

**Report**  
**Inter Departmental Project-II**  
**On**  
**Smart Home**

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**VIGNAN'S**

Foundation for Science, Technology & Research

**(Deemed to be University)**

-Estd. u/s 3 of UGC Act 1956

**(ACCREDITED BY NAAC WITH “A+”GRADE)**

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## CERTIFICATE

This is to certify that the IDP report entitled “**Smart Home**” that is being submitted by P.Sri Lakshmi Tulasi (201FA04406 CSE),P.Siddardha(201FA04440 CSE),J.Hamsini (201FA04443 CSE), S.Jaya Ajay Kumar (201FA05086 ECE) of Vignan’s Foundation for Science Technology and Research, is a record of work carried out by them under the guidance of **Dr.B.Suvarna** of Computer Science And Engineering.

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## **ABSTRACT**

Home automation is gaining popularity day by day, because of many advantages. One can achieve home automation by simply connecting home appliance electrical devices to the internet. The reason for this surge demand of network enabled home automation is reaching the zenith in recent days due to its simplicity and affordability. In this project we have used IOT based home automation system whose goal is to develop a home automation system that gives control to the user over remotely controllable aspects of his/her home. The automation system will have ability to be controlled from a central host pc, the internet, and also remotely accessed via mobile based application.

## CONTENTS

1. Objective.....	04
2. Introduction.....	06
3. Circuit diagram.....	07
4. Components required.....	09
5. Working &Result of project.....	17
6. Advantages and disadvantages.....	20
7. Applications.....	21
8. Future scope.....	22
9. Conclusion.....	22
10.Reference.....	23

## **1.OBJECTIVE**

This IOT based smart home helps to reduce human efforts to a great extent.

The suggested system is Works as follows:

- To control the lights (On and Off) and Fan using WIFI.
- To Control Door Lock System using WIFI.
- Smart Watering for plants using soil moisture and water pump using WIFI.
- Smart waste segregation using water and IR sensor by Servo Motor
- Smart Baby cradle using water , Sound sensor using WIFI.
- Smart Garage Opening using servo motor.

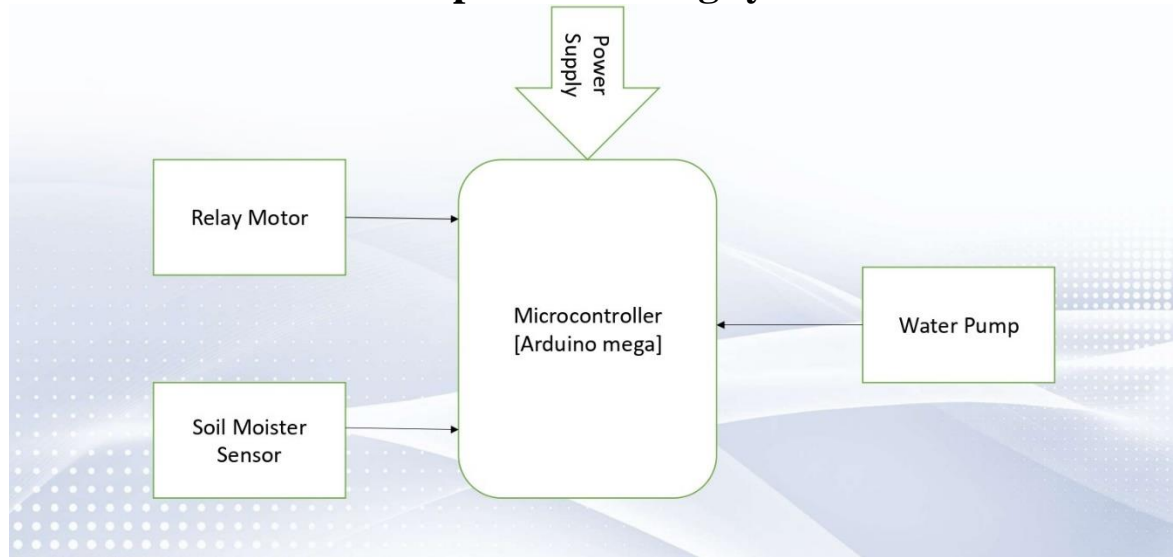
## **2.INTRODUCTION**

The home automation is control of home device form a central control point automation is where more things are being completed every day automatically. Usually the basic tasks of turning on or off certain device and beyond, either remotely or in close proximity.

