

The background features abstract green shapes in the corners, resembling leaves or organic forms. A cluster of small black dots is located in the bottom right corner.

# IOT BASED SMART RENEWABLE ENERGY GENERATION & IRRIGATION SYSTEM WITH MOISTURE DETECTION

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# INTRODUCTION

The IoT-based Smart Renewable Energy Generation & Irrigation System with Moisture Detection is an innovative solution that integrates Internet of Things (IoT) technology to enhance agricultural practices. This system combines renewable energy sources, such as solar or wind power, with intelligent irrigation management and moisture detection capabilities.

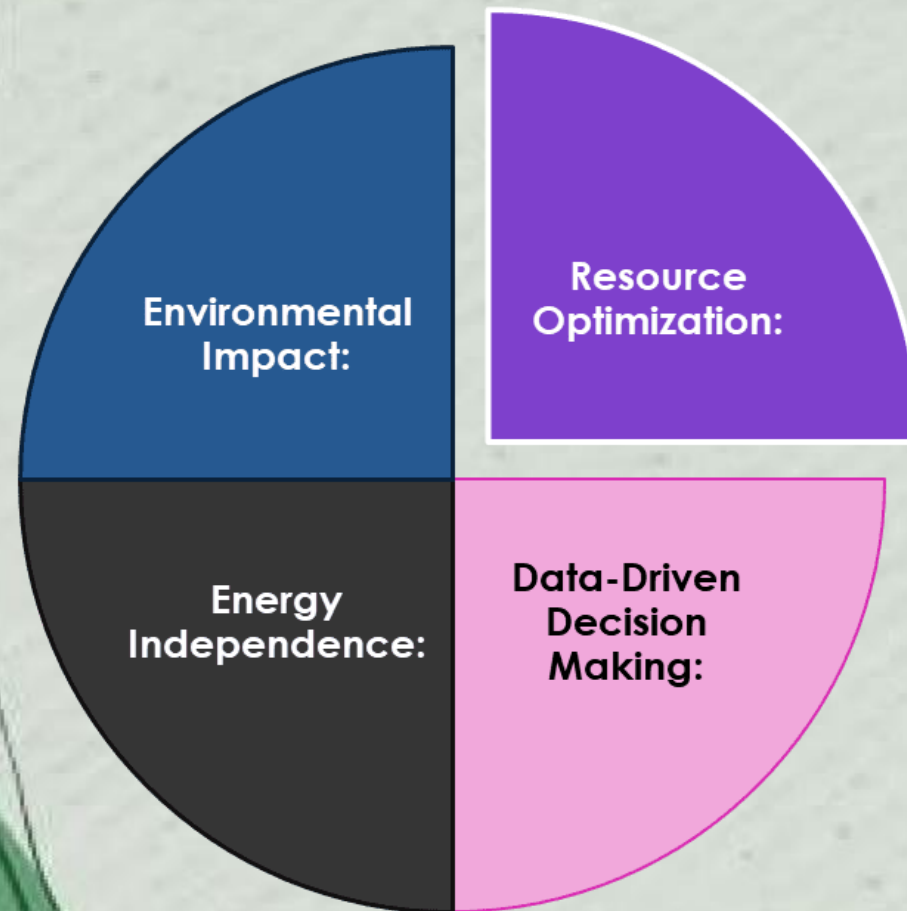




# OBJECTIVES

- Develop an IoTbased system that combines renewable energy sources with intelligent irrigation management
- Implement sensors for real-time monitoring of soil moisture levels, allowing for data-driven irrigation decisions
- Integrate renewable energy sources such as solar and wind power to provide a sustainable and eco-friendly energy supply.
- Design a user-friendly interface for remote monitoring and control of the entire system

# MOTIVATION



## •Resource Optimization:

- Optimize water usage for irrigation.
- Maximize renewable energy generation for sustainability.

## •Data-Driven Decision Making:

- Use real-time data for informed irrigation decisions.
- Analyze historical data to enhance future planning.

## •Energy Independence:

- Reduce dependence on conventional energy sources.
- Harness renewable energy for self-sufficiency.

## •Environmental Impact:

- Minimize environmental footprint.
- Promote eco-friendly agricultural practices.



# LITERATURE SURVEY

Authors : Shweta B. Saraf, Dhanashri H.  
Gawali

Published by : IJRASET  
DOP : 25-02-2022

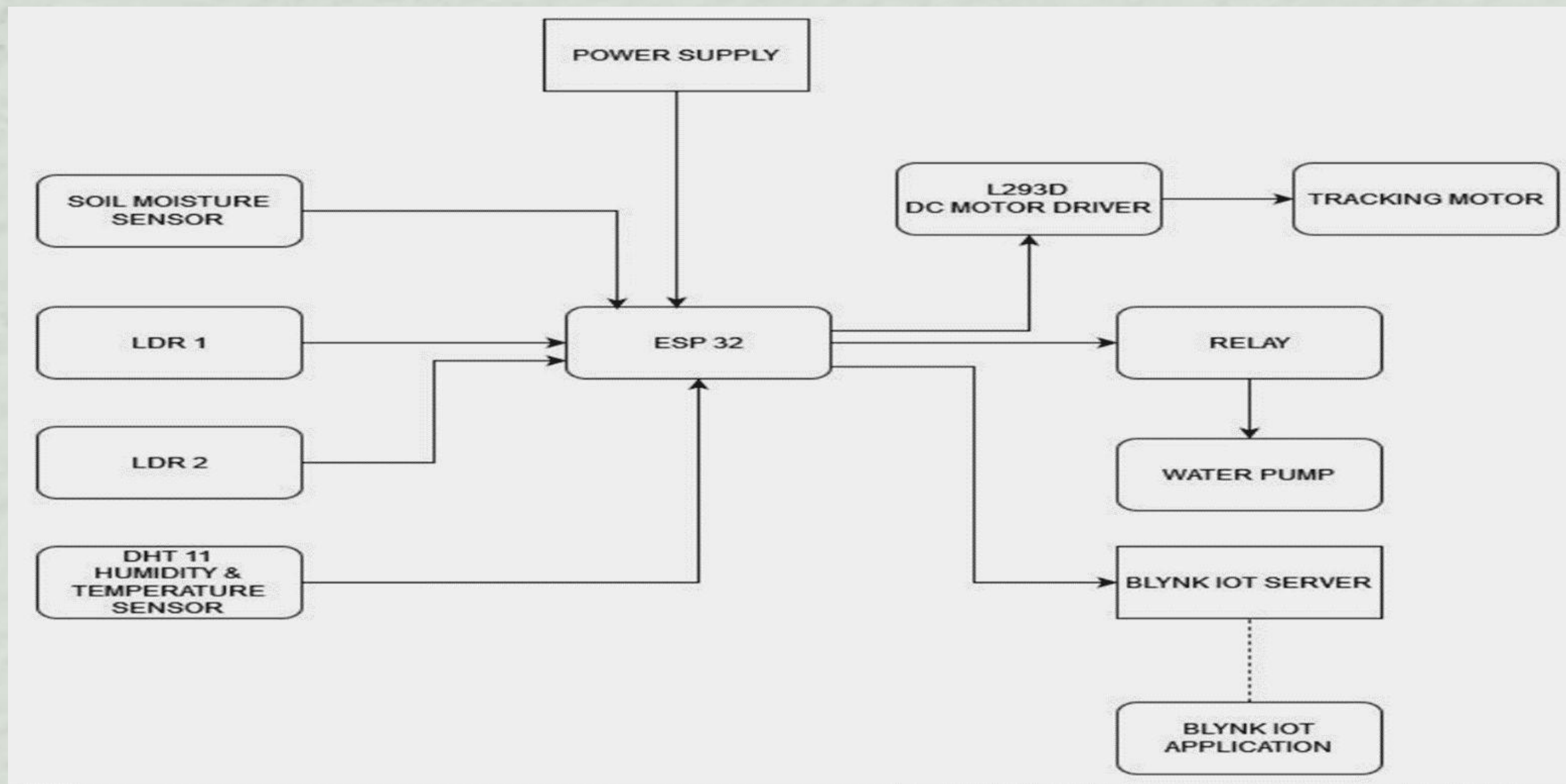
Authors : Moinak Bose, Sourodip Ghosh  
Published by : IRJET  
DOP : 25-03-2020

