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A Smart Farming and "Crop Monitoring Technology" in Agriculture Using IOT

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Abstract: ***A Smart Farming and "Crop Monitoring Technology" Using IOT in Agriculture. Agriculture is basic source of livelihood People in India. It plays major role in economy of country. But now a days due to migration of people from rural to urban there is hindrance in agriculture. Monitoring the environmental factor is not the complete solution to increase the yield of crops. There are no of factors that decrease the productivity to a great extent. Hence Automation must be implemented in agriculture to overcome these problems.***

An automatic irrigation system thereby saving time, money and power of farmer. The Traditional Farm land irrigation techniques require manual intervention. With the automated technology of irrigation the human intervention can be minimized. Continuous sensing an monitoring of crops by convergence of sensors with Internet of things (IOT) and making farmers to aware about crops growth, harvest time periodically and in turn making high productivity of crops and also ensuring correct delivery of products to end, consumers at right place and right time. So to overcome this problem we go for smart agriculture technique using IOT.

This Project includes sensors such as temperature, humidity, soil moisture and rain detector for collection the field data and processed. These sensors are combined with well established web technology in the form of wireless sensor network to remotely control and monitor data from the sensors.

Keywords: Arduino Uno, ESP8266 (Wi-Fi module), Automation of Irrigation System, Sensors, Batteries, Motor, etc.

I. INTRODUCTION

Agriculture is the main source of income for most people in India and contributes significantly to the Indian economy. The last ten years have seen a marked increase in crop development in the agricultural sector. Food prices are constant they grow because the quality of the plants has dropped. There are a number of factors that cause this may be due to water litter, low soil fertility, fertilizer misuse, climate change or diseases etc. It is very important to do it successfully agricultural interventions and the solution is IoT to integrate with the wireless sensor network. Internet of Things (IoT).it is a way of connecting everything to the internet- connecting an object or objects (such as a car, home, electronic Devices, etc. ...) previously unrelated to the main purpose of IoT to ensure the delivery of rights information to the right people at the right time. In agriculture irrigation is an important factor as heavy rainfall is heavy unexpected and uncertain.

A. Need for Automatic Irrigation

1) Simple i easy to install and configure.
2) Save energy and resources, so that they can be used efficiently and effectively.
3) Farmers will be able to apply the right amount of water at the right time by automatic irrigation.
4) To avoid irrigation at the wrong time of day, reduce the flow of excess waterlogged soil
5) improve plant performance.
6) The automatic irrigation system uses vales to turn on and off the engine. Motors can be automated usin
7) Controls and no work need to shut down the engine.
8) It is an accurate irrigation system and an important tool for controlling soil moisture in a very special way
9) heat vegetable production.
10) Time-saving, eliminating human error in adjusting available soil moisture levels.

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The project utilizes IoT technology in agriculture, collecting plants for natural boundary growth in a stable environment to help farmers identify problems on time.

Agricultural experts provide guidelines with specific information to expand farmer's money and help them prevent and control plant and pest diseases.

Through culture the development of mobile applications, has begun with the promotion of agricultural technologies and online experts FAQ. System upgrades include three components: Server, Android client and PC client for achievement rating, high reliability, safety, compliance with technical requirements.

II. LITERATURE SURVAY

Experts have analyzed the data collected to determine the relationship between local activity and the benefits of general activity. Focusing on crop monitoring, temperature and rain information are collected as primary location data as well analyzed to reduce crop losses and improve crop production.

The IoT Based Crop-field that monitors the flexible irrigation system defines the crop field. System developed through sensors and in accordance with a decision from a data-based server that hears, irrigation system default. Through wireless transmission heard data is transmitted to the web server website. If irrigation is automatic that means when the humidity and temperature fall below the potential range. User can monitor and manage the system remotely with the help of an app that provides a visual web connection to the user. Prof. K.A. Patil and Prof. N.R. Kale proposed a smart agricultural model for ICT irrigation (Information Communication Technology).

The perfect real-time and historical environment is expected to help achieve success resource management and use. The IoT Based Smart Agriculture Monitoring System enhances various features such as GPS-based remote-control monitoring, sensitivity to humidity and temperature, panic attack, protection, leaf moisture and proper watering resources.