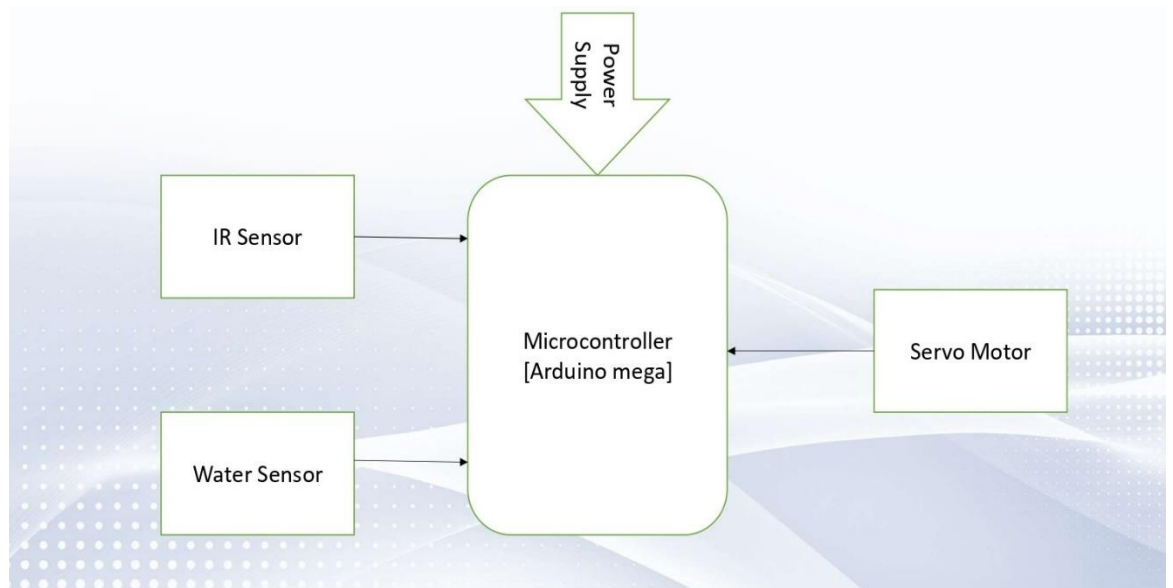
In an intelligent home automation system there are many possible solution for how and form where to control the automation system and single device a user interface can be a computer-based system a mechanical switch a single light a loudspeaker with a microphone or a some kind of personal remote controller using normal PC, laptop or table PC by stand alone software or web-based user interface. In the near future all electronic appliances in a home will be networked.

