MINI PROJECT

HOME AUTOMATION USING ARDUINO
1. VIA BLUTOOTH
2. VIA GESTURE CONTROL

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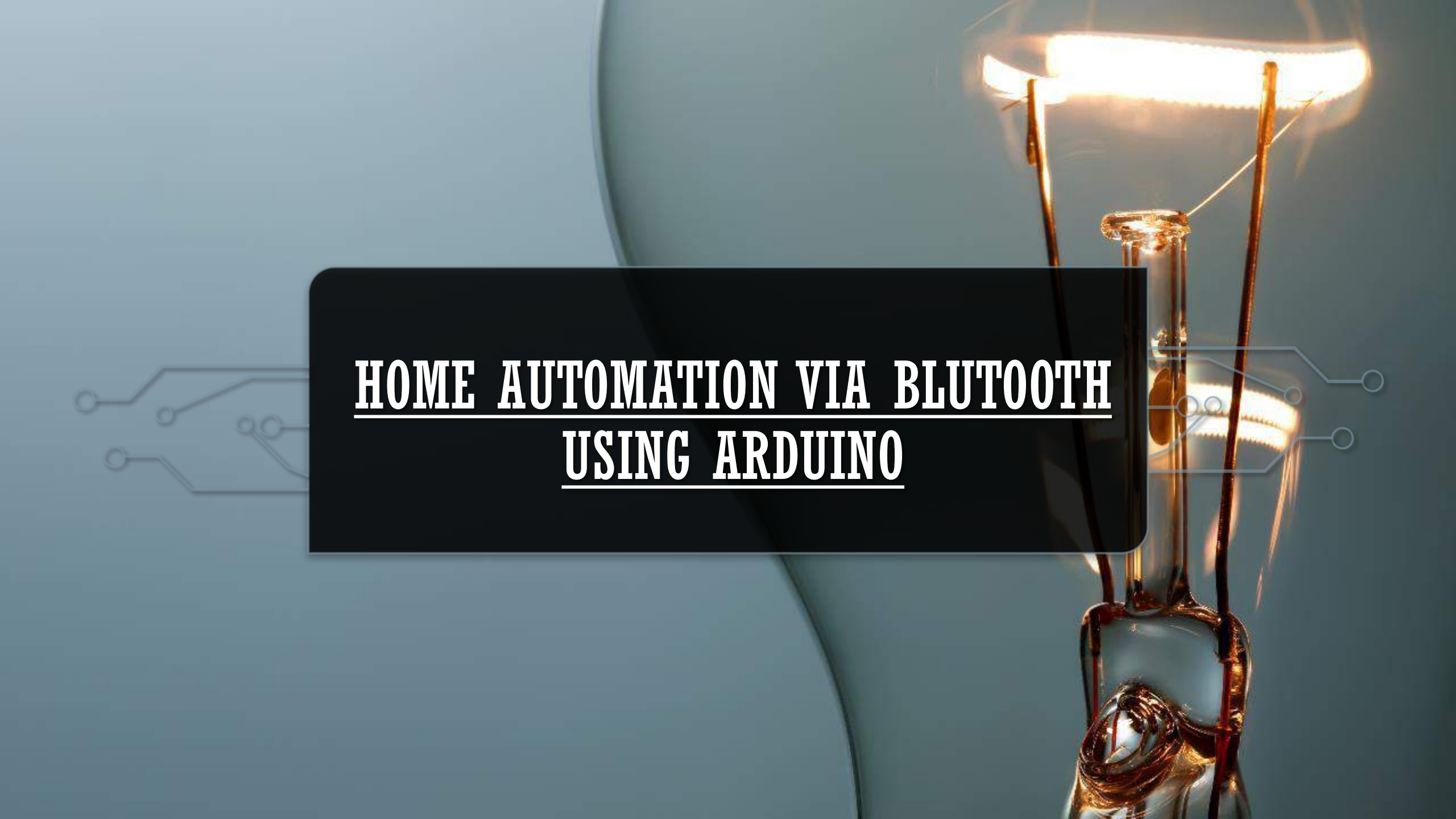
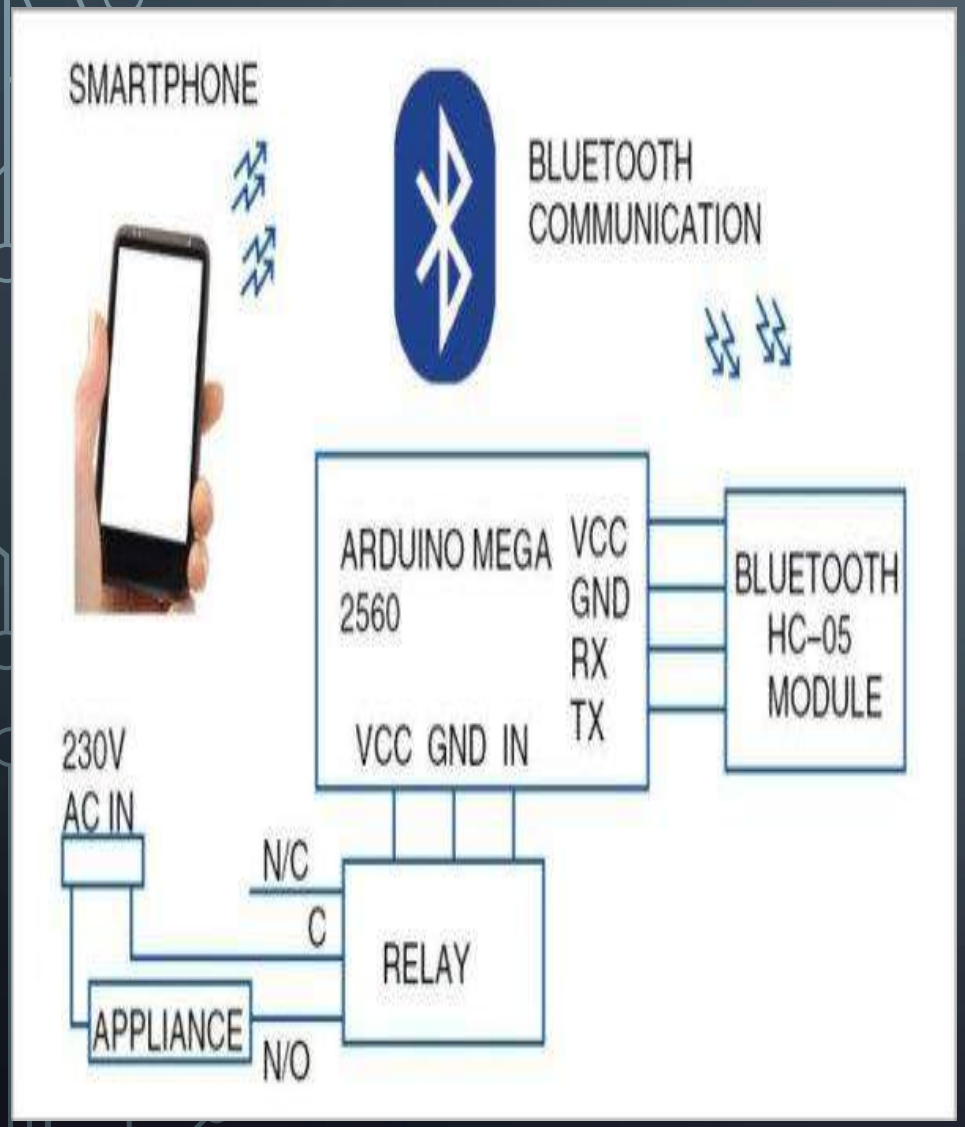
SHWETHA A (2019105576)

HOME AUTOMATION VIA BLUTOOTH USING ARDUINO



ABSTRACT



- In this project, the design of a Home Automation System compatibly via remote access is presented.
- It is a Bluetooth Based System Using Android that is designed and implemented using Arduino.
- This way of smart home technology using Bluetooth (from mobile device) makes it cheap and efficient to use. The home automation system designed can be used to enable home lighting, ceiling fans, water pumping motor, smoke detection, television, etc.