# PROJECT WORK DESCRIPTION

'The IoT-based Smart Renewable Energy Generation & Irrigation System with Moisture Detection is a pioneering project that seamlessly integrates renewable energy sources and advanced irrigation techniques. Utilizing Internet of Things (IoT) technology, the system optimizes energy generation from renewable sources like solar and wind, ensuring sustainable power for irrigation. Real-time moisture detection enables efficient water management, ensuring precise irrigation based on soil moisture levels. This smart system enhances agricultural productivity, reduces energy dependency, and promotes environmental sustainability by harnessing clean energy and optimizing water usage through intelligent monitoring and control mechanisms.

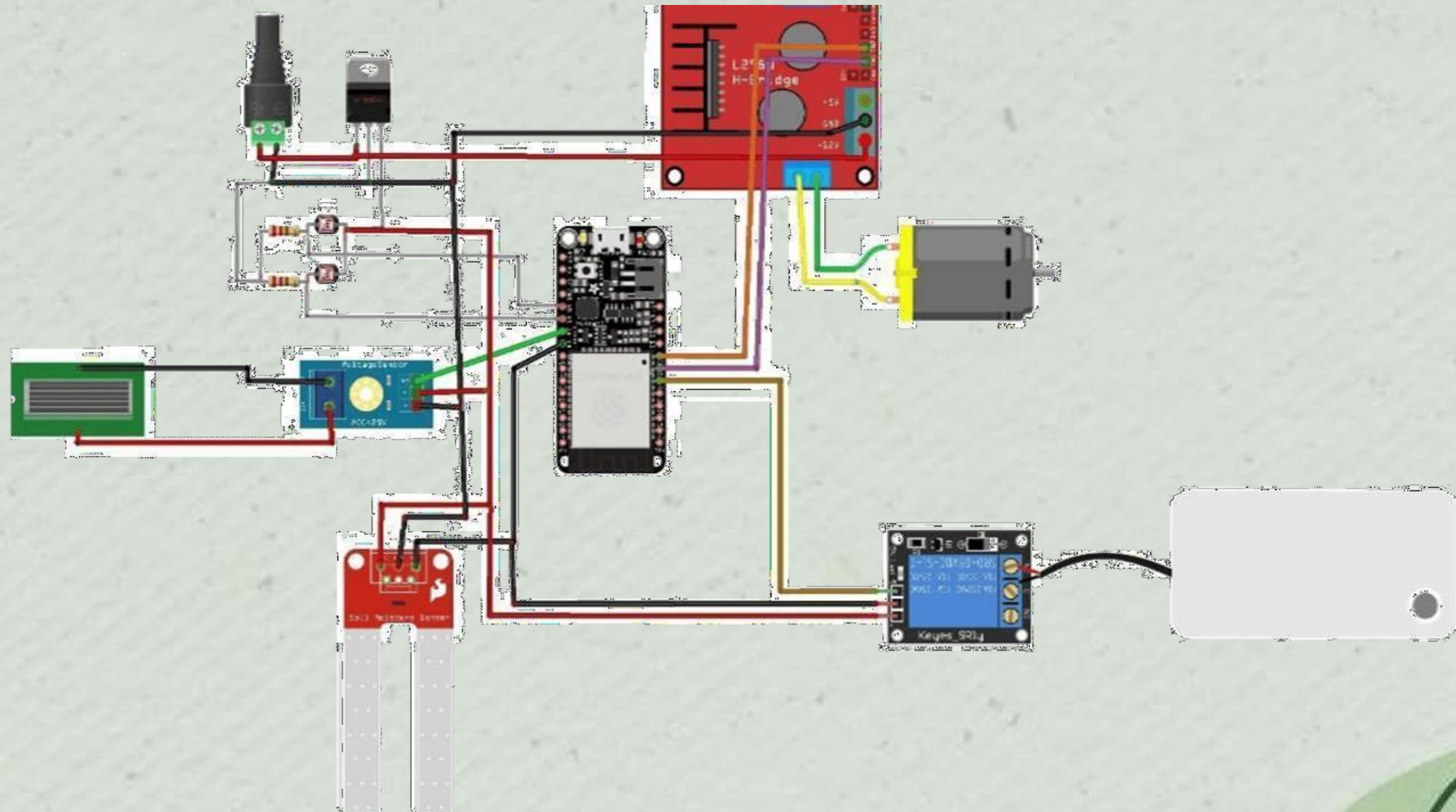


# BLOCK DIAGRAM





# CIRCUIT DIAGRAM





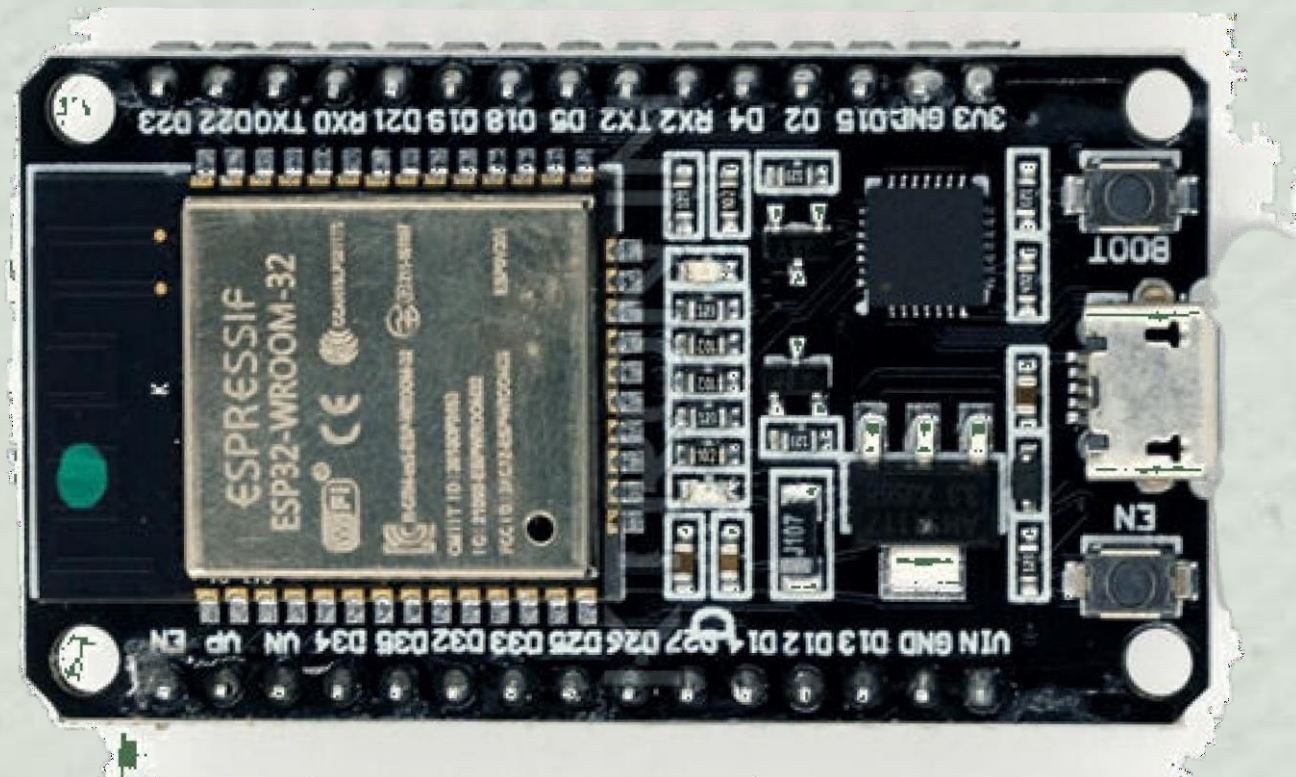
# HARDWARE COMPONENTS

- ESP 32
- Solar Panel
- L293D
- LDR Sensor
- LDR Module
- Soil Moisture Sensor
- Soil Moisture Module
- ACS712 Current Sensor
- Voltage Sensor
- DHT 11
- Relay Module
- DC Motor
- Transistor
- Capacitor
- Resistor



# ESP 32

- The ESP32 is a powerful, low-cost microcontroller developed by Espressif Systems.
- It integrates Wi-Fi and Bluetooth capabilities, making it suitable for IoT (Internet of Things) applications.



# SOLAR PANEL

Solar panels, also known as photovoltaic (PV) panels, are devices that convert sunlight into electricity.

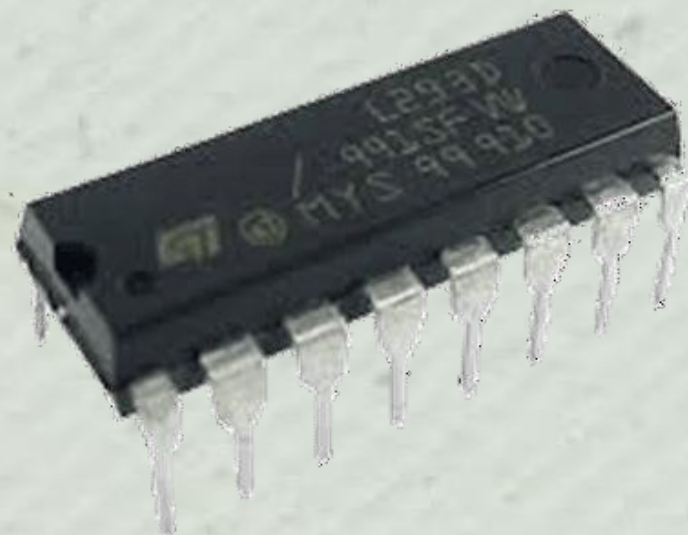






# L293D

The L293D is a dual H-bridge motor driver IC that facilitates bidirectional control of DC motors. It enables seamless interfacing with sensors and microcontrollers, making it a versatile choice for various robotic and electronic applications. The IC's built-in protection ensures reliability in motor control circuits.



# LDR

The Light Dependent Resistor (LDR) is a passive electronic component that exhibits a change in resistance based on the intensity of light it is exposed to. Widely used in light-sensing applications, LDRs find applications in automatic lighting systems, cameras, and other devices requiring light-level detection for control or measurement.