Mahammad shareef Makala, Dr.P. Viswanathan demonstrated the common use of the IOT Agricultural Sensor Monitoring Network Technologies uses Cloud computing as the backbone.

Prathibha S.R., Anupama Hongal Jyothi M.P. Temperature monitoring and Moisture created in the agricultural sector through a sensor using the CC3200 Single chip. The camera is connected to the CC3200 to take pictures and send those pictures via MMS for mobile farmers using Wi-Fi.

III. EXISTING AGRICULTURAL PRACTICES

Agricultural activities continue to be one of outstanding livelihood strategies. Food production plants do not depend on any officially acquired plants agricultural knowledge. Especially in rural areas, farmers follow traditional production methods their food crops with the help of the environment.

Using common agricultural techniques, the labor required of a farm is more than a building good harvest. To get the best yield, we need you to protect the crop from pests. This pest control is made in traditional ways that farmers use spraying pesticides to kill problems from the field using sprays. There is a loss in the harvest. As we do not know about daily weather reports, either the need depends on rainfall and the flow of river water to irrigation system and river. Proposed A new agricultural system is being developed for transformation which makes traditional farming a high yield production and for-profit.

IV. PROPOSED WORK

Our proposed program focuses on monitoring sensory farming conditions such as Humidity, Temperature, and soil moisture; LDR is used for hearing light power on the farm, and IR sensor used to identify insects, birds, and humans through their bodies temperature and notify the user with a message format on their mobile phones These sensors are an interface to process the Arduino-UNO module. LCD is used to make

show different sensory conditions. Where there is a change in temperature, sensor receives then turn on DC and cool the condition.

After the temperature reaches normal, DC fan will close . LDR (Depends on light Resistor) used to detect light energy in farm. When light is low on the farm, LDR detects the situation and CALLS the light. When the required light power is returned, the lamp will do so Close . Soil moisture sensor is used for hearing soil moisture level (water level) where water levels are reached down to the ground. The ground gets

dry, and the sensor detects it, then OPENs DC water pump. When the floor is wet, DC the water pump will shut down. User can monitor these situations on mobile phones with the help of a Wi Fi module using the IoT mobile site .

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A. Block Diagram of Proposed Work

