Product Devolopment Laboratory

Title:

SMART HOME SECURITY WITH AUTOMATIC PHONE CALLING

AND IMAGE SENDING SYSTEM USING ARDUINO WITH IOT

Developed By:

RATANPALKE KAVYA   **419MA5060**

SWASTIK PANDA   **120EC0430**

DEBASHRITA SAMANTRAY   **120EC0438**

Report By: Ratanpalke Kavya

Abstract:

This project is about a smart reliable and robust smart security system that can notify us when someone breaks into our home or shop.

It works as follows-When someone breaks into the home or shop, the owner automatically gets an image notification on his or her phone.

Also the device has the facility to call a specific number (say cops) upon detecting unusual activity.

Objectives:

Burglary and break-ins have become quite common in certain areas, especially during these challenging times. But with our busy lives, it is not possible to monitor it 24*7. So, we need a more reliable and robust smart security system that can notify us when someone breaks into our shop or home.

This can be of great use in commercial establishments as well. When a thief enters a jewellery shop, the shop owner automatically gets a notification on his/her phone. Also, the device can automatically call the cops instantly and notify as many persons as we want.

Thus, providing security, especially when there is no scope for physical monitoring is one of the basic objectives of the project.
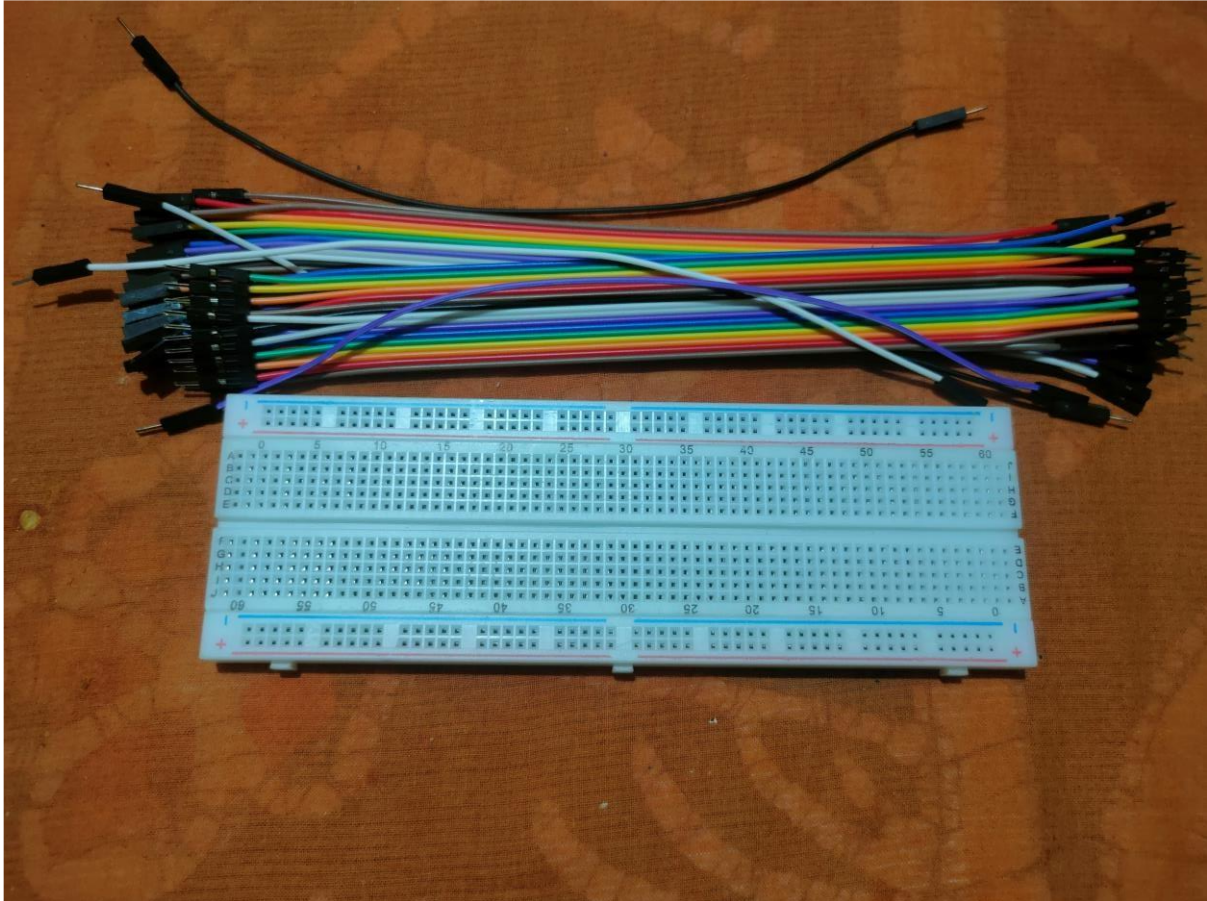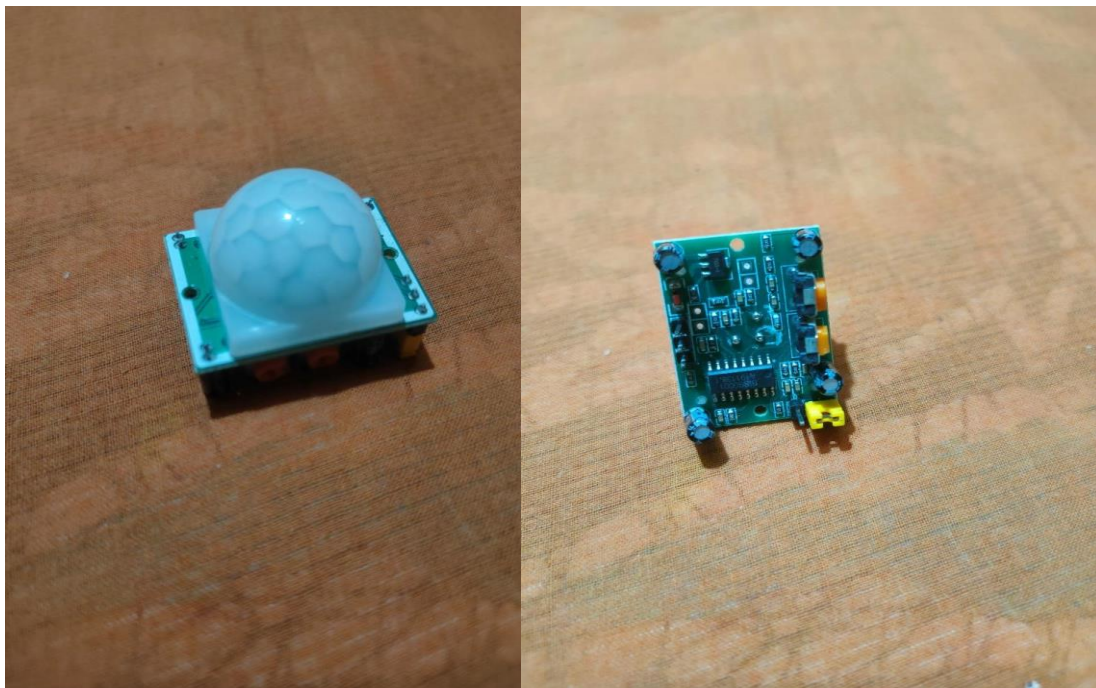
System Model:
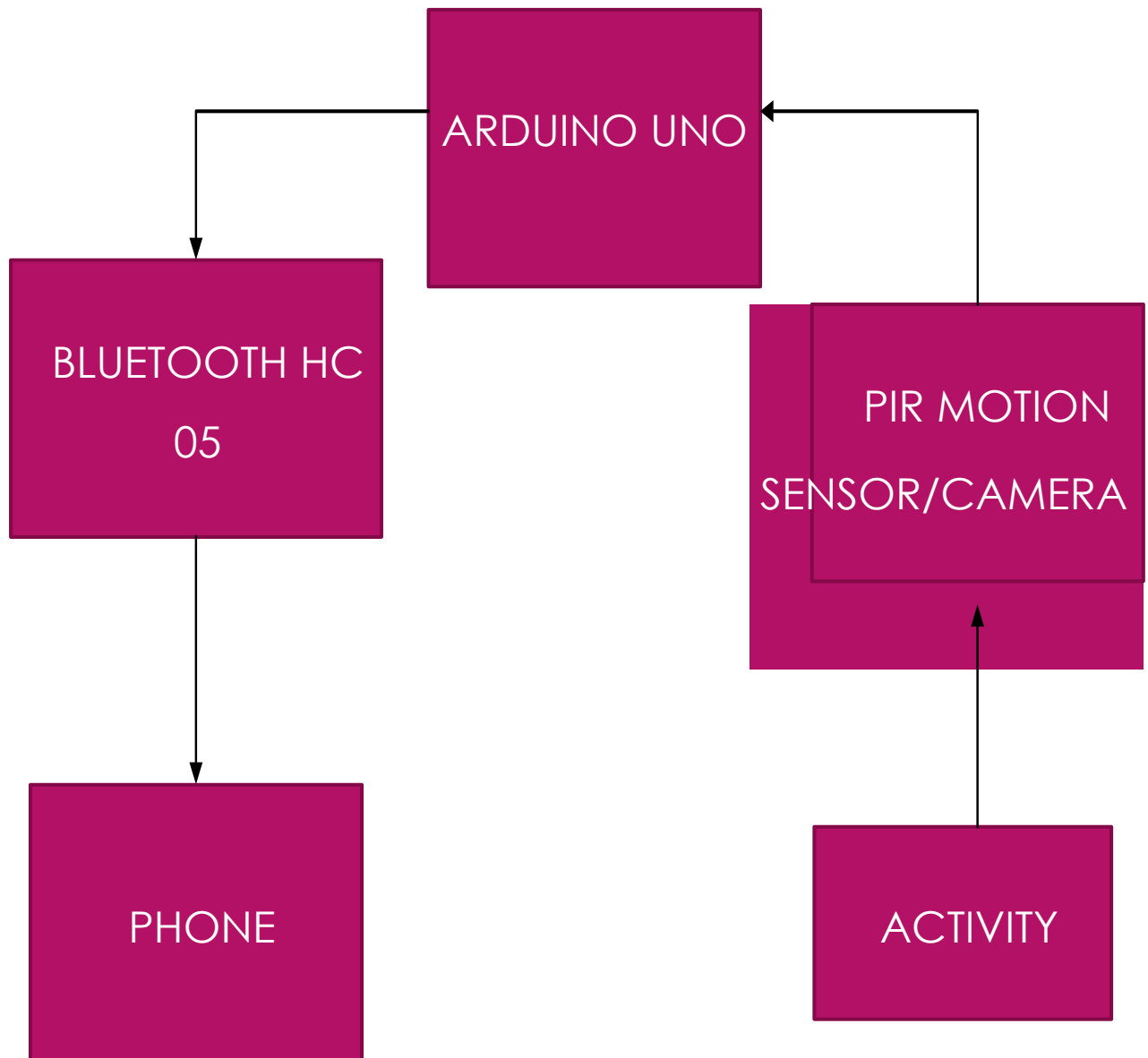
Circuit Diagram:
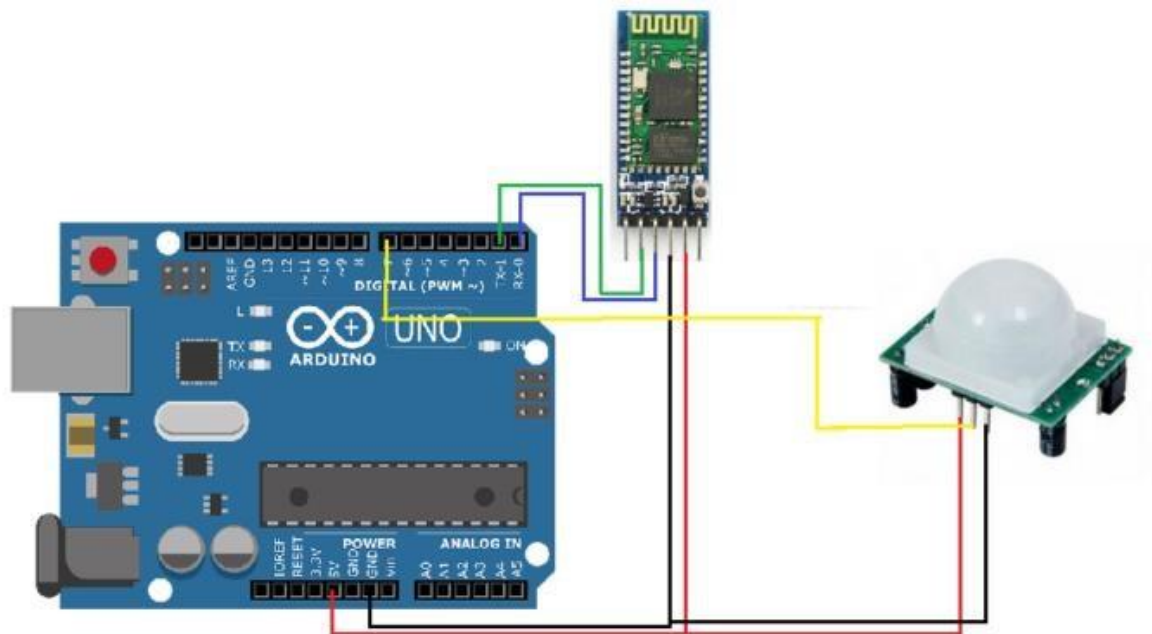
Components(procured):