### 3. BLOCK DIAGRAM

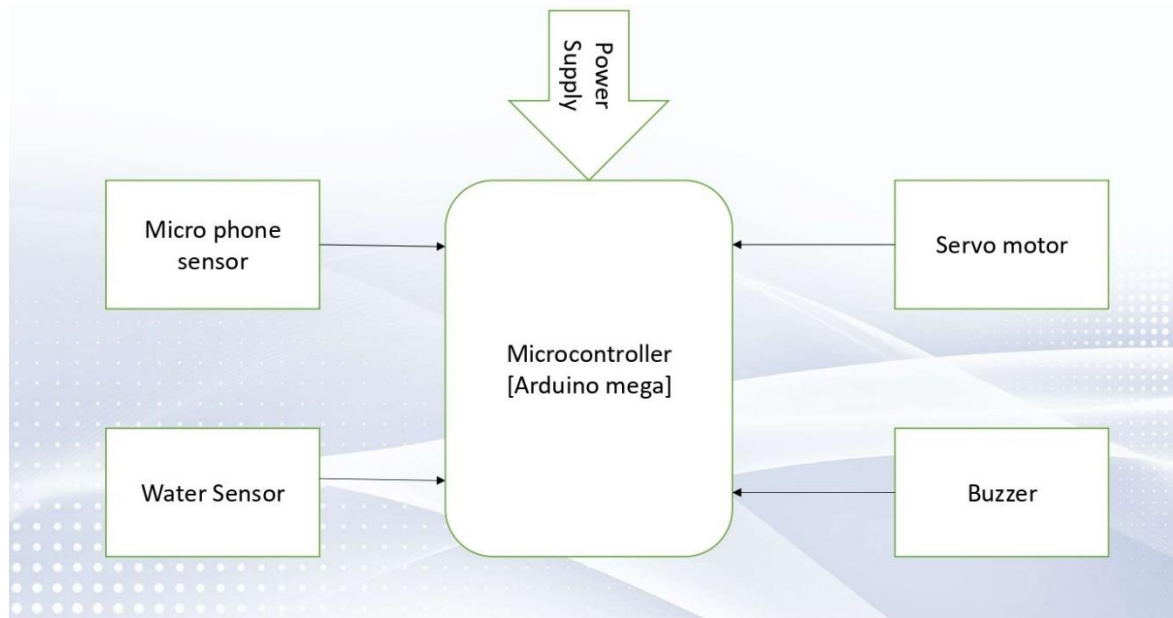
#### Smart plant watering system



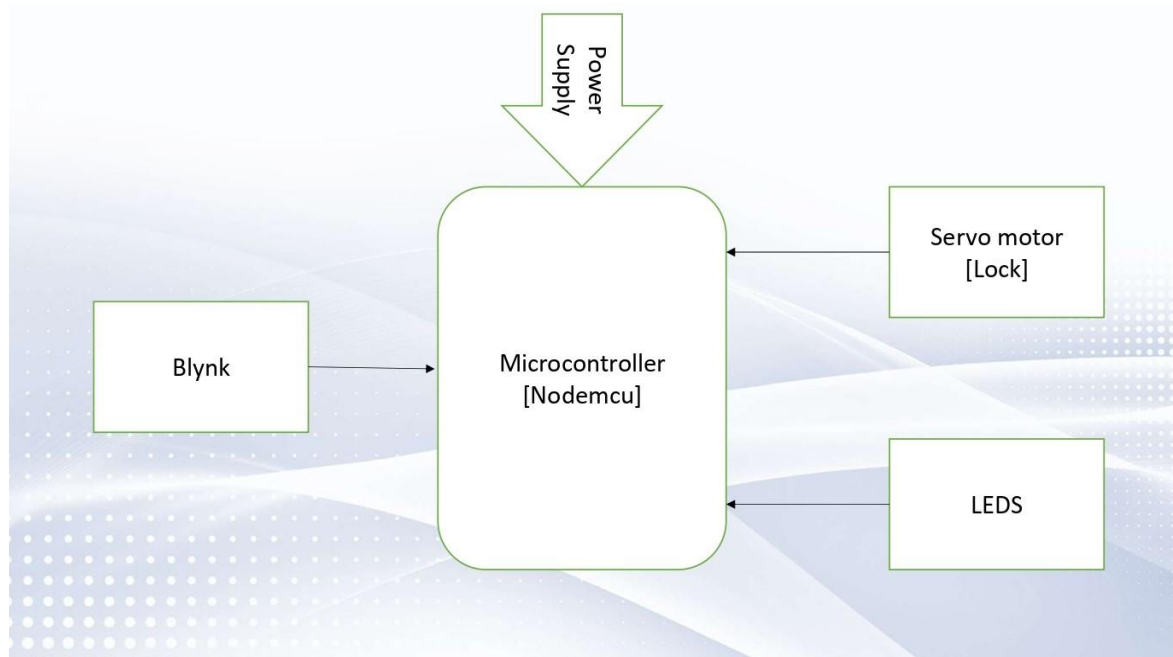
#### Smart waste bin



## Smart Baby cradle



## Smart controller





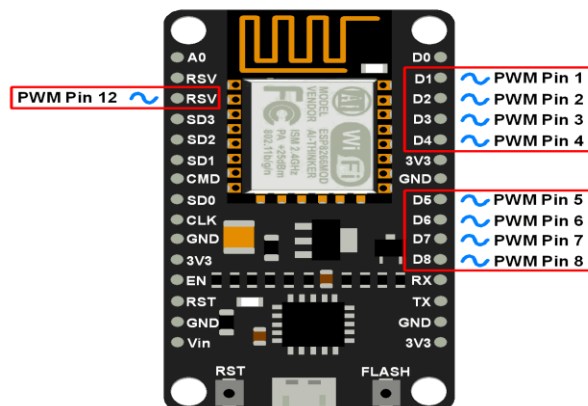
## 4. COMPONENTS REQUIRED

- NodeMcu
- Relay module
- Soil Moisture Sensor
- Water pump
- IR sensor
- Water Sensor
- Servo Motor
- LED Lights
- Water Sensor
- Sound Sensor
- Jumper Wires
- Bread Board
- Arduino Mega
- Buzzer

## 5. DESCRIPTION OF COMPONENTS

- **NODE MCU:**

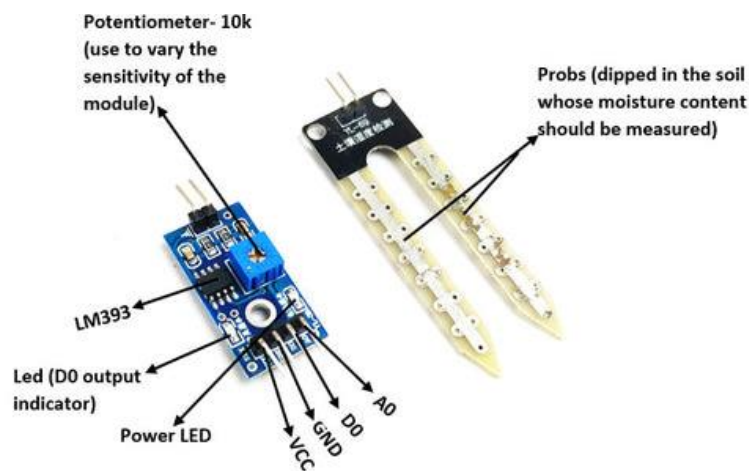
NodeMCU is an open-source firmware and development kit that helps you to prototype or build IoT products. It includes firmware that runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The firmware uses the Lua scripting language.