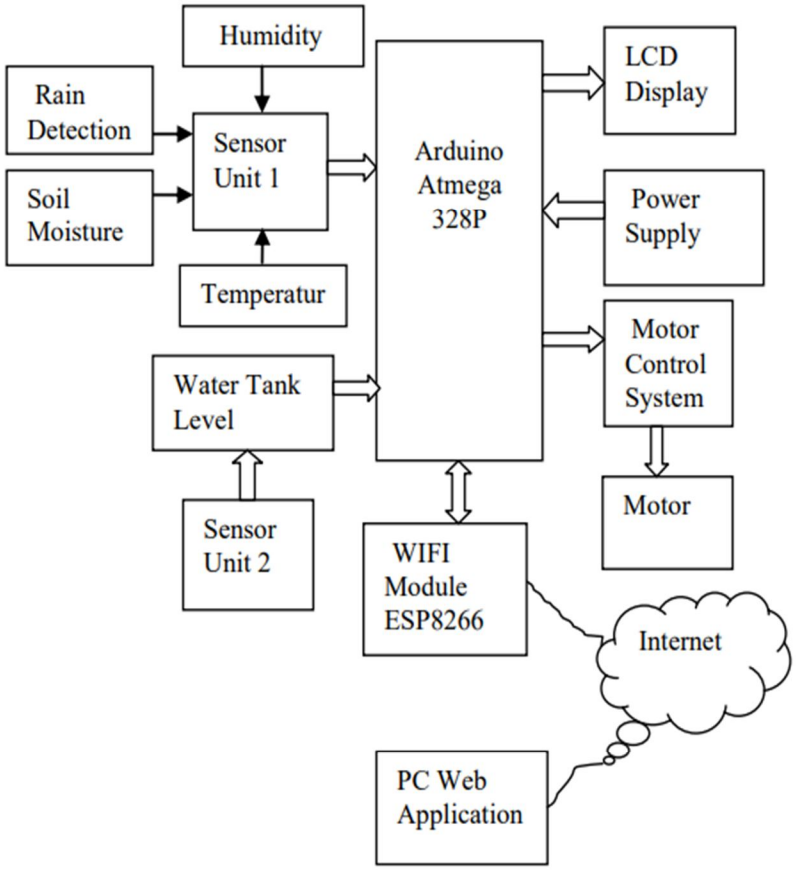


Fig1. Block Diagram Proposed Work

1) *Negotiation of Sensory Data:* The sensor interacts with Arduino Uno such as DHT11 Temperature, Humidity, Soil Moisture and Rain detection sensor is used.
2) *Wireless Data Transfer:* Data obtained from sensors is transferred to a web server using wireless transmission (WIFI module ESP8266).
3) *Data Processing and Decision Making:* Data processing is the process of evaluating various sensory data obtained in a field that has already been processed limit values. The engine will automatically turn on when the moisture level falls below the threshold and vice versa. The farmer can even turn on the Motor from the mobile phone using the mobile app.
4) *Automation and Irrigation System:* The irrigation system works automatically when the controller is found in a web system or mobile application. I relays used to transfer web control system to power switches using Arduino microcontroller. I circuits with a low power signal that can be controlled using a relay.
5) *Web Application:* The web application will be designed to monitor the field and crops anywhere using an internet connection. To control Arduino processing IDE used, a web page can be transferred using IDE processing.
6) *Mobile Application:* The mobile app will be upgraded to android. The mobile app helps to monitor the controlled file from anywhere.

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V. ARDWARE USED

A. Soil Moisture Sensor

Soil moisture is a sensor that feels the moisture of the earth. The sensor has both analogs as well digital output. Digital output is fixed and analog output limits may vary. Applies to the principal of open and short regions. Output up or down output is indicated by LED. When the soil is dry the stream will not pass with it will therefore act as an open circuit. So the output is said to be large. When the soil is wet, the current will pass from one terminal to another and the circuit is said to be short and the output will be zero.

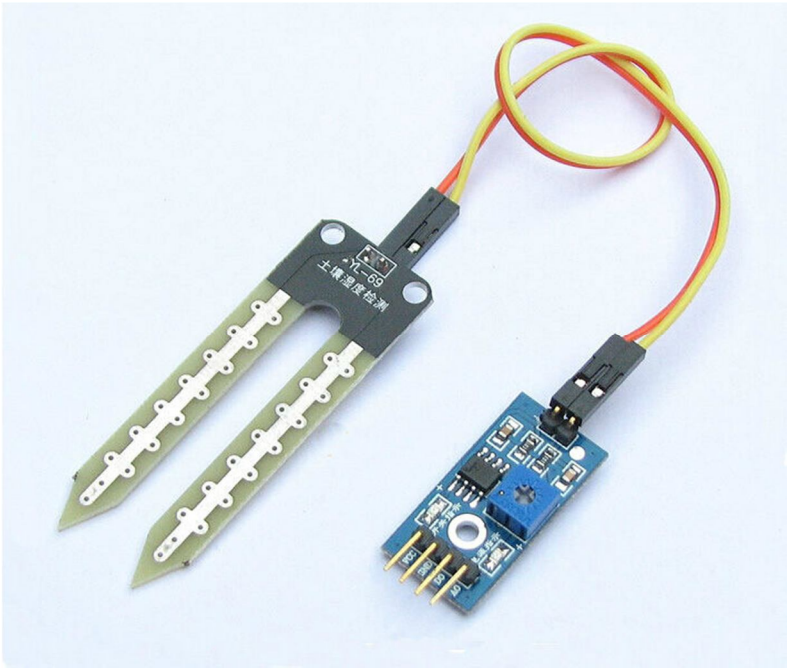


Figure 1:Soil Moisture Sensor

B. Temperature Sensor

The LM35 sensor is widely used because its output voltage corresponds to the Celsius temperature measurement. It has a wide range of performance. The maximum output is 5V. The output will increase by 10 mV in every single degree increase temperature. Ranges from 55 degrees to +150 degrees. There are three terminals like VCC, Ground and analog sense. It uses a small amount of electricity. Thus, it saves energy. It works very well in agriculture. Icon easy to use.