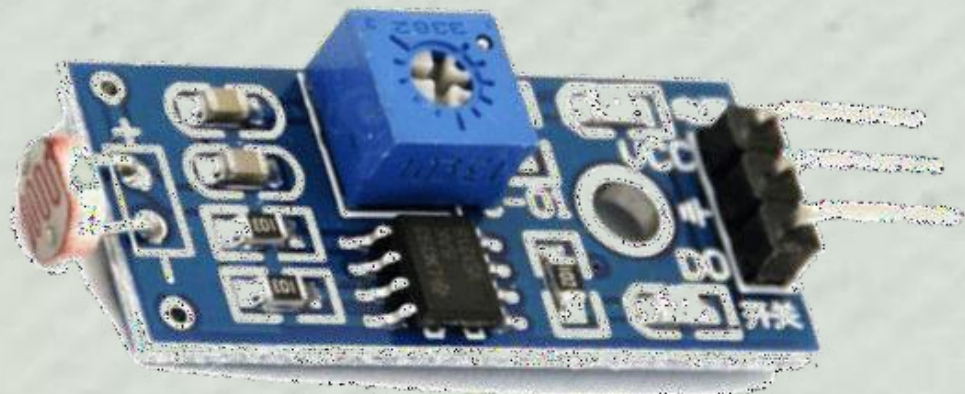






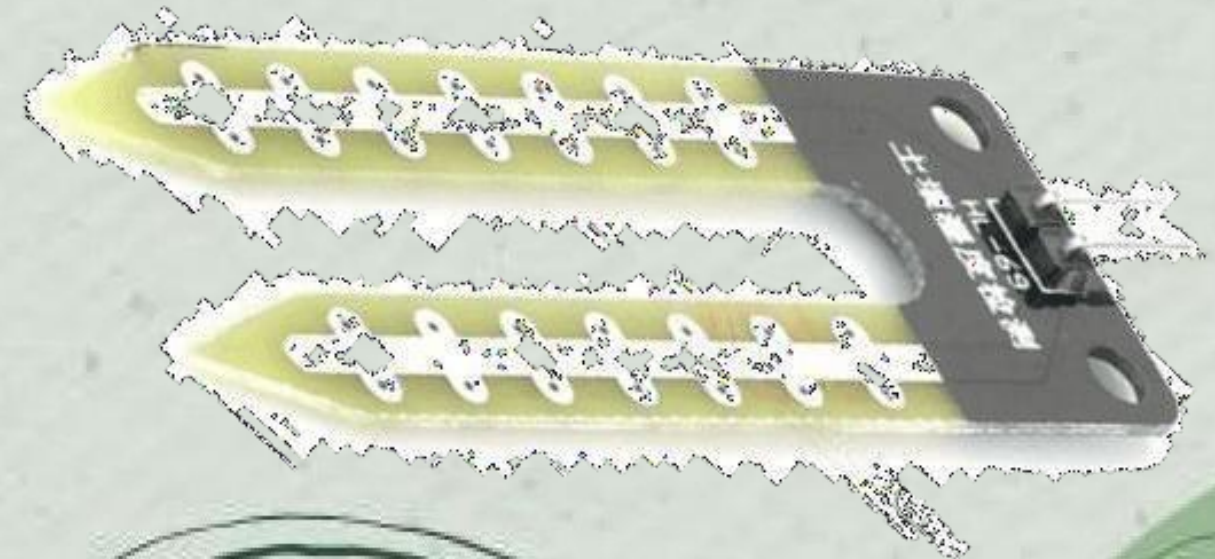
# LDR MODULE

The LDR (Light Dependent Resistor) module is a photoresistor-based sensor sensitive to ambient light levels. As light intensity changes, the module's resistance varies, providing a voltage output. Widely used in electronic projects, it's instrumental for applications such as automatic lighting control, sun tracking systems, and daylight-sensitive circuits.



# SOIL MOISTURE SENSOR

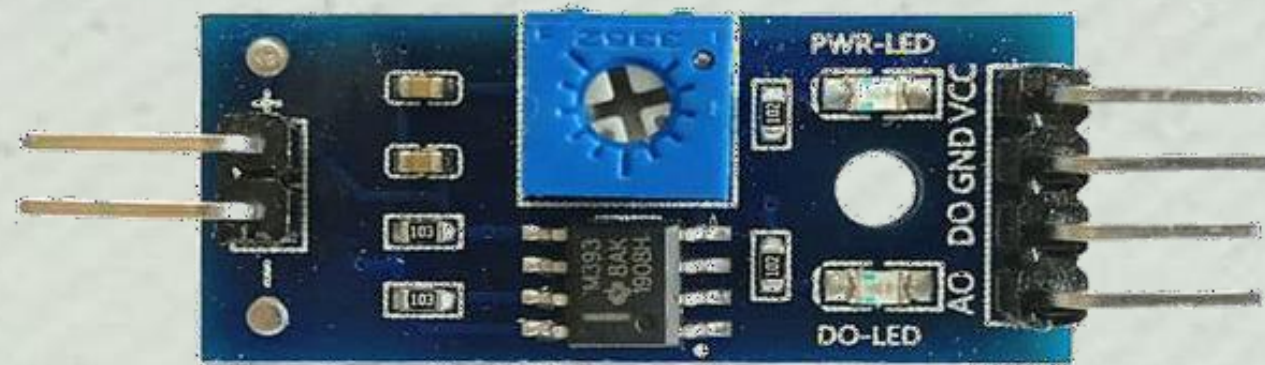
The soil moisture sensor is a device that measures the water content in soil. It provides crucial data for efficient irrigation in agriculture. The sensor's analog or digital output is directly proportional to the soil moisture level, aiding in optimal water management and promoting sustainable agricultural practices.





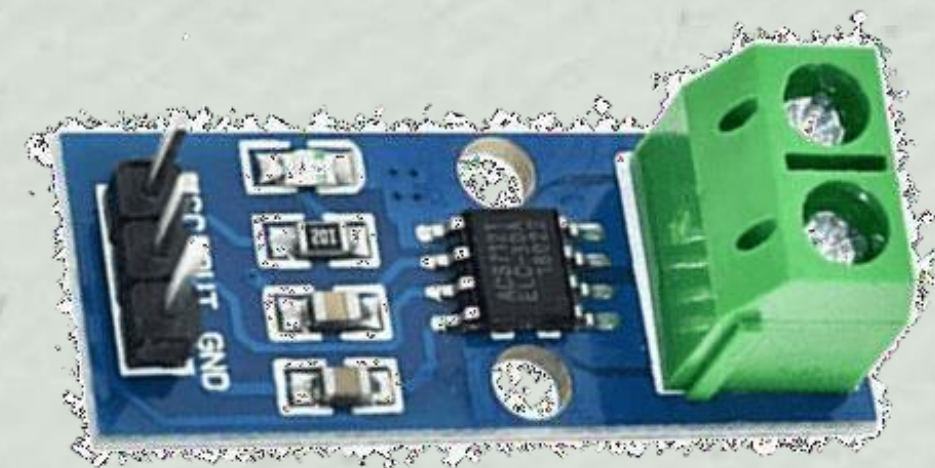
# SOIL MOISTURE MODULE

The Soil Moisture Module is a sensor used to measure the moisture content in soil. It typically employs conductive probes to assess the soil's water level, providing crucial data for efficient irrigation in agriculture and gardening. The module aids in preventing overwatering and promoting optimal plant health.