## NodeMCU ESP8266 Specifications & Features

- Microcontroller: Tensilica 32-bit RISC CPU Xtensa LX106
  - Operating Voltage: 3.3V
  - Input Voltage: 7-12V
  - Digital I/O Pins (DIO): 16
  - Analog Input Pins (ADC): 1
  - UARTs: 1
  - SPIs: 1
  - I2Cs: 1
  - Flash Memory: 4 MB
  - SRAM: 64 KB
  - Clock Speed: 80 MHz
  - USB-TTL based on CP2102 is included onboard, Enabling Plug n Play
  - PCB Antenna
- 
- **Soil Moisture Sensor:**

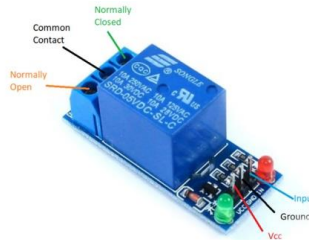
Soil moisture sensors measure the water content in the soil and can be used to estimate the amount of stored water in the soil horizon. Soil moisture sensors do not measure water in the soil directly. Instead, they measure changes in some other soil property that is related to water content in a predictable way.



It consists of 4 pins in which two pins, Vcc and Gnd are connected to supply voltage. The remaining two pins are digital (D0) and analog (A0) are the output pins.

- **Relay Module:**

A power relay module is an electrical switch that is operated by an electromagnet. The electromagnet is activated by a separate low-power signal from a micro controller. When activated, the electromagnet pulls to either open or close an electrical circuit.



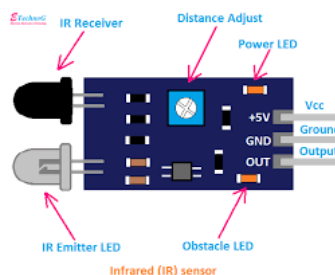
- **Water Pump**

The DC Water pump module is highly used with 12V power supply. It is a fully submersible water pump having lot of applications as water outlet, soda drink outlet, project work and science model applications.



- **IR Sensor:**

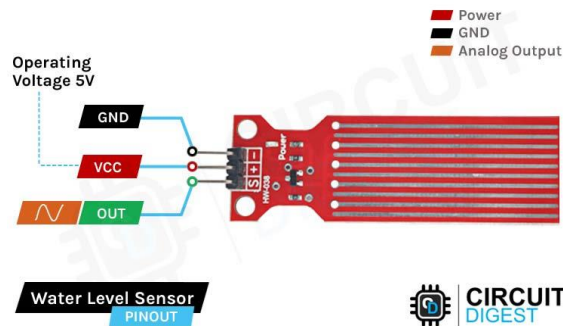
Active infrared sensors work with radar technology and they both emit and receive infrared radiation. This radiation hits the objects nearby and bounces back to the receiver of the device. Through this technology, the sensor can not only detect movement in an environment but also how far the object is from the device.



Pin No	Pin Name	Description
1	VCC	+5 v power supply
2	GND	Ground (-) power supply
3	OUT	Digital Output

- **Water Sensor:**

A water sensor is a device used in the detection of the water level for various applications. Water sensors can come in several variations that include ultrasonic sensors, pressure transducers, bubblers, and float sensors.

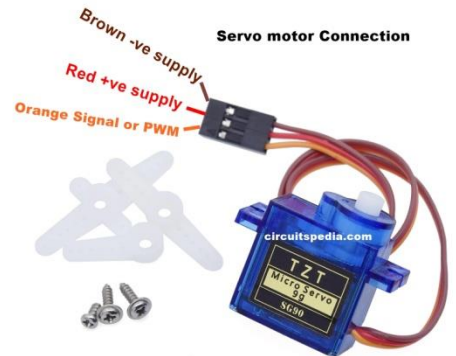


- VCC: is the power supply pin of the Rain Detection Sensor that can be connected to 5V of the supply.
- GND: is the ground pin of the board and it should be connected to the ground pin of the Arduino.
- S(Signal): is the Analog output pin of the board that will give us an analog signal in between VCC and ground.

- **Servo Motor:**

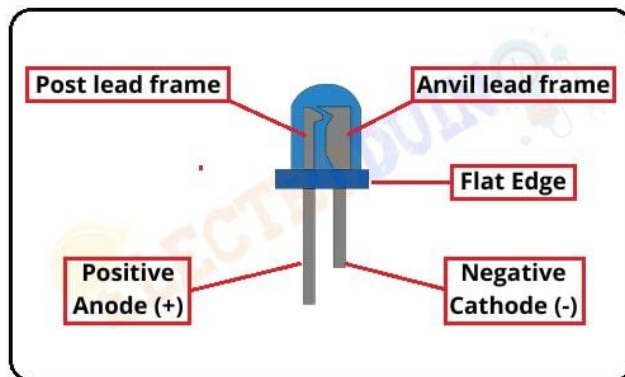
A servo motor is a self-contained electrical device that moves parts of a machine with high efficiency and great precision. In simpler terms, a servo motor is a BLDC motor with a sensor for positional feedback. This allows the output shaft to be moved to a particular angle, position, and velocity that a regular motor cannot do. However, a servo motor is only one part of a closed-loop motion control system. A complete motion system includes an amplifier, control circuit, drive gears, potentiometer, shaft, and either an encoder or resolver as well as the servo motor.

A servo motor has 3 pins: 1 red (5V), 1 brown or black (Ground), and 1 yellow or white (Control).