LITERATURE REVIEW

S.NO	NAME OF AUTHOR	NAME OF PAPER	PUBLICATION NAME	TECHNIQUE USED
1.	Patil Mitali, Bedare Ashwini, Pacharne Varsha	The design and implementation of voice controlled wireless Intelligent Home Automation using Zigbee.	International journal of Advanced Research in computer science and software engineering, Volume 3,Issue 4 April 2013	Voice controlled Intelligent
2.	Sawant S.D Mukkawar Madhuri R	Home automation through FPGA controller	(IJERT) Vol.3 Issue 3, March-2014	FPGA Controller
3.	D.Naresh , B.Chakradhar, S.Krishnaveni	Bluetooth Based Home Automation and Security System Using ARM9	(IJETT) – Volume 4 Issue 9- Sep 2013	Bluetooth based home automation

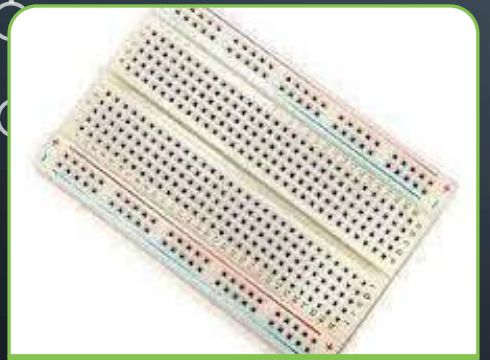
COMPONENTS USED

ARDOINO UNO MICROCONTROLLER

ANY ANDROID PHONE

HOME APPLIANCES: A LIGHT BULB

RELAY MODULE



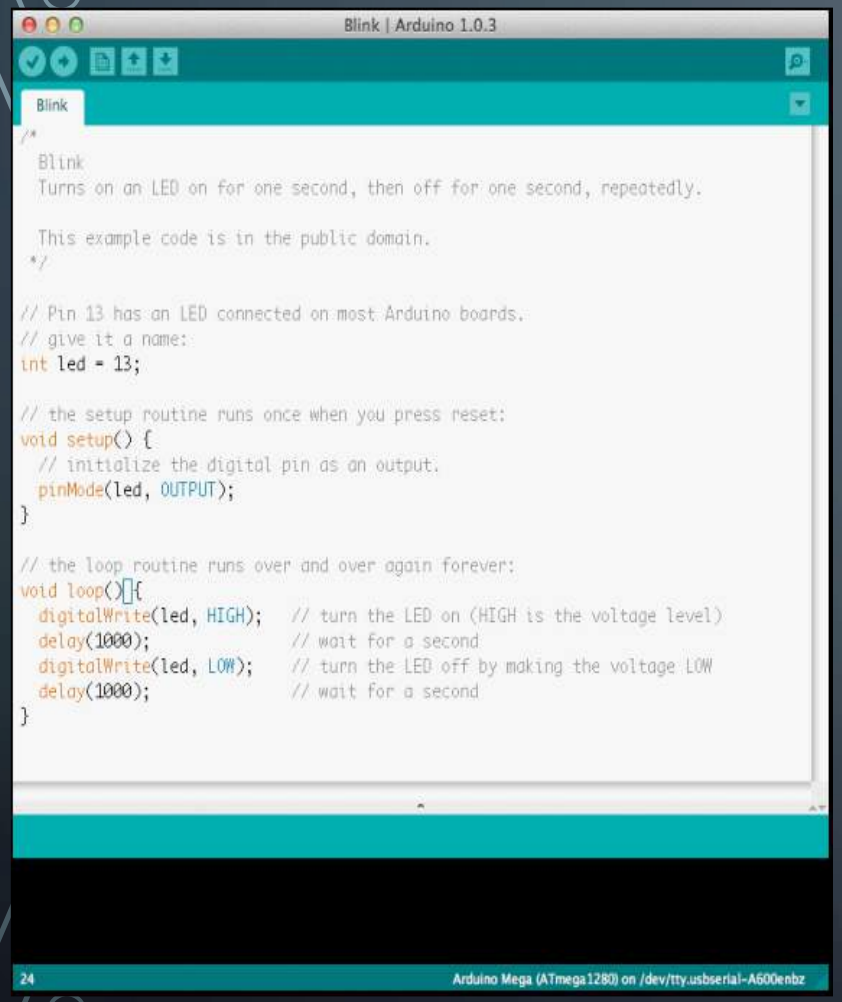
BREAD BOARD

BLUETOOTH MODULE

JUMPER WIRES (M-M:2, M-F: 10)

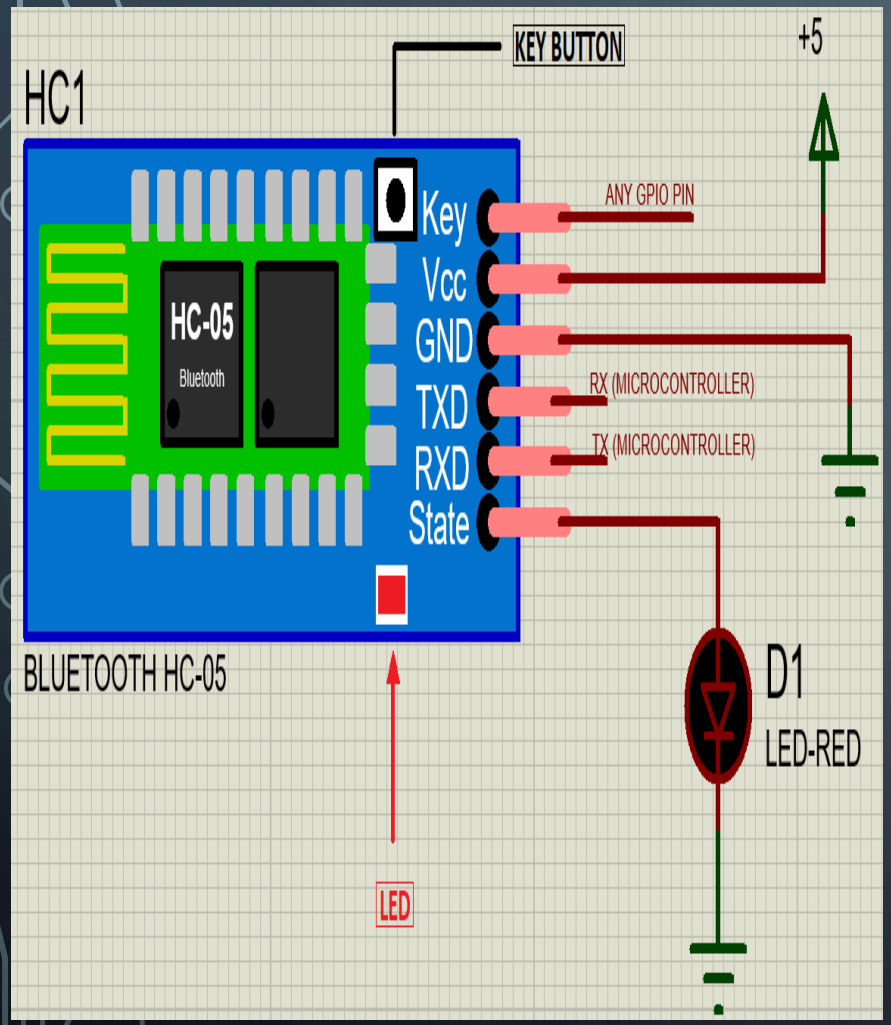
MIT APP INVENTOR

ARDUINO SOFTWARE



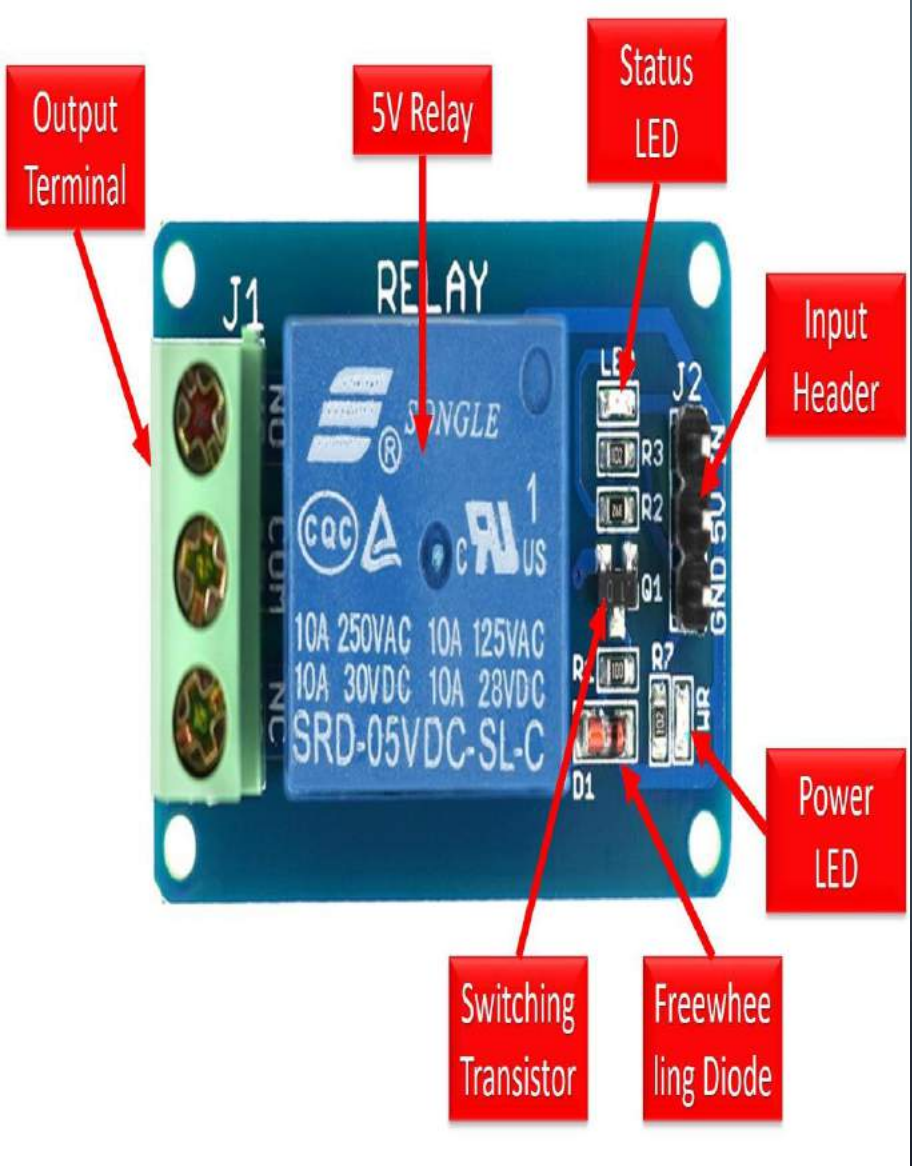
Arduino IDE (Integrated Development Environment) is open-source software and that enables better and assisted code editing, compiling and debugging. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software. So, this Arduino IDE basically has in built functions and commands that though work on Java platform, are customized to run on the Arduino board. Thus Arduino IDE serves for code editing, its compilation, debugging and then burning the code into the Arduino board.