# ACS712 CURRENT SENSOR

The ACS712 is a Hall-effect based current sensor, providing a precise and non-intrusive method for measuring DC or AC currents. With its linear output proportional to the sensed current, the ACS712 is commonly used in electronic projects, power monitoring systems, and renewable energy applications for accurate current measurement.





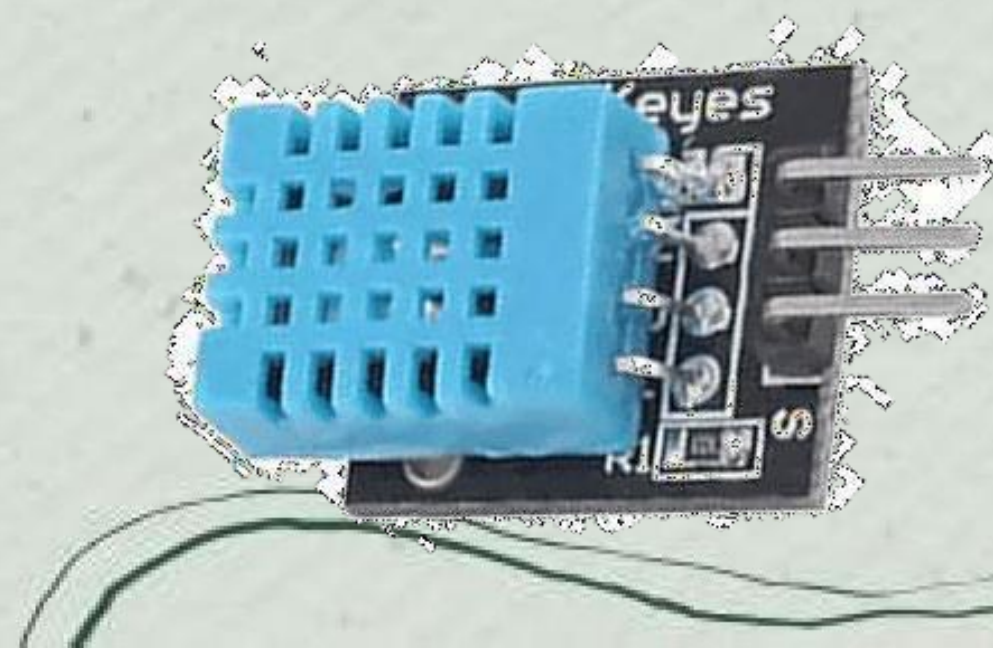
# VOLTAGE SENSOR

A voltage sensor is a device that measures electrical potential difference between two points in a circuit. It provides a proportional output voltage corresponding to the measured voltage, aiding in monitoring and control applications. Voltage sensors are crucial for assessing electrical systems' health and ensuring optimal performance in various electronic devices.



## DHT 11

The DHT11 is a basic, low-cost digital temperature and humidity sensor. Widely used in hobbyist projects, it provides reliable and real-time data. With a simple 3-pin interface, it is easy to integrate with microcontrollers, making it popular for weather monitoring and indoor climate control applications.







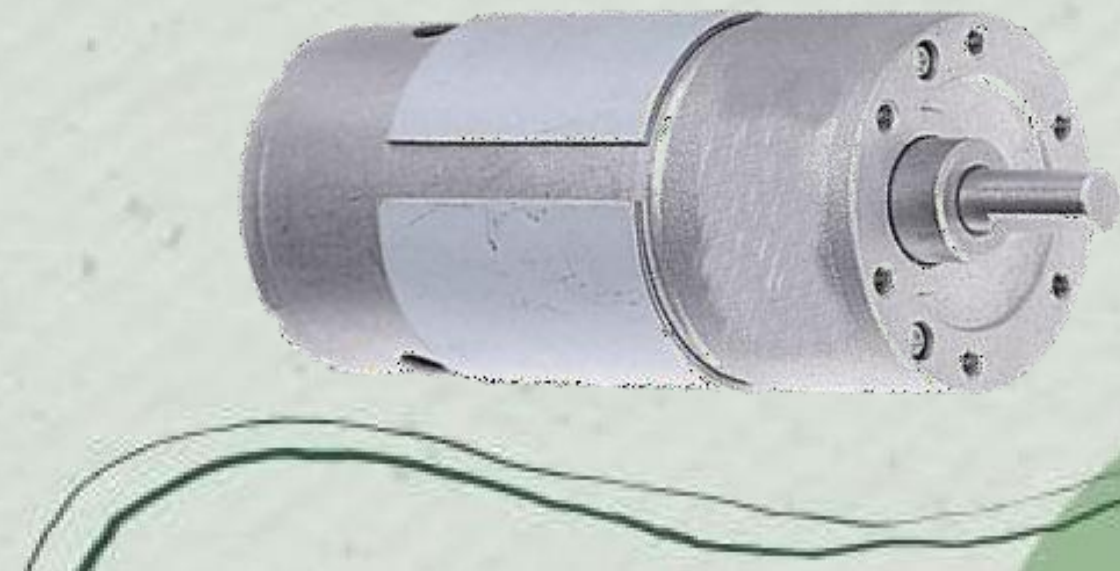
# RELAY MODULE

A relay module is an electronic device containing one or more relays that enable the control of high-power electrical devices using low-power microcontrollers or digital circuits. It acts as a switch, allowing the isolation and control of circuits, making it essential in automation, robotics, and home electronics projects.



# DC MOTOR

A DC (Direct Current) motor is an electromechanical device that converts electrical energy into mechanical motion. It operates on the principle of electromagnetic induction, using a direct current to create a magnetic field that drives the rotation of the motor's shaft. DC motors are widely employed in various applications, including robotics, electronics, and automotive systems.