1.Breadboard and Jumper wires

2. PIR Motion Sensor

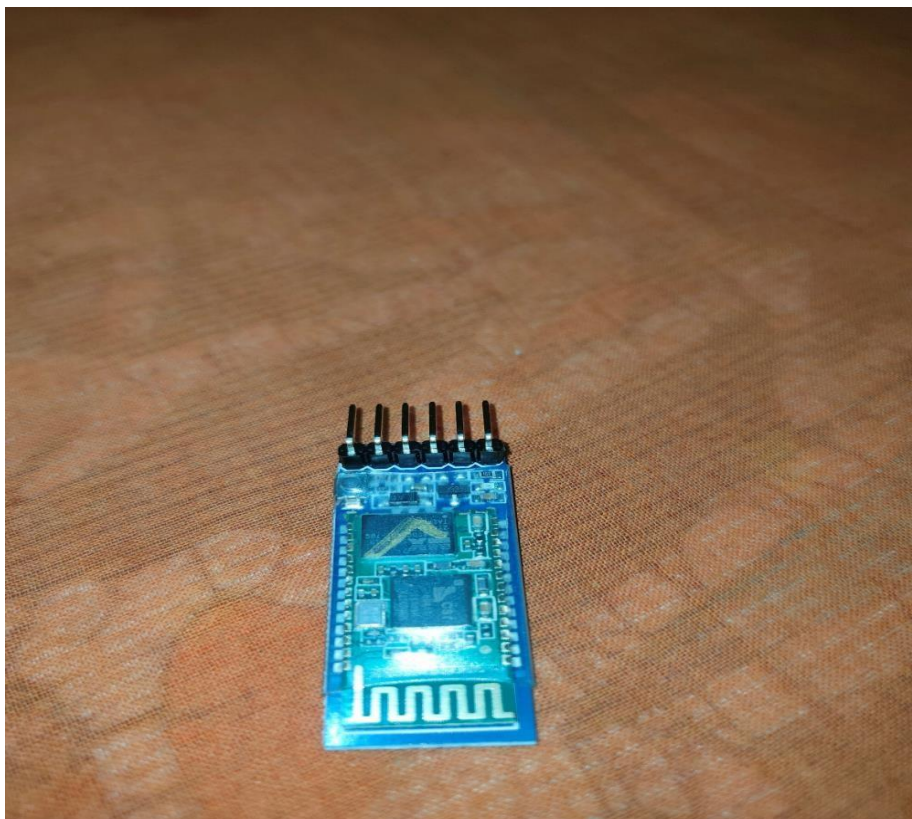## 3. Arduino Uno Board

4. HC-05 Bluetooth Module Master Slave

5. Smartphone to be used for image capturing

Hardware:

-BREADBOARD AND WIRES

-PIR MOTION SENSOR

-ARDUINO UNO

-BLUETOOTH HC 05

-SMARTPHONE (CAMERA) BATTERY

Software:

-ARDUINO IDE

-MIT APP INVENTOR

Arduino Coding:

-> First of all, take a variable for motion sensor pin. Here we have used Arduino digital pin 7.

-> After that create a set-up function and set the Bluetooth baud rate (here we have used baud rate 9600) and set the pin mode for PIR sensor as input.