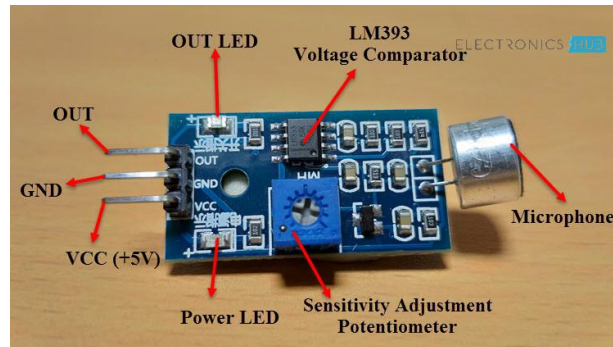
- **LED Lights:**

A light-emitting diode (LED) is a semiconductor device that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. The color of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band gap of the semiconductor. White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device.



- **Sound Sensor:**

A sound sensor is a simple, easy-to-use, and low-cost device that is used to detect sound waves traveling through the air. Not only this but it can also measure its intensity and most importantly it can convert it to an electrical signal which we can read through a microcontroller.

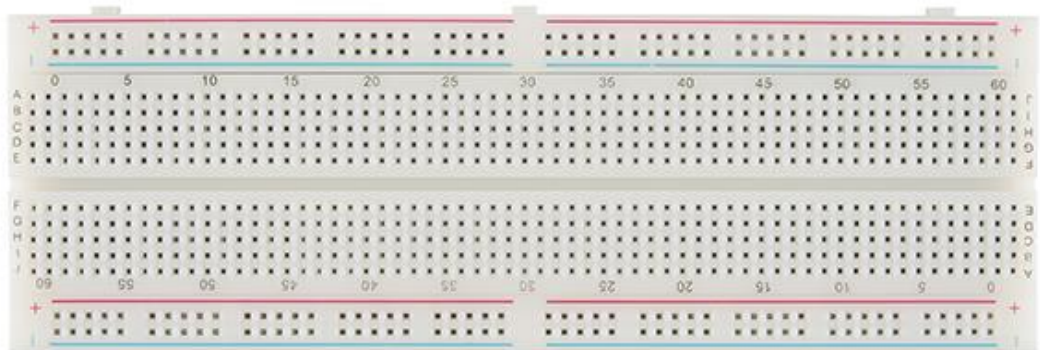


This sensor includes 3 pins and they are,

- Pin1 (VCC): 3.3V DC to 5V DC
- Pin2 (GND): This is a ground pin
- Pin3 (OUT): This is an output pin. It provides high signal when there is no sound and goes LOW when sound is detected. You can connect it to any digital pin on an Arduino or directly to a 5V relay or similar device

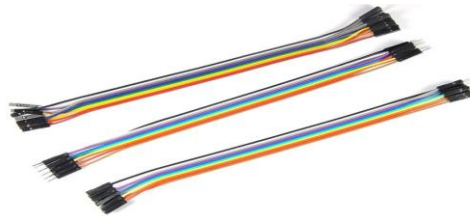
- **Bread Board:**

A breadboard, solderless breadboard, or protoboard is a construction base used to build semi-permanent prototypes of electronic circuits. Unlike a perfboard or stripboard, breadboards do not require soldering or destruction of tracks and are hence reusable.



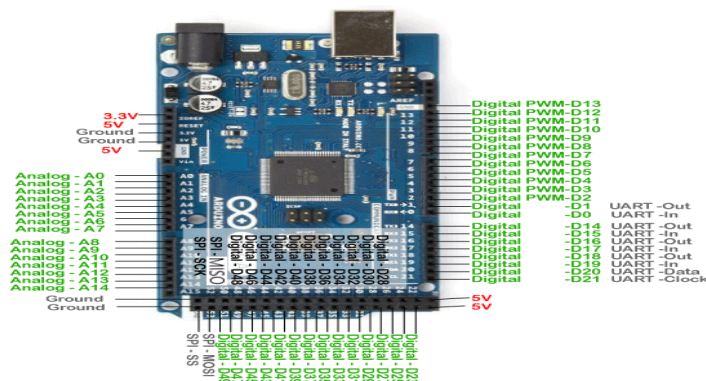
- **Jumper Wires:**

A jumper wire is an electric wire that connects remote electric circuits used for printed circuit boards. By attaching a jumper wire on the circuit, it can be short-circuited and short-cut (jump) to the electric circuit. Jumper wires typically come in three versions: male-to-male, male-to-female and female-to-female. The difference between each is in the end point of the wire. Male ends have a pin protruding and can plug into things, while female ends do not and are used to plug things into. Male-to-male jumper wires are the most common and what you likely will use most often. When connecting two ports on a breadboard.



- **Arduino Mega:**

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega 2560 board is compatible with most shields designed for the Uno and the former boards Duemilanove or Diecimila.





