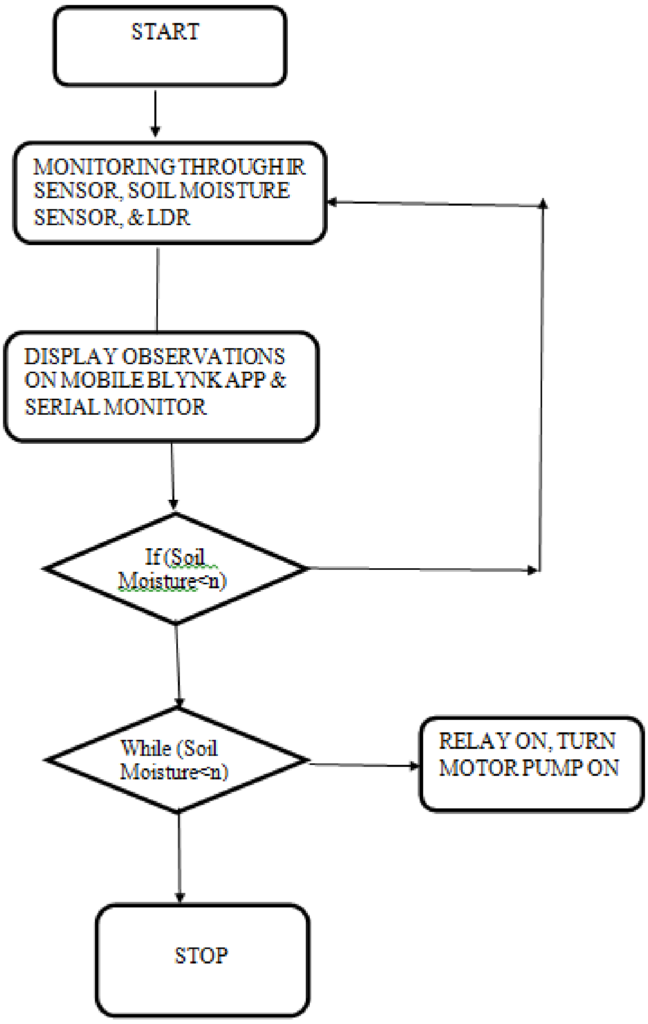



When the soil moisture sensor detects a moisture level in the soil that is less than the preset value, it sends a command to the relay contact, which closes after being typically open. The motor then starts and continues to run until the required moisture content is restored.

When the LDR detects that the amount of sunlight is more than the set value, a message is sent to the user via the Blynk App.

The IR Sensor detects any object that gets close to the sensor; the infrared light from the LED bounces off of the object and is detected by the receiver; a warning is then issued via the BLYNK app on the user's (farmer's) smartphone.

### 5.2 FLOW CHART




## 3. CONCLUSIONS

In a few words, So far, we've noticed a variety of parameters in this study, including soil moisture, light intensity, and the presence of someone on the farm, all of which encourage farmers to focus on improving their technology. The system has a high level of efficiency and accuracy when it comes to retrieving live data such as soil moisture and light intensity.

By delivering precise live feeds of environmental temperature and soil moisture with over 99 percent accuracy, the technology discussed in this research would assist farmers in increasing agricultural productivity and taking efficient care of food production.

This system generates soil parameter values based on the continuous data from the field and data from the climate repository. Sensors are used in the harvest field, which is connected to the internet.

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