Figure 2: Temperature Sensor

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C. Humidity Sensor

Its small size, low power transmission up to 20 meters signal making it the best choice for a variety of applications, This DHT11 Humidity sensor incorporates a damp sensor complex with a standard digital signal output. Through a special digital signal-acquisition detection method and temperature and humidity sensors, ensures high reliability and excellent long-term stability. This sensor incorporates a humidity measure of the opposite type part.

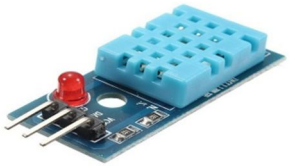


Figure 3:Humidity Sensor

D. Rain Detection Sensor

Rain sensor module is a simple rain detection tool. It can be used as a replacement when a raindrop falls by using a rain board and measuring rain energy. Module features, rain board and controls separate board for convenience, LED for power indicator and sensitivity adjustable using a potentiometer. Analogue output used to detect rainfall decreases. Connected to 5V power supply, The LED will turn on if the input board has no rainfall, and the DO output is high. When you throw a small amount of water, The output of the DO is low, the switch indicator will open, turn off the water droplets, and when restored to its original state, results are high quality.

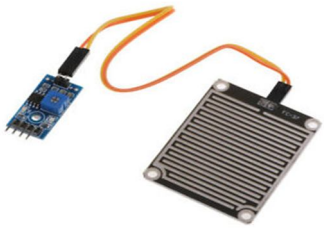


Figure 4: Rain Detection Sensor

E. Light Sensor

Light-based resistor, also known as a photoresistor or photoconductor, or photocell, it is resistor whose resistance depends on the intensity of the light. LDRs are lightweight, sensitive devices. Light the sensor is a practical device that converts this "light energy, "whether visible or in infra-red components spectrum, into an output of an electrical signal. Light the sensors are best known as "Photoelectric Devices "or" Image Sensors " because they are flexible the power of light (photographs) into electricity (electrons). Electronic image devices can be divided into two main parts categories: those that generate electricity if illuminated, such as Photo-voltaic or Photoemissions, etc., and those who change their electrical properties in in some way, such as photoresist or Photo-conductors. This leads to the subsequent division of the device.

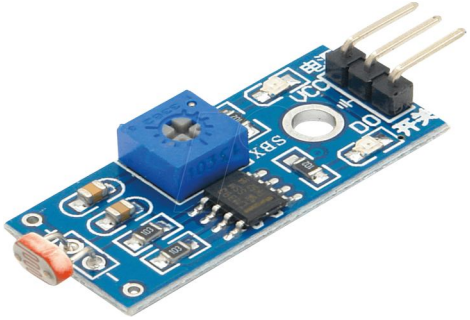


Figure 5: Light Sensor

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F. IR Sensor

An infrared sensor is used to emit light to hear something in the surrounding area. Can measure the temperature of the object and then detects the movement of things. Generally, in the infrared spectrum, everything objects emit a certain type of radiation. These types of radiation are invisible to our eyes; however the infrared sensor can detect these rays. When IR light falls on the photodiode, resistance to light output voltages will change according to the intensity of the IR light is accepted .The IR sensor contains an IR LED and an IR sensor Photodiode; together, called Photocoupler, or Optocoupler IR Transmitter is an output LED Infrared radiation is called IR LED. IR LED looks like a normal LED, the radiation emitted by IR LEDs are invisible to the human eye.



Figure 6: IR Sensor

G. Arduino-UNO Microcontroller Board

Arduino Uno is a small controller with open-source board based on Microchip ATmega328P microcontroller and developed by Arduino. Cc its easy-to-use hardware and software. Arduino can install various senses as input and reproduction provided output is required for actuators, engines, etc. User friendly to those with basic knowledge electronics and C programming language. Arduino The platform mainly consists of a Hardware Board called Arduino Board and Arduino IDE Software to be edited it. Other external hardware such as sensor modules, Vehicles, Arduino UNO, and Arduino Software (IDE) -1.0. Uno is a microcontroller board based on ATmega328P. Arduino contains 14 digital input / output where 6 is the PWM output, and 6 there are analog input, USB connection, power jack, and 16MHz quartz crystal, ICSP header, and reset button. Arduino Integrated Development Environment (IDE) is a cross-platform application (of Windows, Mac, OS, Linux) written in Java planning language. Used for writing and uploading plans on the Arduino board to get up from the room temperature. Sensors can change the effect, which is involves the conversion of the output voltage, which causes adoption.