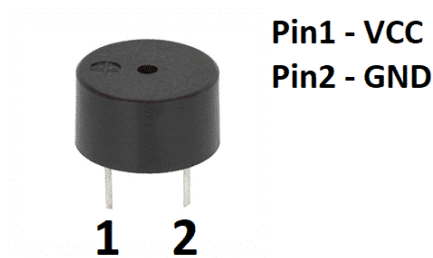
- **Battery:**

It is based on Zinc Carbon Chemistry and can be used easily replaced if discharged just like any standard AA and AAA batteries. The battery can be used to power LEDs, Toys, Flashlight and Torch, electronic equipment like multimeter, wall clocks, or other devices with a 9V system.



- **Buzzer:**

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, train and confirmation of user input such as a mouse click or keystroke.



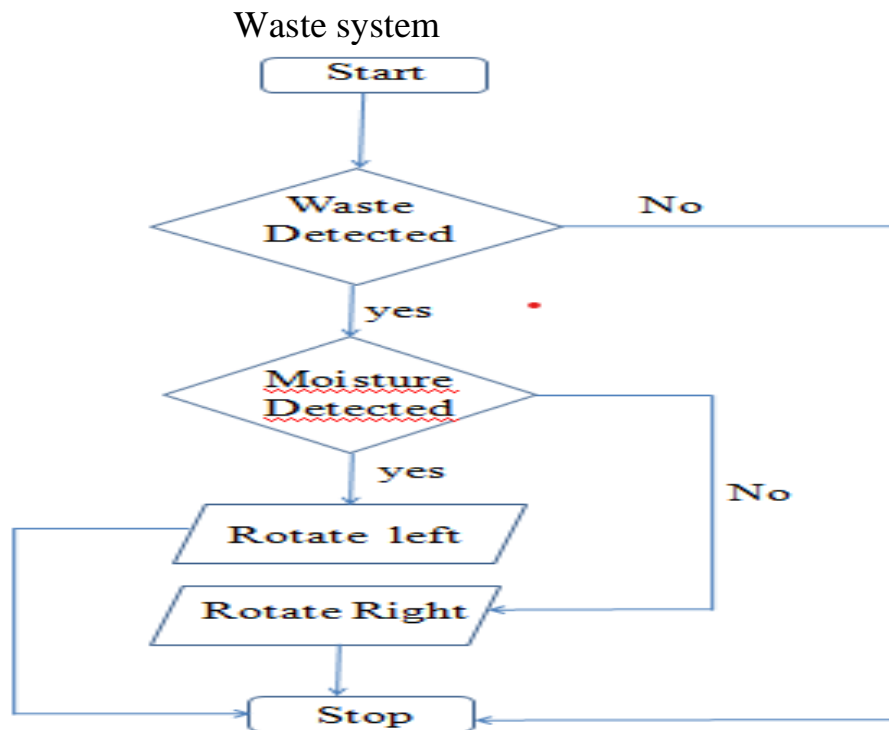


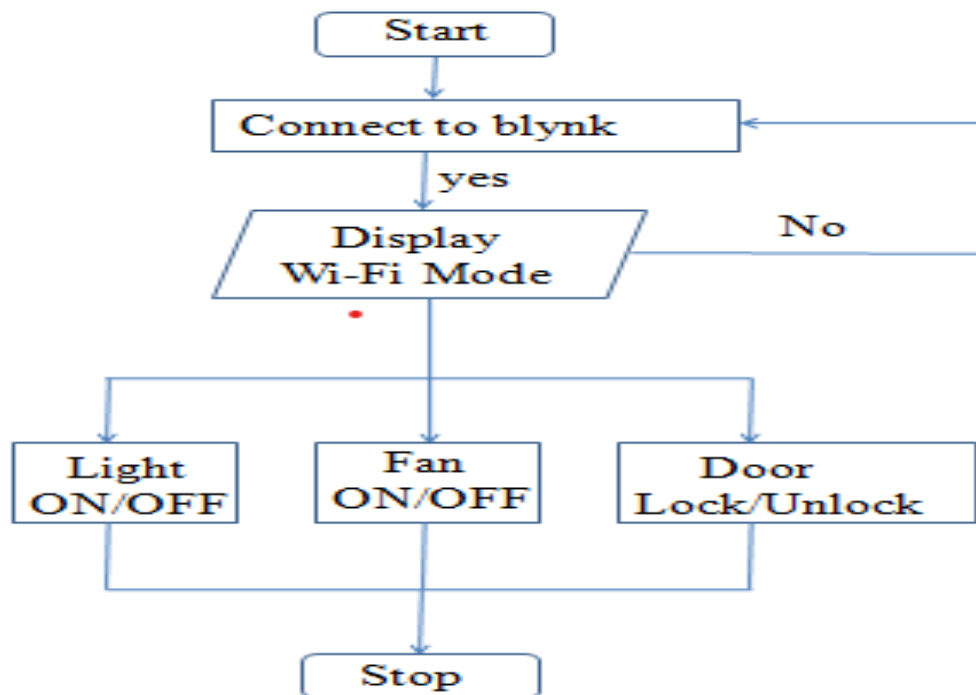
## 5. Working of the Project

The project is controlled by using the Nodemcu and Arduino Mega Controllers.