-> Then in the next part of the code, create a loop function and under that create an 'if condition' that checks the status of motion detection by PIR sensor. When the PIR motion sensor detects any human motion, the Arduino sends a number over Bluetooth to our Android app created.

Arduino code sample:

sketch_jan07a | Arduino 1.8.19

File Edit Sketch Tools Help

sketch_jan07a

```
int pir=7;
void setup(){
  Serial.begin(9600);
  pinMode(pir,INPUT);
}
void loop(){
  if(digitalRead(pir)==1){
    Serial.println("23");
    delay(3000);
  }
}
```

The app:

- ► The app is built using MIT app inventor.

- ► App Inventor is a cloud based tool, using which means we can create apps for phones right in our web browser.

- ► The Designer is for creating the app's interface:

- ► The Blocks Editor lets us program the app's behaviour by putting blocks together:

- ► At last, the app can be shared as source code (.aia) that can be loaded into App Inventor and remixed. Or, it as an executable (.apk) that can be installed on a device.

How it works?

▶ When the PIR motion sensor and camera(cell-phone camera) detects any human motion, the Arduino sends a number and the image captured by the camera over Bluetooth to our Android app.

▶ Now, whenever intrusion is detected, arduino will send a number and the image/images captured to the app and the app will automatically call on the phone number and simultaneously send the photo to the user over whatsapp/ email.

▶ Next, it is upto the user to take a proper action if the intrusion is genuine or ignore it if it's some animal movement or similar stuff.

Progress:

Circuit building

Order was placed for items unavailable nearby and procurement of remaining from local shops, mean while learning Arduino IDE was procured from online sources.

After the arrival of items ordered one by one, a camera module was to be added to our project, as per the feedback from the instructors. Various means to connect smartphone camera and ways to trigger it were pondered upon.

Thereafter, individual components were tested, one defective product replaced.

A basic circuit experiment was performed to detect motion and trigger LED with a message on serial monitor along with successfully connecting to the Bluetooth of the app under progress.

Currently, various applications to trigger smartphone camera shutter through Arduino, upon motion detection by PIR Sensor are being looked out for. With this being done, we will be reaching to the completion of project.

Results so far
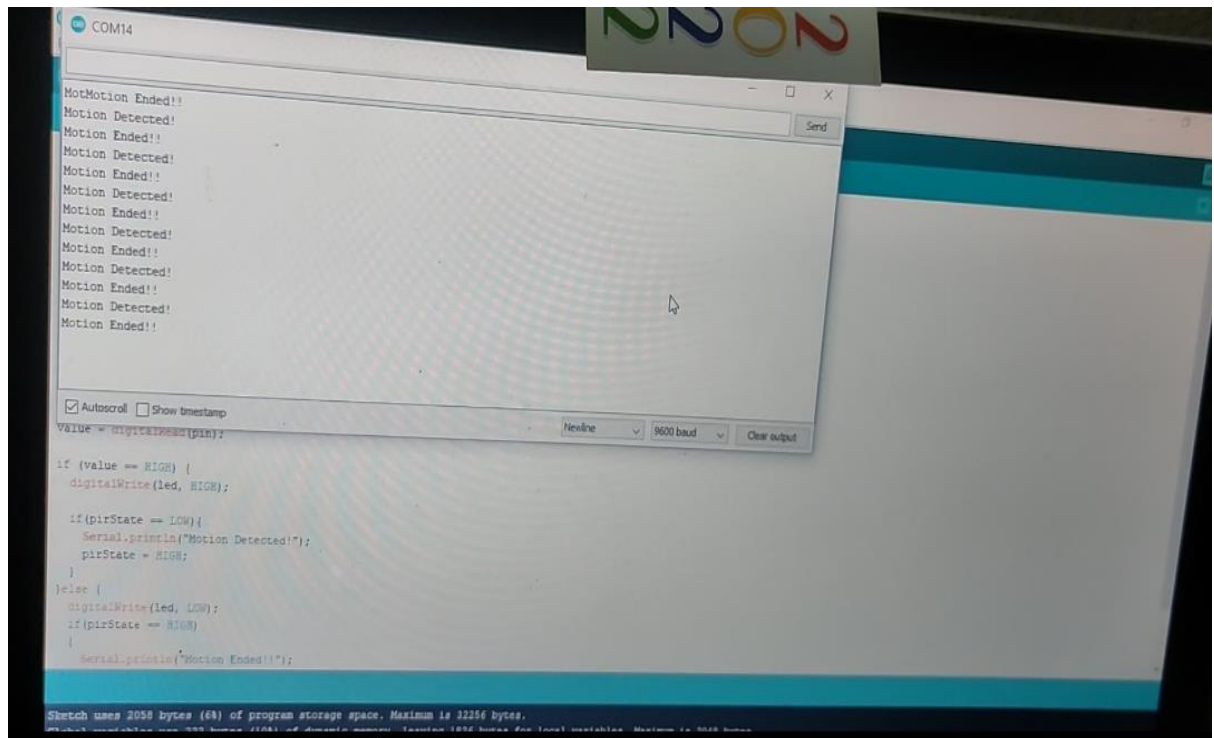
Arduino Code:

```
PIR
int led = 13;
int pin = 2;

int value = 0;
int pirState = LOW;

void setup() {
  // put your setup code here, to run once:
pinMode(led, OUTPUT);
pinMode(pin, INPUT);
Serial.begin(9600);
}

void loop() {
  // put your main code here, to run repeatedly:
value = digitalRead(pin);

if (value == HIGH) {
  digitalWrite(led, HIGH);

  if(pirState == LOW){
    Serial.println("Motion Detected!");
    pirState = HIGH;
  }
}else {
  digitalWrite(led, LOW);
  if(pirState == HIGH)
  {
    Serial.println("Motion Ended!!");
    pirState = LOW;
  }
```