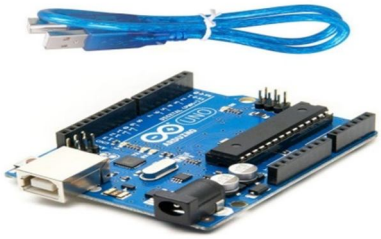


Figure 7: Arduino UNO

H. WI-FI Modules

The ESP8266 Wi-Fi Module is a standalone system chip with built-in TCP / IP protocol stack enabled microcontroller to access Wi-Fi network. IESP8266 has the ability to hold operating or deploying a Wi-Fi network works perfectly in an additional application processor. This module is powerful enough to process and maintain the board that allows it to be integrated with sensors and other applications some devices with their GPIOs have a low cost further development and less loading at a time working time.

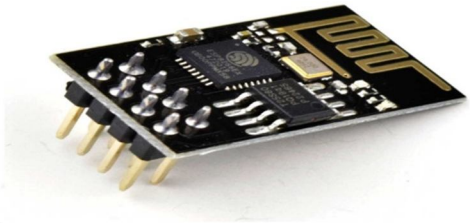


Figure 8: Wi-Fi Modules

I. Flow Chart

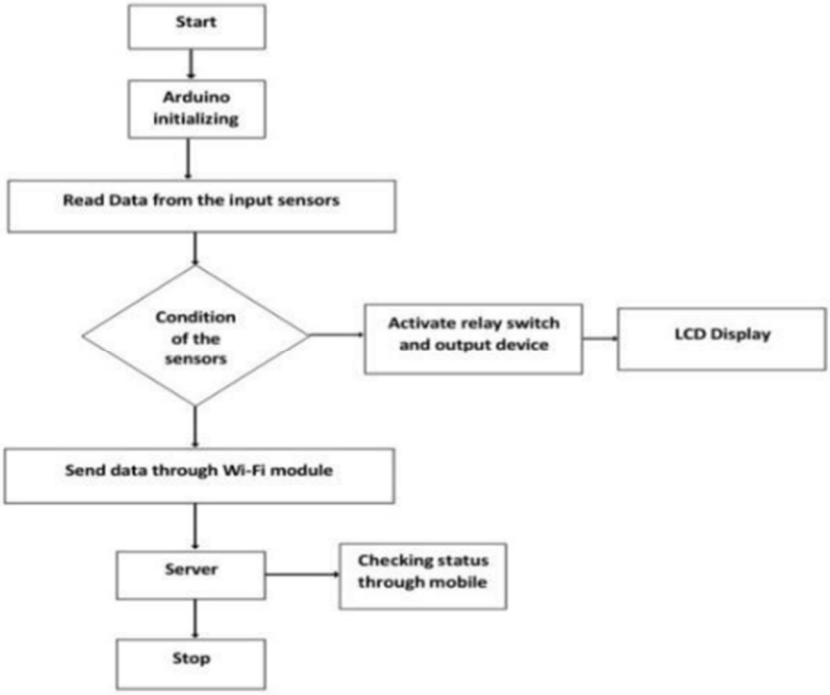
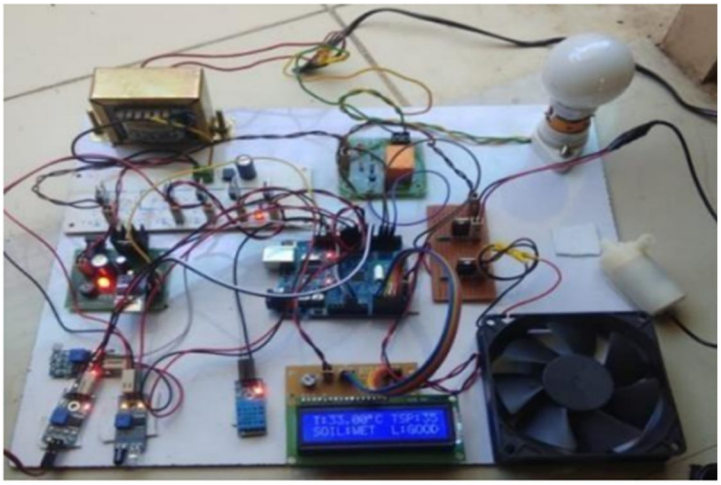