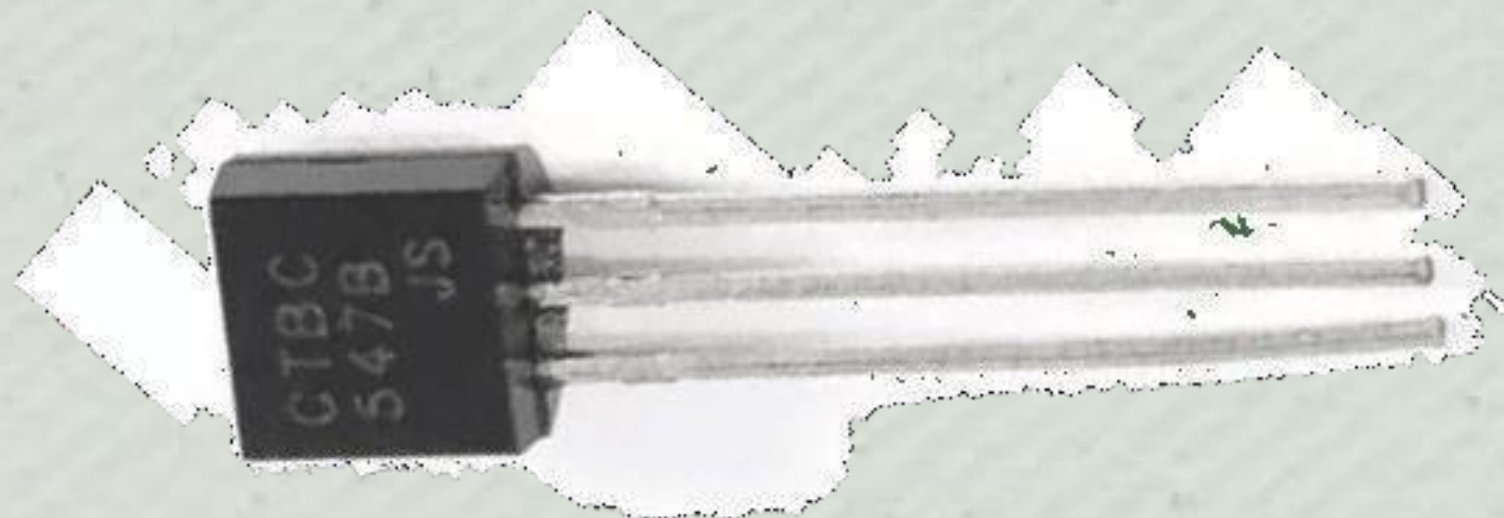






# TRANSISTOR

A transistor is a semiconductor device that amplifies or switches electronic signals. It has three layers of semiconductor material: the emitter, base, and collector. By applying a small current to the base, a much larger current can flow between the collector and emitter, allowing precise control in electronic circuits.



# CAPACITOR

The 1000  $\mu\text{F}$  capacitor is an electrolytic capacitor with a capacitance of 1000 microfarads. It is commonly used in electronic circuits to stabilize voltage, filter out low-frequency noise, and store electrical charge. Its high capacitance makes it effective for smoothing power supplies and supporting applications where substantial charge storage is required.

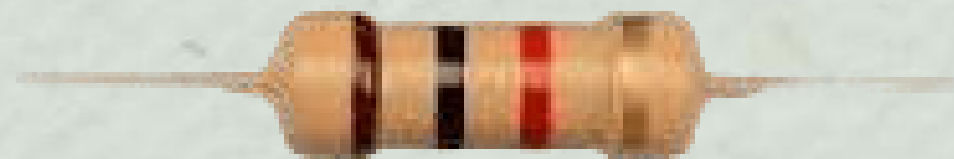






# RESISTOR

1K resistors are electronic components that are used to reduce the flow of electric current in a circuit. They are passive components that are designed to resist the flow of current, and they are often used to limit the current in a circuit to protect other components from damage.