BLUETOOTH MODULE HC-05



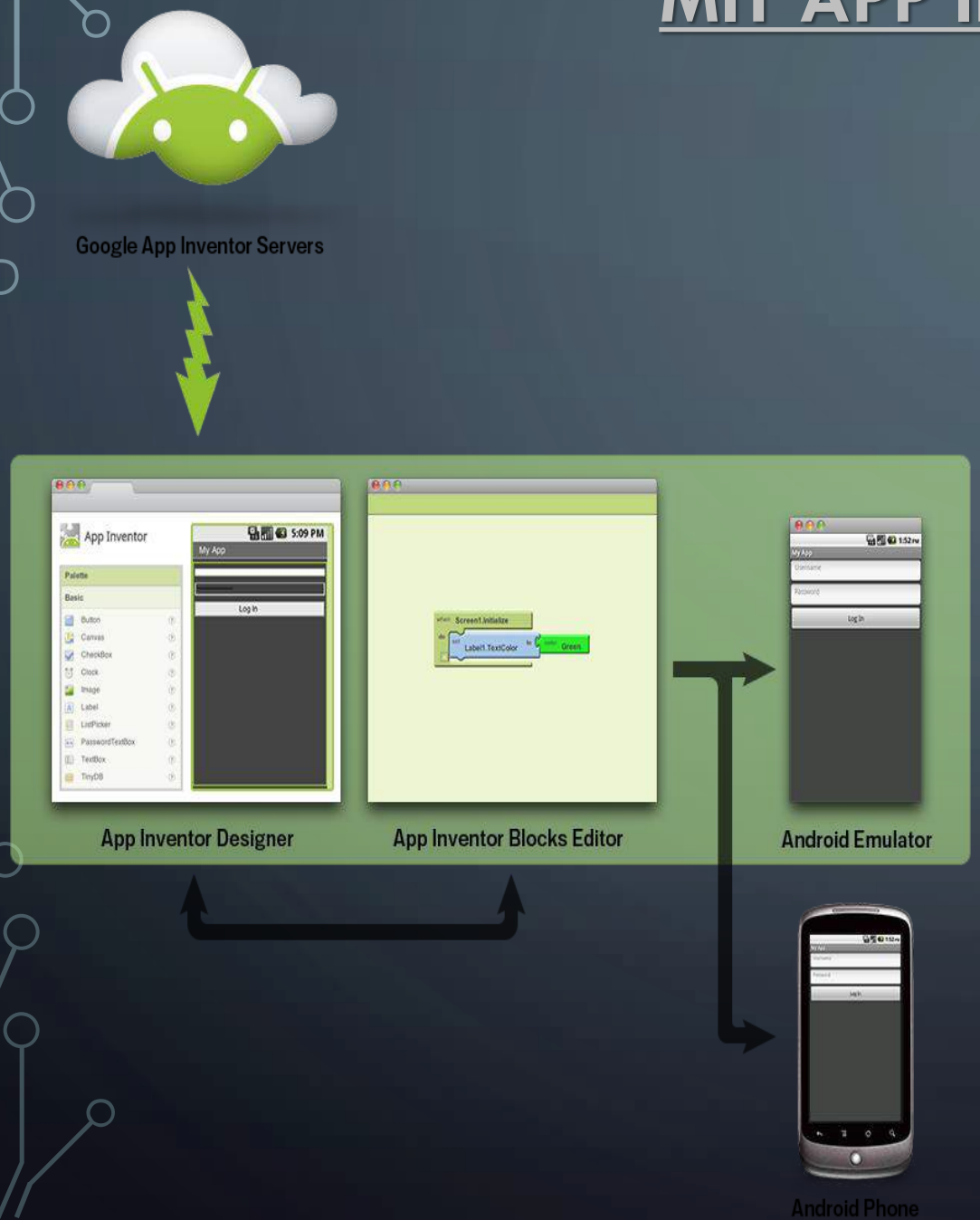
- Used for many wireless applications, the Bluetooth module hc05 has range up to <100m which depends upon transmitter and receiver and other conditions.
- Using it one can build wireless Personal Area Network (PAN). It uses frequency-hopping spread spectrum (FHSS) radio technology to send data over air and uses serial communication to communicate with devices. It communicates with microcontroller using serial port (USART).
- HC-05 has red LED which indicates connection status, whether the Bluetooth is connected or not.
- This module works on 3.3 V. We can connect 5 V supply voltage as well since the module has on board 5 to 3.3 V regulator.

RELAY MODULE



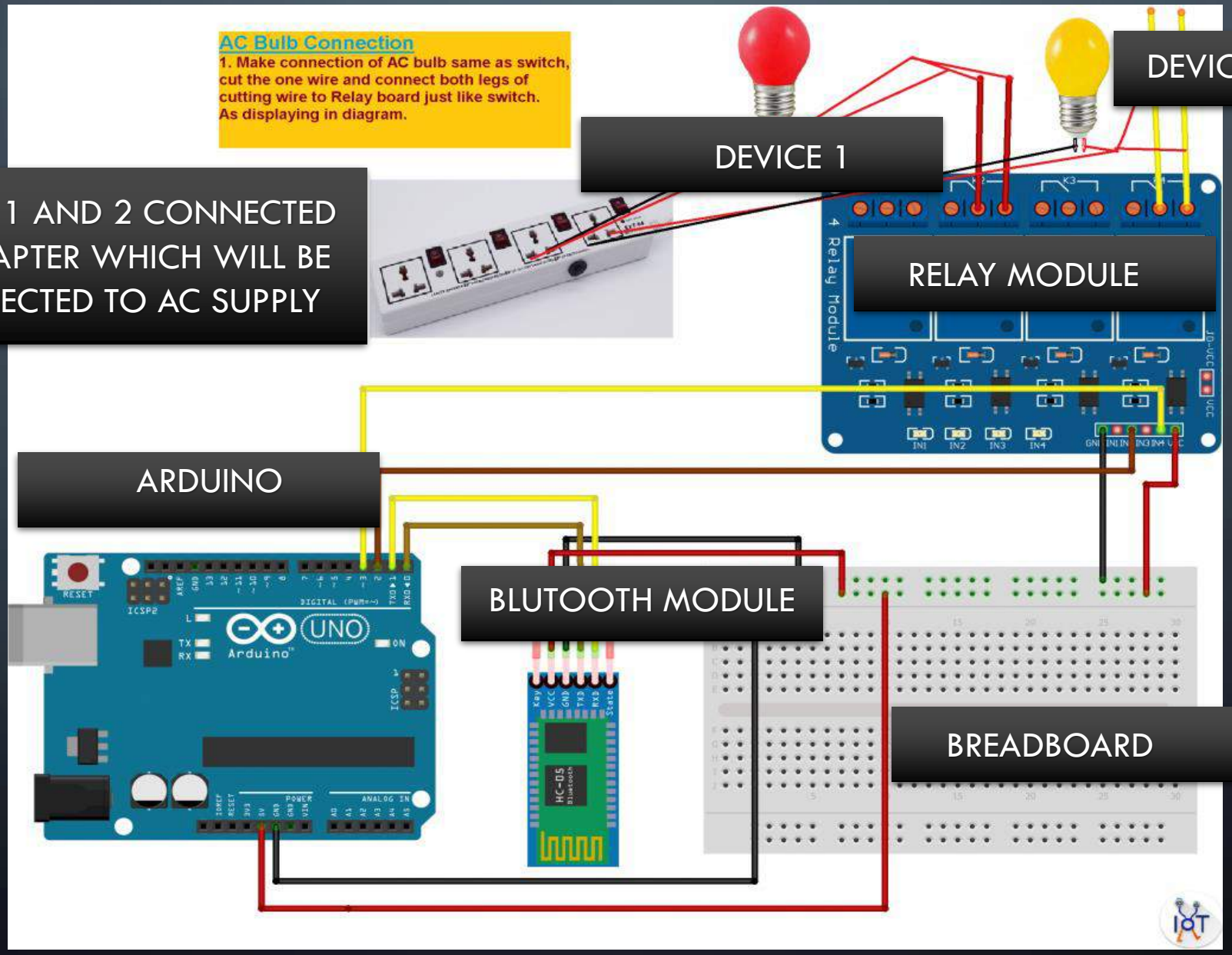
A Relay module is an electrical switch that is operated by an electromagnet. The electromagnet is activated by a separate low-power signal from a micro controller. When activated, the electromagnet pulls to either open or close an electrical circuit. Channel Relay Module is a convenient board which can be used to control high voltage, high current load such as motor, solenoid valves, lamps and AC load. It is designed to interface with microcontroller such as Arduino, PIC and etc. The relay module is a separate hardware device used ***for remote device switching****. With it you can remotely control devices over a network or the Internet. Devices can be remotely powered on or off with commands coming over a local or wide area network..*