Figure 2: Flowchart

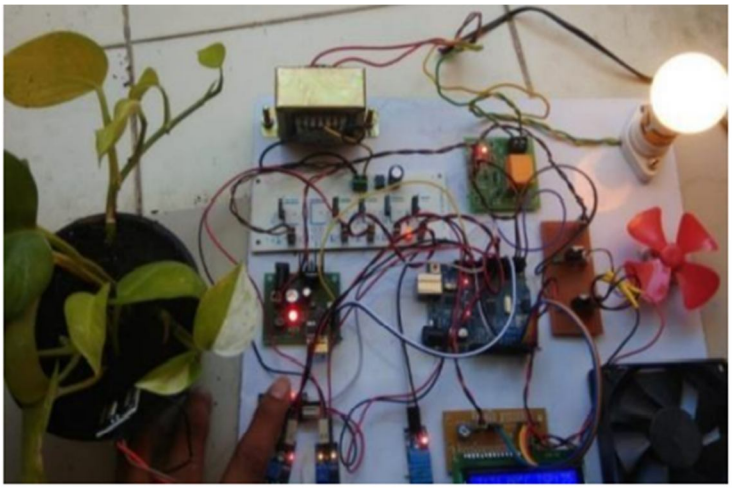
VI. IMPLEMENTATION

First, we write the code in Arduino IDE and then upload it code on the Arduino board. Arduino starts to launch. First, we write the code in Arduino IDE then upload the code to the Arduino board. Arduino it starts to start. Then we connect all the senses, lady module, relay switch, lamp, water pump, Dc fan and etc. with Arduino board. At the same time, we are to join the Arduino board and IDE with the help of a data cable. This thread assists in accepted delivery voltage to use Arduino board hardware and see serial product. Then once the data has been uploaded to Arduino hardware and connected to Arduino IDE, the project is starting to work. Then based on sensory behavior, Arduino board begins the working condition of the sensors displayed on the LCD. It and sends data via Wi-Fi module to server and monitor its position via mobile phone phone.

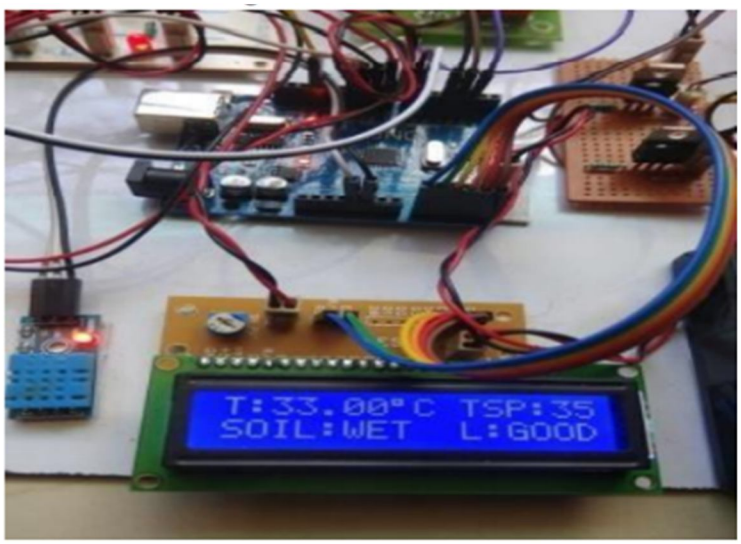
1) Connections of Smart Farming using IOT is shown in below figure:



2) The output of Smart Farming using IOT is shown below figure:



3) The status of various sensors displayed on LCD screen is shown below figure:



VII. CONCLUSION

This paper describes an automated irrigation system that uses IoT. Internet of things and cloud computing together do a system that effectively regulates the agricultural sector. This program will hear all the environmental parameters and send data to user by cloud. The user will take control action depending on whether this will be done using an actuator. This property allows the farmer to develop the crop in the way that the crop needs. It leads to higher, longer crop yields production time, better quality and less use of protective chemicals.