# SOFTWARE USED

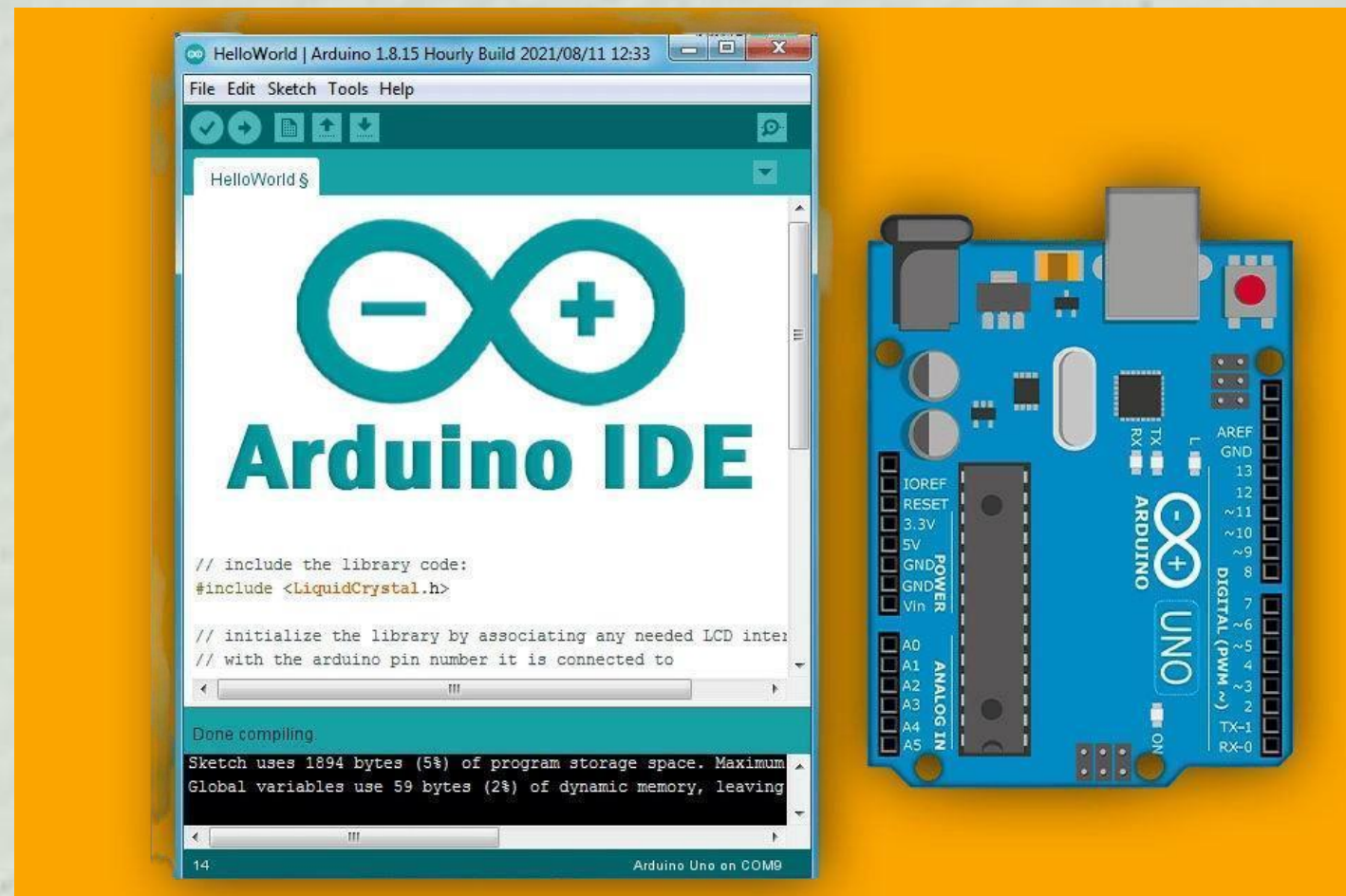
- Arduino IDE
- Blynk IOT App





# ARDUINO IDE

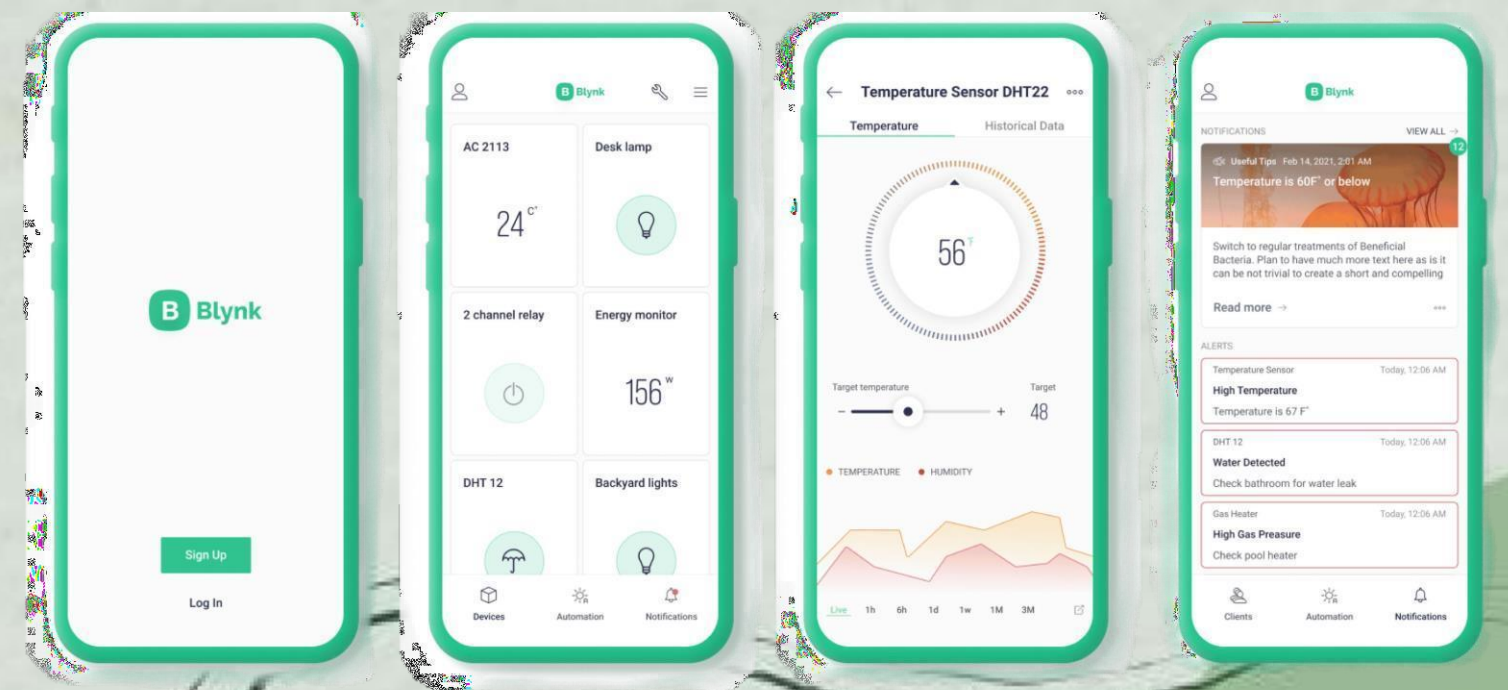
The Arduino IDE (Integrated Development Environment) is used to write the computer code and upload this code to the physical board. The Arduino IDE is very simple and this simplicity is probably one of the main reasons Arduino became so popular.