MIT APP INVENTOR

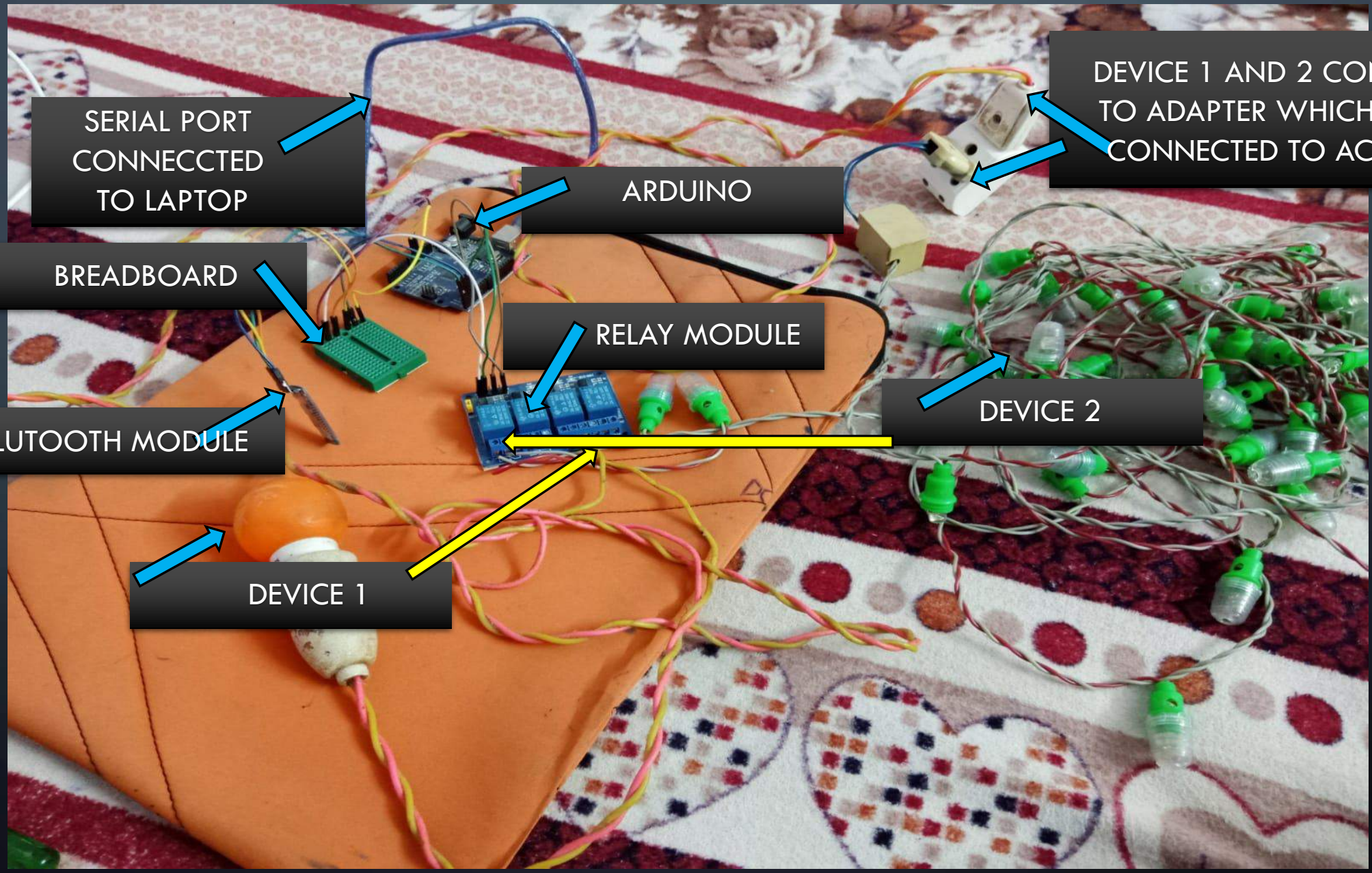


MIT App Inventor is used to develop applications for Android phones using a web browser and is either connected phone or emulator. The App Inventor servers store inventor designs and create fully functional apps without writing any code. The App Inventor development environment is supported for Mac OS X, GNU/Linux, and Windows operating systems, and several popular android phone models. Applications created with App Inventor can be installed on any Android phone.