Progress in the app:

Components of the app:
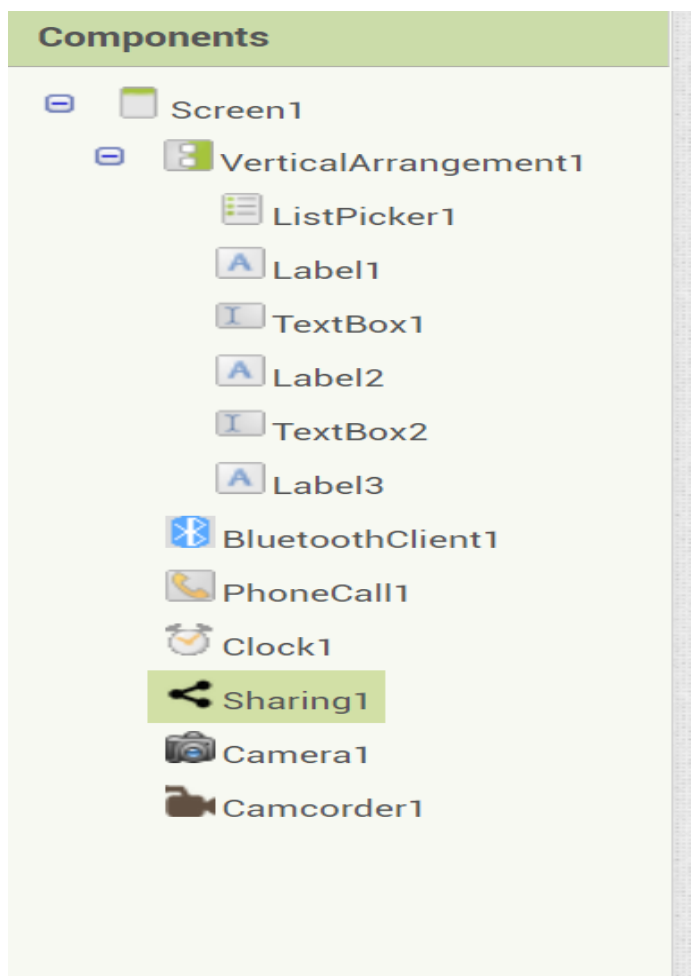
Function of the various components:

Screen 1: Holds the visible components

Vertical Arrangement 1: To hold the various visible components in place in the app interface.

List Picker1: Holds the list of the Bluetooth devices paired with the smartphone on which the app is to be used. This is used to connect the direct the Bluetooth client to connect to the required Bluetooth device.

Label1 & TextBox1: Display the status of connection with the Bluetooth.

Label2 & TextBox2: Display the phone call status.

Label3: Displays whether a phone number has been set for calling or not.

Non-visible components

Bluetooth Client 1: Used to connect the Bluetooth HC 05 module to the device so that it can transmit the necessary data across the Arduino and the application.