# BLYNK IOT APP

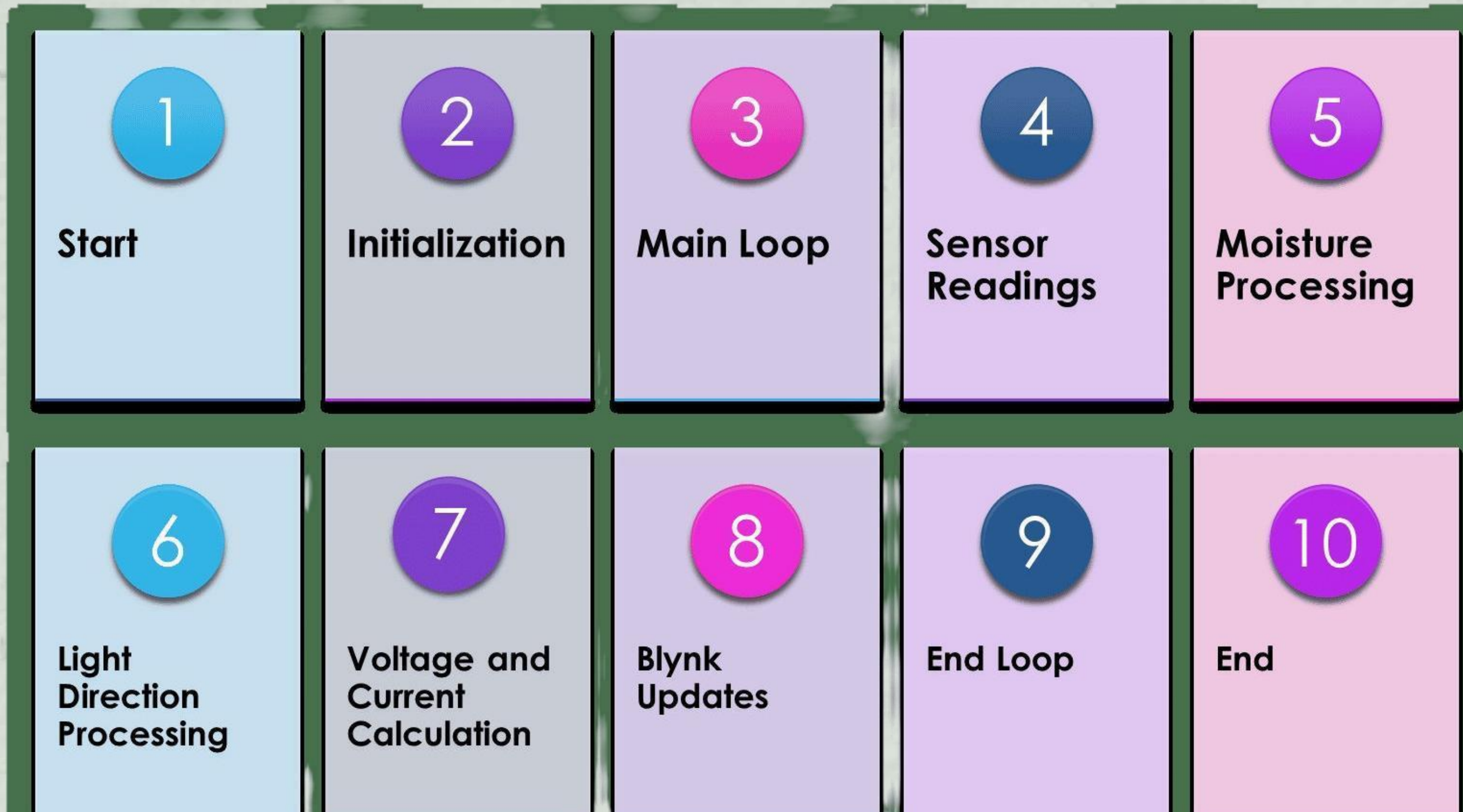
Blynk is an IoT (Internet of Things) platform that provides a mobile app to control and monitor connected devices. It enables users to create custom dashboards with buttons, sliders, and displays, allowing remote interaction with their IoT projects.