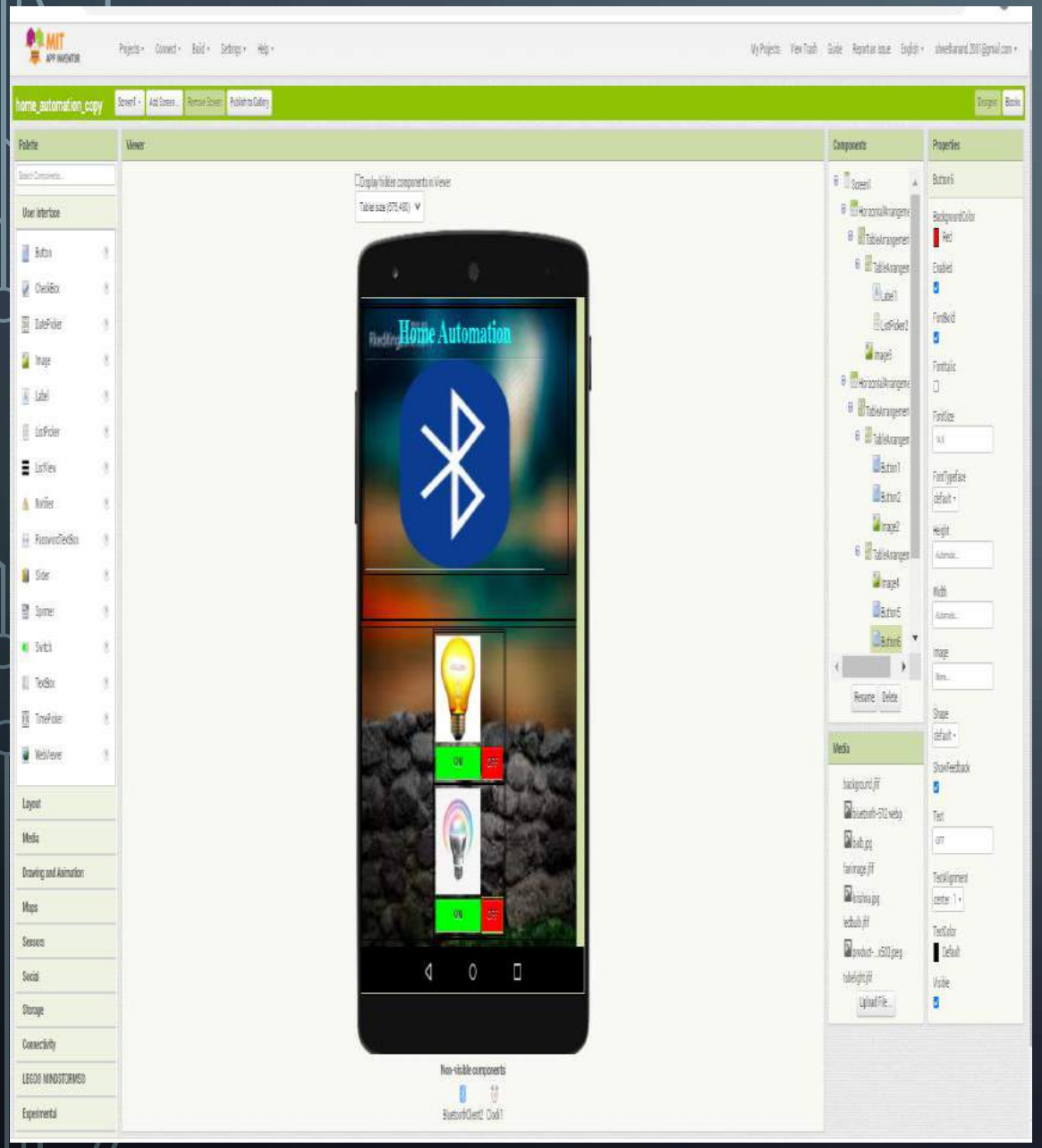
CIRCUIT DIAGRAM



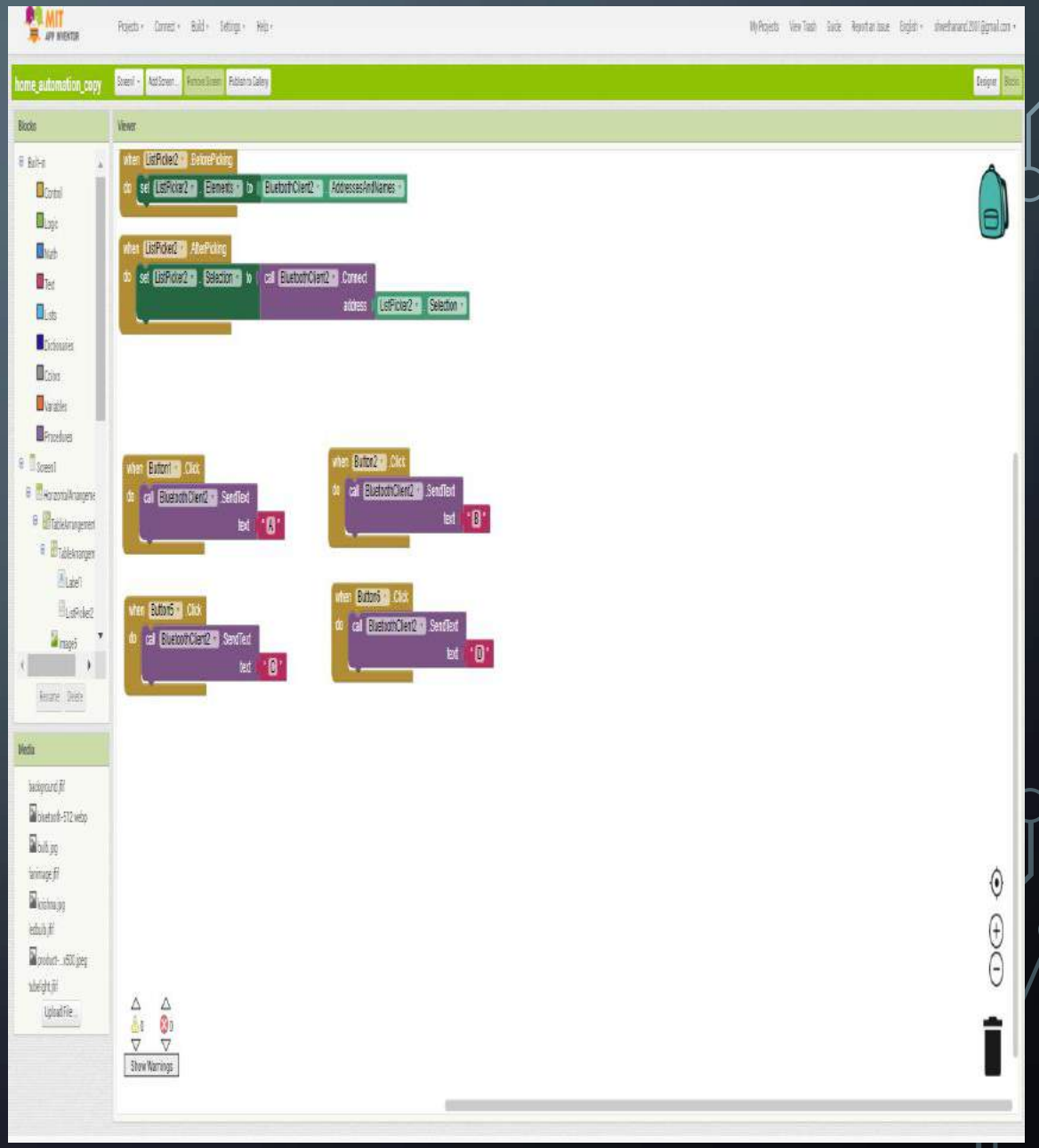
PROJECT SETUP



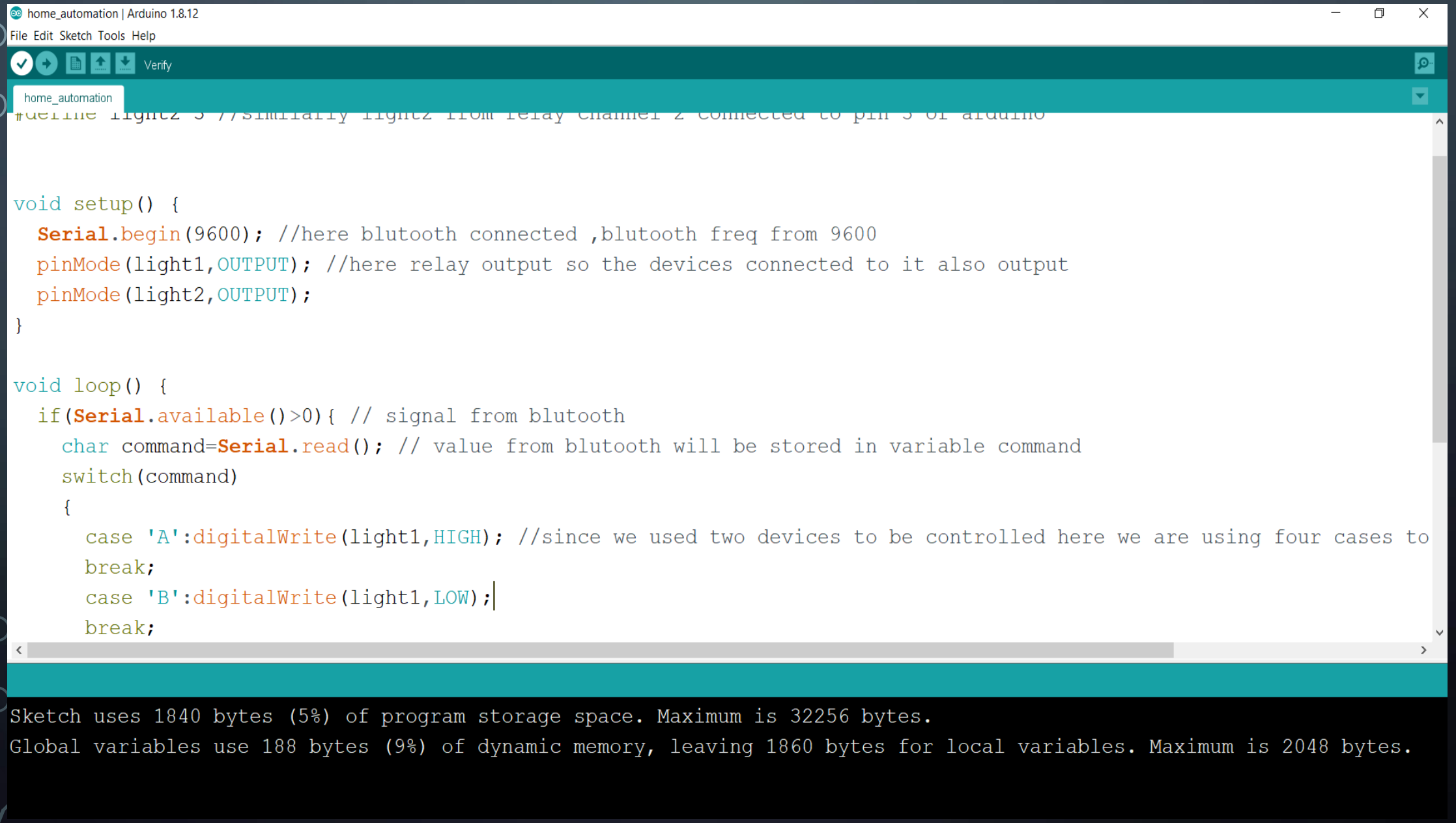
APP DESIGN



APP BLOCKS



ARDUINO CODING



WORKING

CONCLUSION:

This project is a low-cost and efficient project for home application. It has a simple and easy to use interface for decrepit and physically disabled people. By using this method, home appliances can be controlled to avoid the dangers of electric shock and is much more convenient for users. It can further be developed to make a secure home by alerting people when smoke is detected or gas is leaked. With few additions and modifications, this project can be make commercial scale products for Home Automation System. In future we can add temperature sensors so that it can monitor some surrounding temperature parameters around the house and in short make Home a Smarter place.