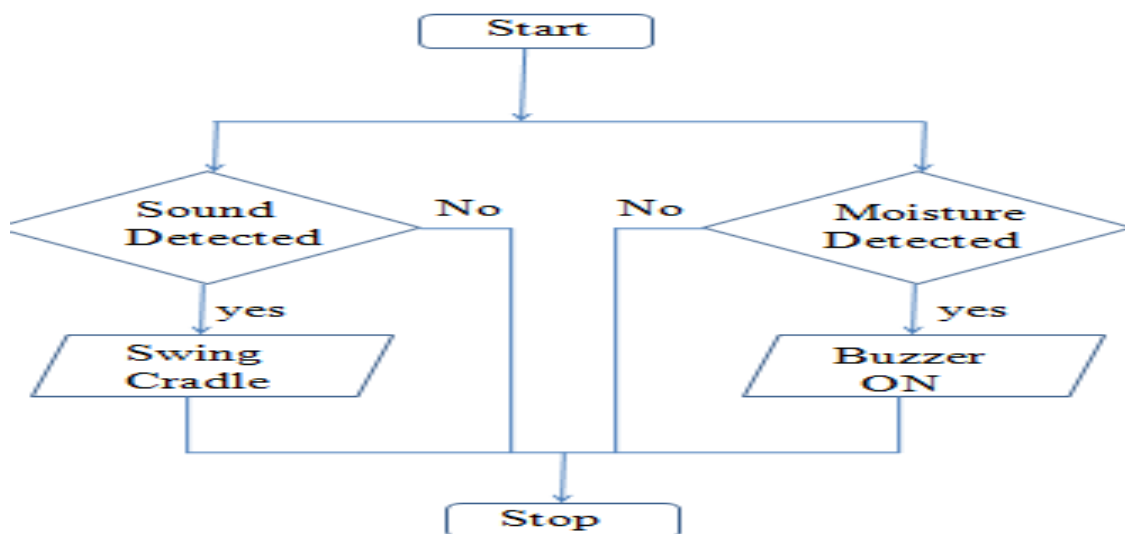
The Project consists of following Modules They are:

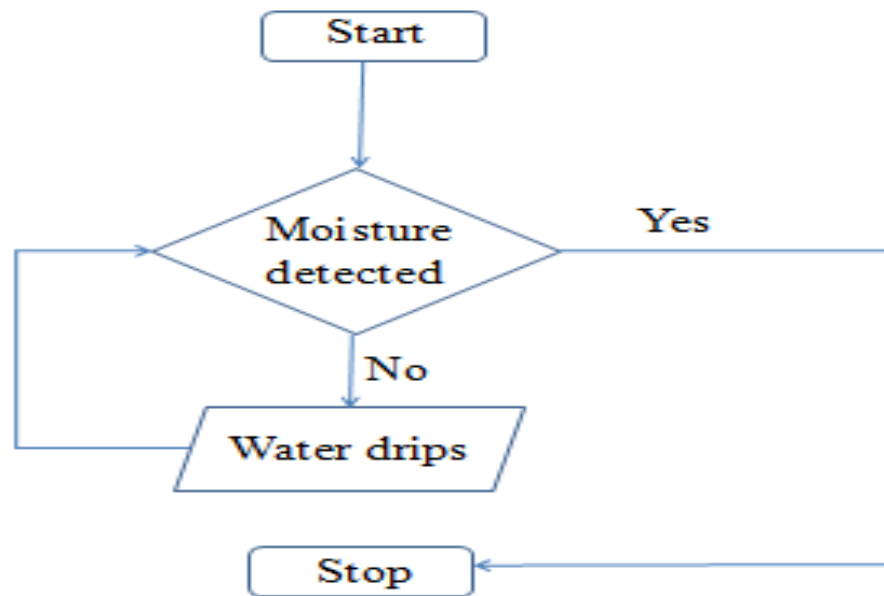
- The soil moisture sensor, Relay module and water pump are used to water the plants in the garden.
- The Water sensor, IR sensor and Servo motor were used to separate the dust in the home.
- The Lights, Door lock and Unlock are done using Nodemcu by controlling through Blynk App.
- The Water sensor, Sound Sensor is used to monitor the baby in the Cradle by predicting his wetness and Cry of the baby.