Blynk simplifies the development of IoT applications by providing a user-friendly interface for building mobile apps that communicate with microcontrollers or other hardware.





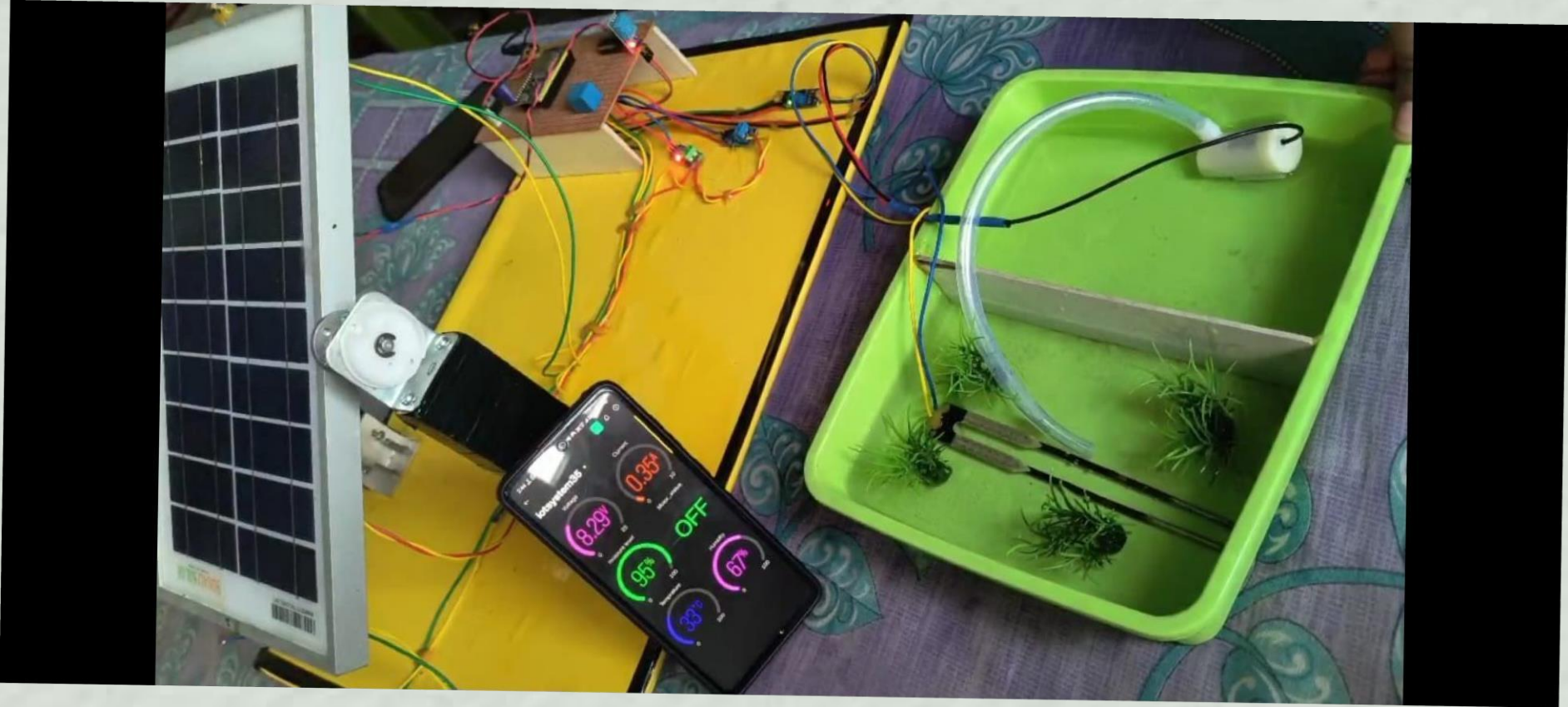
# FLOWCHART







# RESULTS

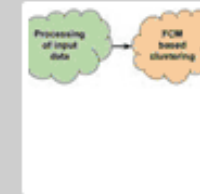




# FUTURE SCOPE



**Advanced Sensor Technologies:**



**Data Analytics and Machine Learning:.**



**Remote Monitoring and Control:**



**Integration with Weather Forecasting:.**



**Distributed Energy Storage:**



**Precision Agriculture Techniques:**



# CONCLUSION

•In conclusion, the IoT-based Smart Renewable Energy Generation & Irrigation System with Moisture Detection presents a pioneering solution for sustainable agriculture. By seamlessly integrating renewable energy sources and IoT technology, the system optimizes energy efficiency and ensures precise irrigation based on real-time moisture detection. This innovative approach not only enhances crop yield but also promotes environmental conservation. The system's adaptability, cost-effectiveness, and minimal environmental impact underscore its potential for widespread adoption in modern agriculture, marking a significant stride towards efficient resource management and sustainable farming practices.







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