REFERENCES:

[1] Pei Zheng, Lionel Ni, Smart Phone and Next Generation Mobile Computing, Morgan Kaufmann publisher, San Fransisco. 2006.

[2] R. John Robles and Tai-hoon Kim, "Applications, Systems and Methods in Smart Home Technology: A Review," International Journal of Advanced Science and Technology. 15: 37-48-2010.

[3] Ms. Poonam V. Gaikwad, Prof. Mr. Yoginath R. Kalshetty, "Bluetooth Based Smart Automation System Using Android", International Journal of New Innovations in Engineering and Technology, Volume 7 Issue 3- April 2017.

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[5] What is Arduino, [online]. Available: https://www.arduino.cc/en/Guide/Introduction

[6] ARDUINO UNO REV3, [online]. Available: https://store.arduino.cc/usa/arduino-uno-rev3

[7] Ms. M.Preethi, Mr. R.Dharmalingam, "Based on the wireless Bluetooth microcontroller controlling home appliances", International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE), Volume 6, Issue 5, May 2017.

[8] Ayan Maity, Avijit Paul, Priyanka Goswami, Ankan Bhattacharya, "Android Application Based Bluetooth Controlled Robotic Car", International Journal of Intelligent Information Systems, 6(5): 62-66-2017.

GESTURE CONTROLLED HOME AUTOMATION USING IMAGE PROCESSING VIA ARDUINO

ABSTRACT

This project is a real time monitoring system by which humans interact with home appliance like bulbs through gestures. While earlier works have focused primarily on issues such as manipulation and navigation in the environment, few home automation systems are used with user friendly interfaces that possess the ability to control the appliance by natural means. Gesture recognition consists of three stages: capturing of image, image processing and working of the home appliance (i.e. bulb). By giving commands to Arduino board, the user can control the home appliance using gestures of his/her palm, thereby interacting with the home automation system. Using Image processing, the command signals which are generated from these gestures are then passed to the bulb to switch it on or off accordingly.

LITERATURE SURVEY

S.no	TITLE of the JOURNAL	NAME of the AUTHORS	YEAR of PUBLICATION	INFERENCE
1)	**Gesture Controlled Robot using Image Processing**	Harish Kumar Kaura Vipul Honrao Sayali Patil Pravish Shetty	2013	➢ The Gesture Controlled Robot System gives an alternative way of controlling robots. Gesture control being a more natural way of controlling devices makes control of robots more efficient and easy. ➢ Each finger count specifies the command for the robot to navigate in specific direction in the environment and direction based technique directly gives the direction in which robot is to be moved. ➢ Any one of the method , either finger count based gesture control or direction of hand palm based gesture control , can be used according to user's reliability, without using any external hardware support for gesture input unlike specified existing system. ➢ After gesture recognition command signal is generated and passed to the robot and it moves in specified direction.

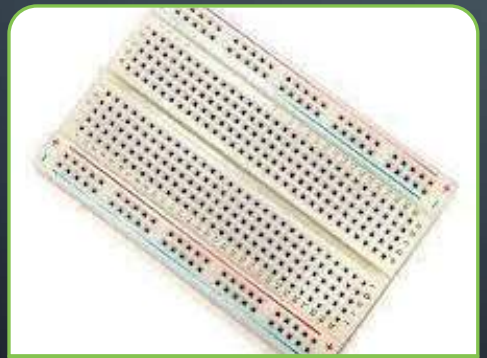
COMPONENTS USED

ARDOINO UNO MICROCONTROLLER

ANY LAPTOP WITH WEB CAM

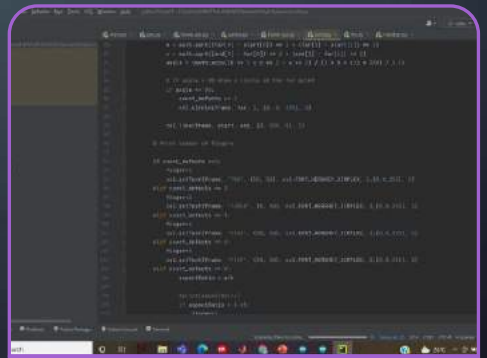
HOME APPLIANCES: A LIGHT BULB

RELAY MODULE



BREAD BOARD

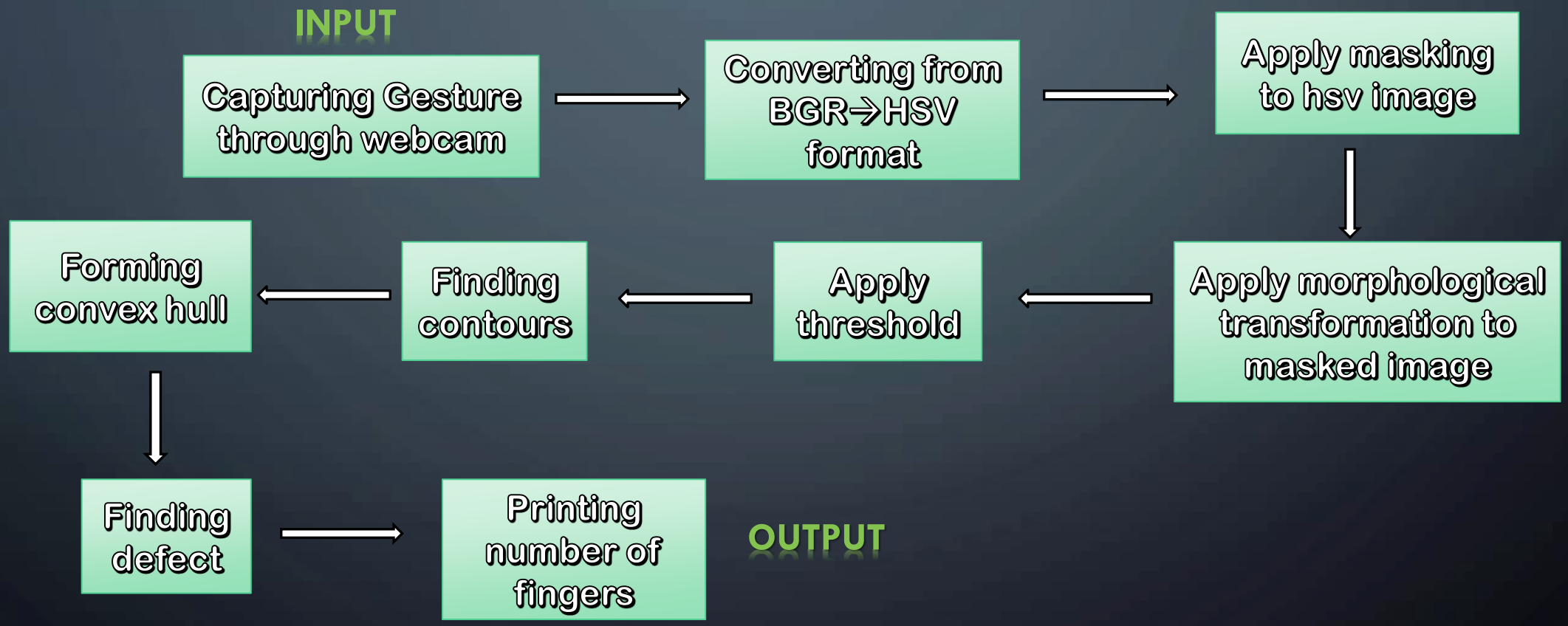
JUMPER WIRES (M-M:2, M-F: 10)