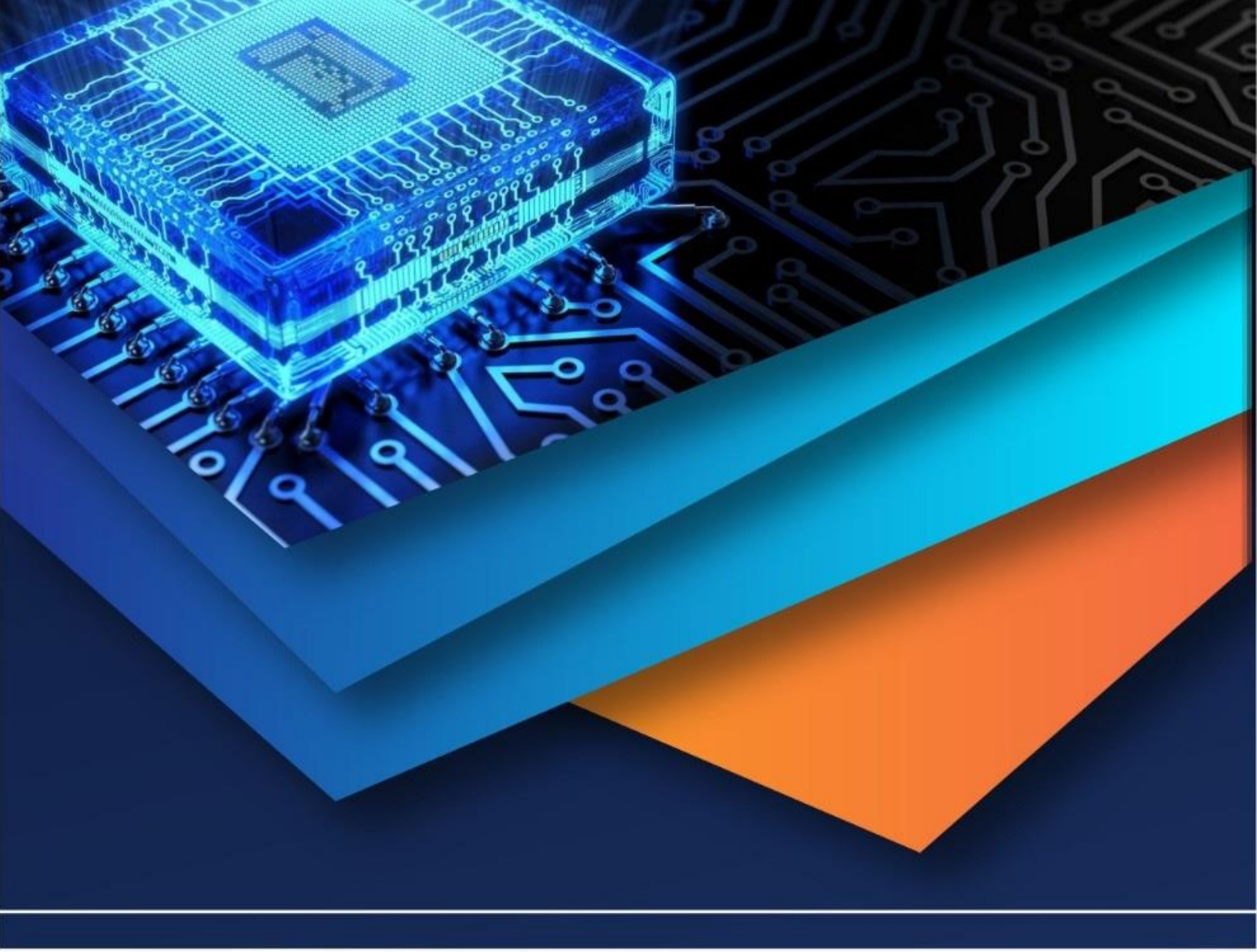
By using IoT, we can increase crop yields agricultural farms. With this IoT platform, we can beware of weather conditions such as humidity and Temperature. We can also change important things farm requirements; moisture and dryness of the soil can be seen by this. Using an IR sensor, we can see insects and humans along the way in the field. Sensory detection and microcontrollers are connected to each other IoT support and wireless communication between senses. This can alleviate the farmer's challenges facing climate. So, farmers can monitor farm conditions using a mobile phone or computers. These programs provide excellent yields produces and produces the best results. Use these plans to increase the excellent crop yields agricultural production in India. IoT you can control of crop yield and growth. It it can also reduce farm workers' work.

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