Smart Lock & LED(ON/OFF)



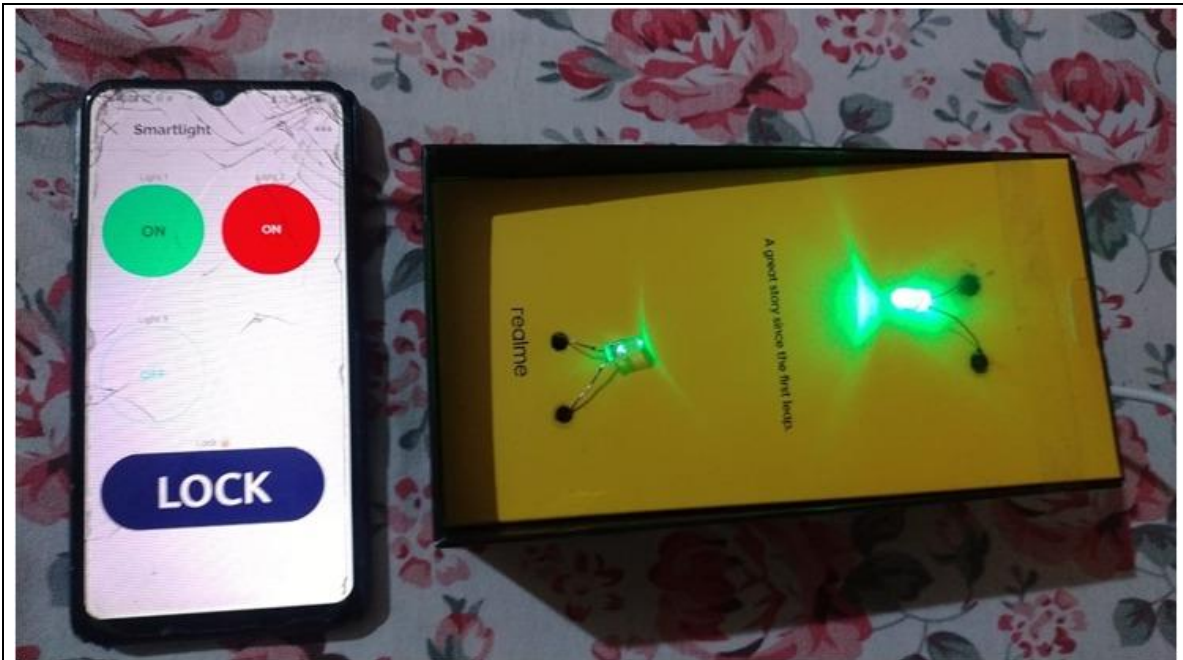


Smart Gardening

## 6. RESULTS:







## 7. Advantages & DisAdvantages

### ADVANTAGES:

- Home automation increases safety and security
- Home automation is convenient
- Home automation offers data and control
- Home automation creates comforting routines
- Home automation improves peace of mind
- Home automation can save energy

### DIS ADVANTAGES:

- Security Issues
- Cost: Extremely expensive
- Greater acceptance

## 8. Applications

- When you leave your house, the system may automatically switch down the lights to save energy.
- Sensors may be quite useful for people who want to cultivate their own veggies, fruit, and herbs at home. Users may see whether the temperature is correct, if the plant is sufficiently hydrated.
- Our future doors will not require keys. The smart door may utilize WIFI to unlock your home.
- Smart segregation of waste leads to reduce the pollution and keep us safe from different diseases.
- Baby cradle is used to comfort the parents from child ,While they are working.

## 9. Future Scope

**Virtual World** – Like facebook's recent can to meta with the concept of the metaverse. The future of smart homes will be consisting of devices that will provide virtual experiences like new before where everything will be possible without even moving out of homes. Things like ordering stuff, meetings, parties, working will evolve to less physically demanding which can be done virtually from our smart homes.

**Increased efficiency, control, and customization:** Artificial intelligence is set to make you lazy in the near future. Technology will become much more efficient and one will be able to control everything from volume to security from one central place. The devices will work automatically and you don't need to waste your energy it will act upon user's preferences. AI would revolutionize home by automatic threat detection and proactive alertness.

**Integration of Smart home devices:** One can command it to control small things of home through voice and Smartphones. All the tech giants are working in the field of IoT to bring advancements in the home automation devices. In near future, homes will be equipped with such IoT devices which will make your daily lives work faster smoother and more accurate.



## **10. Conclusion**

- Android based home automation techniques have been implemented in order to provide ease to the people to control their home appliances.
- Main purpose of home automation system is to provide ease to people to control different home appliances with the help of the android application present in their mobile phones and to save electricity, time and money
- This system also helps the user to protect their homes from burglars when they are away from the home by using Mobile App

## **11.Reference**

- Marie R. Harper, La Mirada, Maxine R. Blea:, “Automatically rocking baby cradle”, US3769641, Date of Patent: Nov. 6, 1973.
- M. P. Joshi and D. C. Mehetre, "IoT Based Smart Cradle System with an Android App for Baby Monitoring," 2017 International Conference on Computing, Communication, Control and Automation (ICCUBE), 2017, pp. 1-4, doi: 10.1109/ICCUBE.2017.8463676.
- S. Durga, S. Itnal, K. Soujanya, C. Z. Basha and C. Saxena, "Advanced and effective baby care monitoring Smart cradle system using Internet of Things," 2021 2nd International Conference on Smart Electronics and Communication (ICOSEC), 2021, pp. 35-42, doi: 10.1109/ICOSEC51865.2021.9591955.