PYCHARM PYTHON PROGRAMMING FOR IMAGE PROCESSING

WORKFLOW

COMMAND DETECTION USING IMAGE PROCESSING



OUTPUT IMAGES

ORIGINAL IMAGE

MASKED IMAGE

HSV IMAGE

FILTERED IMAGE

ERODED IMAGE

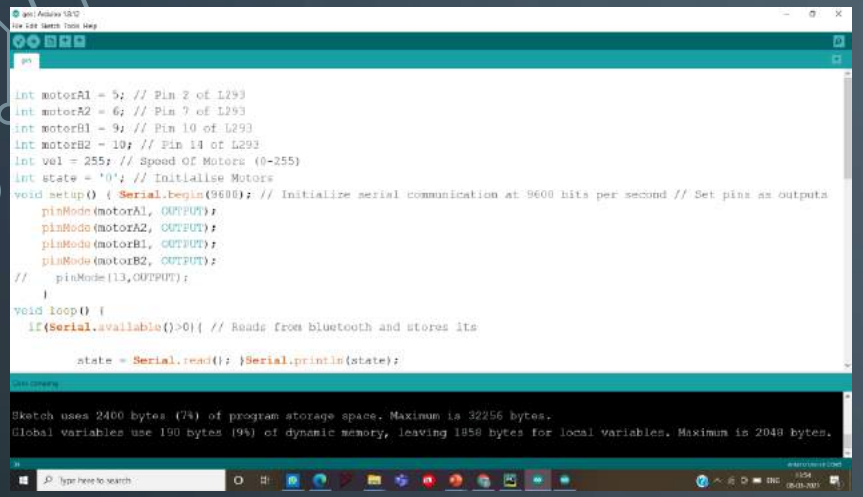
DILATED IMAGE

BLURRED IMAGE

THRESHOLDED IMAGE

SERIAL COMMUNICATION BETWEEN BOT AND PYTHON

ARDUINO Code Editor



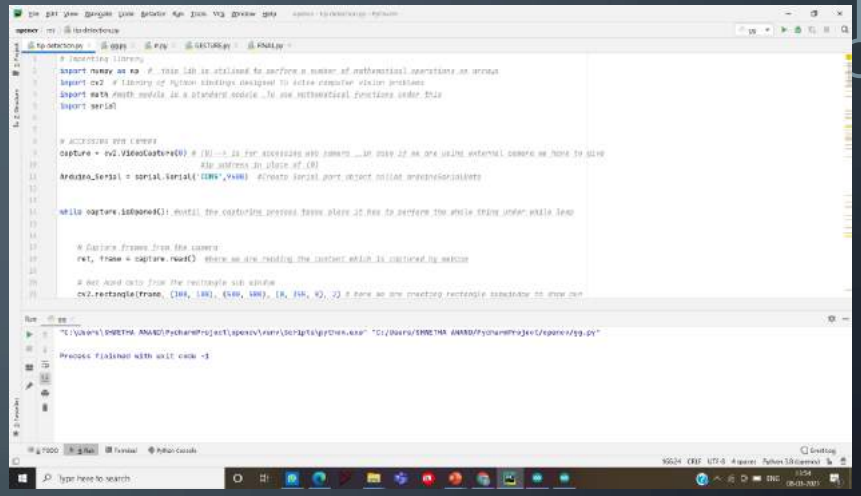
```
int motorA1 = 5; // Pin 2 of L293
int motorA2 = 6; // Pin 7 of L293
int motorB1 = 9; // Pin 10 of L293
int motorB2 = 10; // Pin 14 of L293
int vel = 255; // Spood Of Motors (0-255)
int state = '0'; // Initialise Motors
void setup() { Serial.begin(9600); // Initialize serial communication at 9600 bits per second // Set pins as outputs
    pinMode(motorA1, OUTPUT);
    pinMode(motorA2, OUTPUT);
    pinMode(motorB1, OUTPUT);
    pinMode(motorB2, OUTPUT);
//    pinMode(13,OUTPUT);
    }
void loop() {
  if(Serial.available()>0){ // Reads from bluetooth and stores its

        state = Serial.read(); }Serial.println(state);
```

```
Sketch uses 2400 bytes (7%) of program storage space. Maximum is 32256 bytes.
Global variables use 190 bytes (9%) of dynamic memory, leaving 1858 bytes for local variables. Maximum is 2048 bytes.
```

USING PYSERIAL LIBRARY

To communicate with ARDUINO using PYTHON

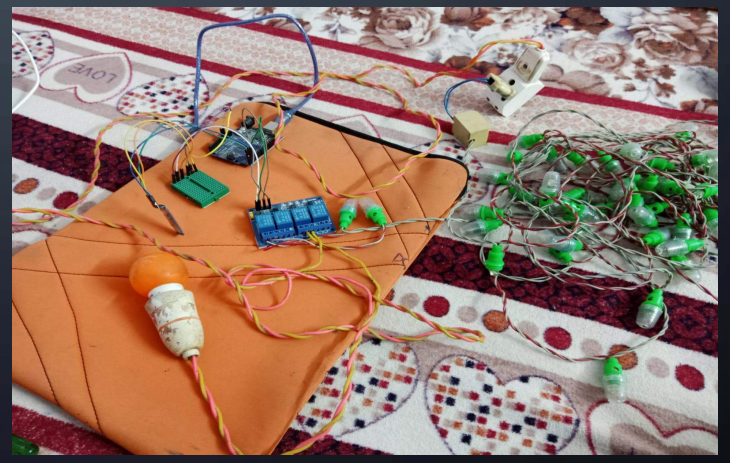
PYCHARM Code Editor



```
import numpy as np # this lib is utilized to perform a number of mathematical operations on arrays
import cv2 # library of Python bindings designed to solve computer vision problems
import math #math module is a standard module ..To use mathematical functions under this
import serial


# accessing the camera
capture = cv2.VideoCapture(0) # (0)---> is for accessing web camera ...in case if we are using external camera we have to give
                              #the address in place of (0)
Arduino_Serial = serial.Serial('COM4',9600)  #Create Serial port object called arduinoSerialData


while capture.isOpened(): #until the capturing process takes place it has to perform the whole thing under while loop


    # Capture frames from the camera
    ret, frame = capture.read()  #here we are reading the content which is captured by webcam

    # Get hand data from the rectangle sub window
    cv2.rectangle(frame, (100, 100), (300, 300), (0, 255, 0), 2) # here we are creating rectangle region/window to draw our
```

```
"C:\Users\SHWETHA ANAND\PycharmProjects\opencv\venv\Scripts\python.exe" "C:/Users/SHWETHA ANAND/PycharmProjects/opencv/gg.py"

Process finished with exit code -1
```

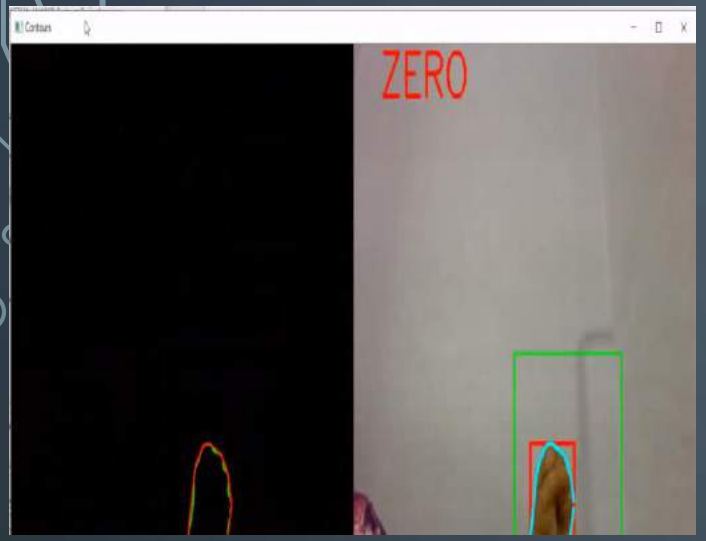
Gesture displayed in the screen will be communicated to setup Using serial communication cable of Arduino

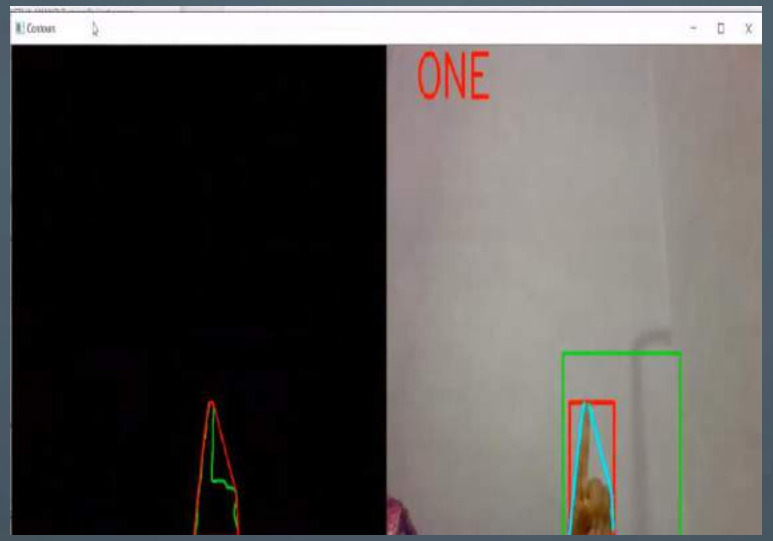


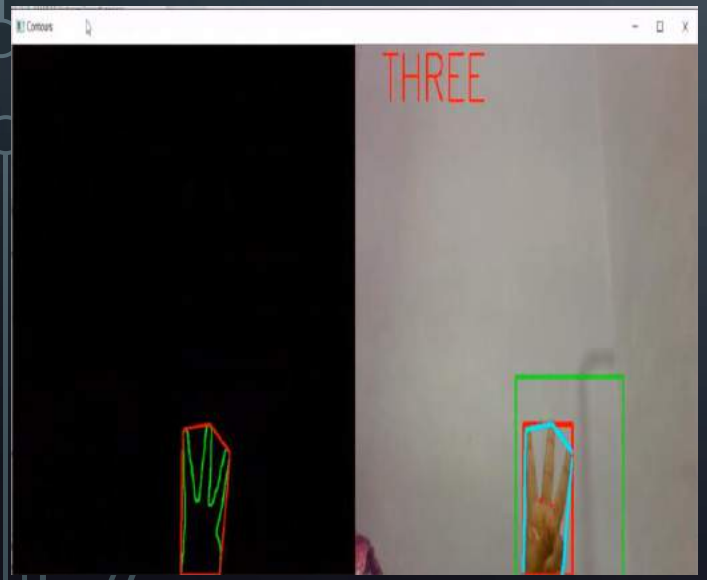
OUTPUT

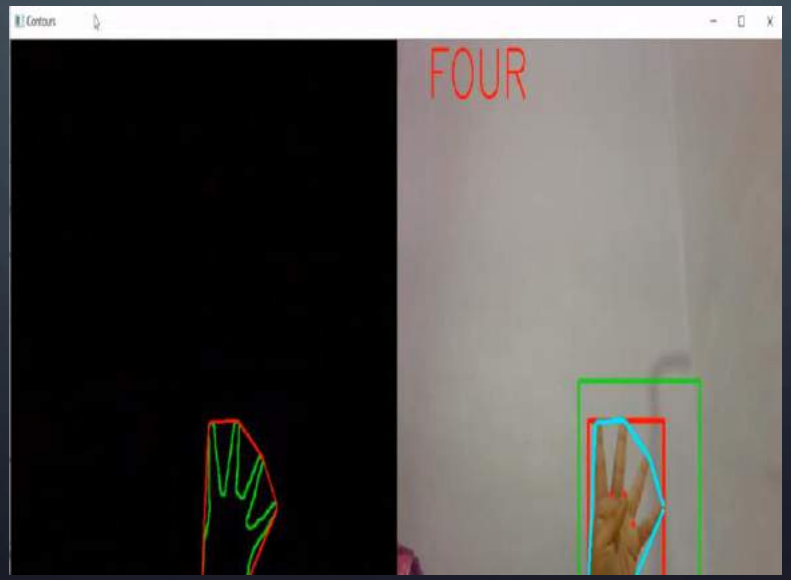
Bulb will ON/OFF accordingly

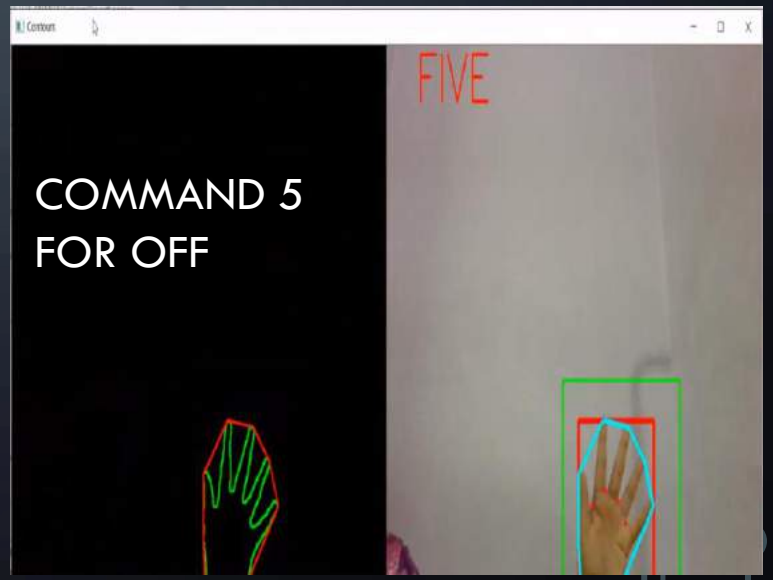
COMMAND DETECTION



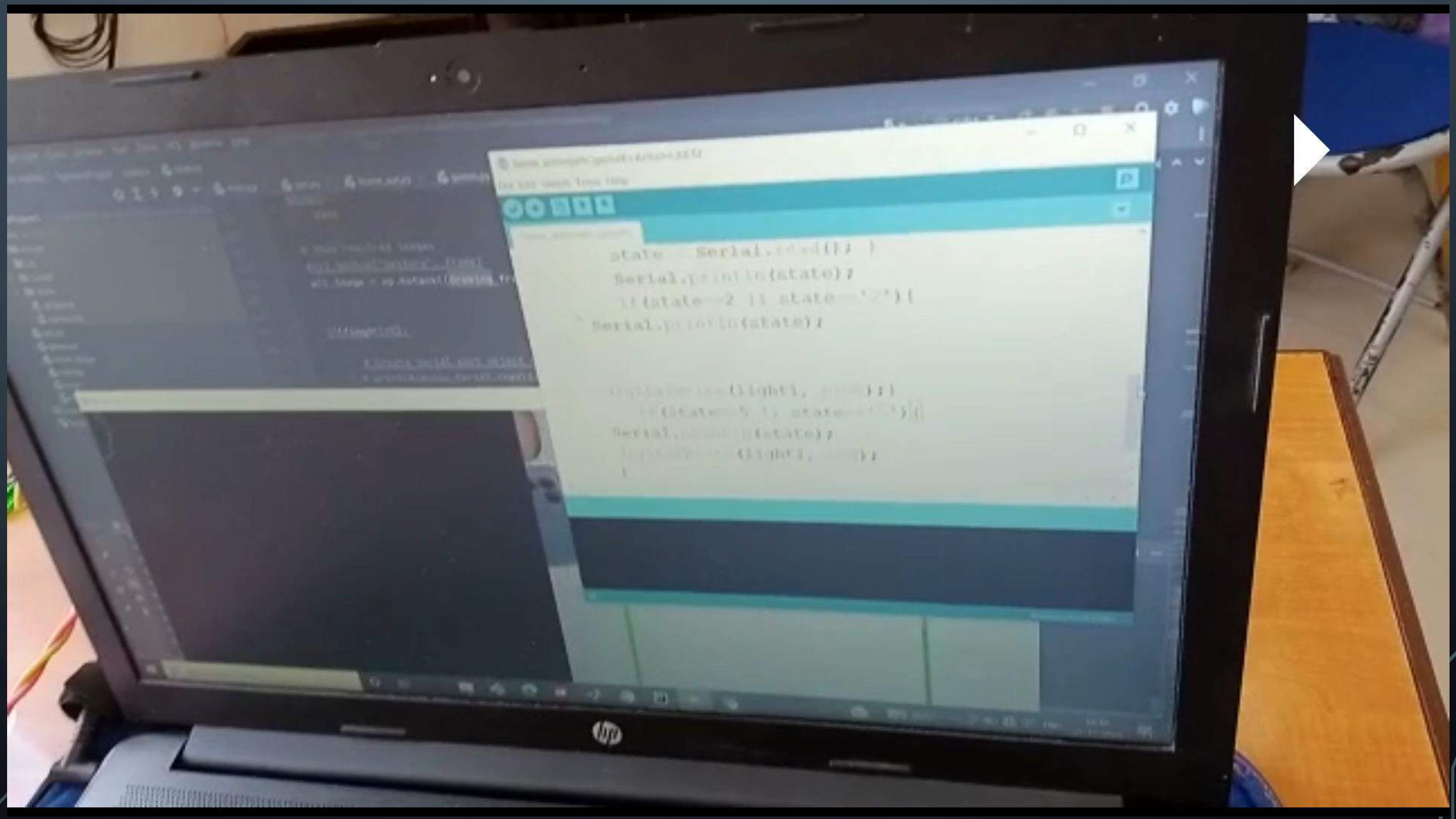








WORKING



CONCLUSION:

The Gesture controlled home automation System gives an alternative way of controlling everyday appliances. Gesture control being a more natural way of controlling devices makes control of appliances more efficient and easy. We have provided a technique of finger count based gesture control, in which each finger count specifies the command for the home appliance to switch on or off. After gesture recognition command signal and passes to the appliance, it works accordingly.

REFERENCES:

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3) *https://medium.com/analytics-vidhya/hand-detection-and-finger-counting-using-opencv-python-5b594704eb08*
4) *https://colab.research.google.com/drive/1GnTbrruWpEUaqdo_2Bw_mvgfB2fUoyM9?usp=sharing#scrollTo=104r2HtWLRHr*
5) *https://www.codeproject.com/Articles/782602/Beginners-guide-to-understand-Fingertips-counting*

THANK YOU