Phone Call1: Used to dial to the registered number, if triggered.

Clock1: Set a delay/ timer for phone calls.

Sharing 1: Used for transfer of the image/ video clip of the suspect to the required device using any medium of choice(email/ whatsapp/ text).

Camera1: Used to control the camera in the device since the cell-phone camera is to be used to capture image of the suspect.
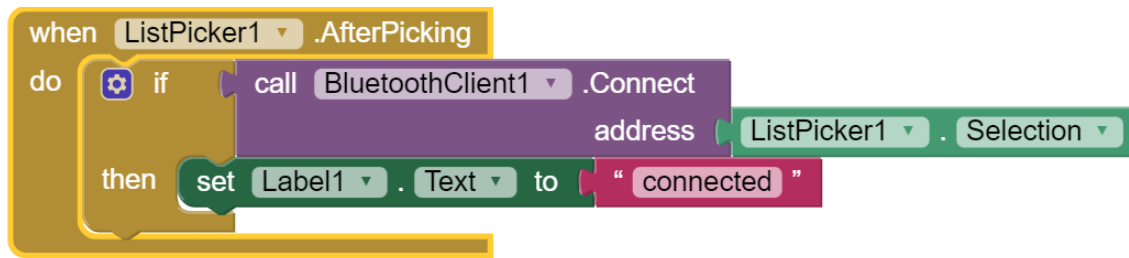
Camcorder 1: Used to capture a short clip of the break-in.

Code:

➔ Code to set Listpicker1 with the names and addresses of available Bluetooth devices.

➔ Code to connect to the HC05 blue-tooth module after pairing and selecting the device from the list of available devices.

```
when  ListPicker1 ▾  .AfterPicking
do    ⚙ if  ┤ call  BluetoothClient1 ▾  .Connect
                                       address ┤ ListPicker1 ▾ . Selection ▾
      then  set  Label1 ▾ . Text ▾ to ┤ " connected "
```

➔   Code to make the phone call

```
⚙ if  ┤⚙ ┤ BluetoothClient1 ▾ . IsConnected ┤ and ▾ ┤ call  BluetoothClient1 ▾ .BytesAvailableToReceive ┤ > ▾ ┤ 0
then  set  TextBox2 ▾ . Text ▾ to  call  BluetoothClient1 ▾ .ReceiveText
                                       numberOfBytes ┤ call  BluetoothClient1 ▾ .BytesAvailableToReceive
⚙ if  ┤ TextBox2 ▾ . Text ▾ ┤ > ▾ ┤ 10
then  call  PhoneCall1 ▾ .MakePhoneCall
      set  TextBox2 ▾ . Text ▾ to ┤ 0
```
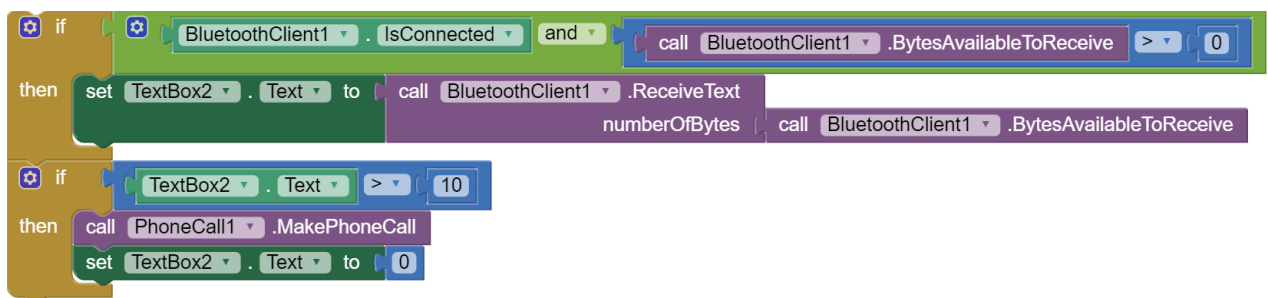
➔ Code to display status of phone call

```
when  PhoneCall1 ▾ .PhoneCallStarted
  status   phoneNumber
do   set  Label2 ▾ . Text ▾ to ┤ get status ▾
     set  Label3 ▾ . Text ▾ to ┤ get phoneNumber ▾
```
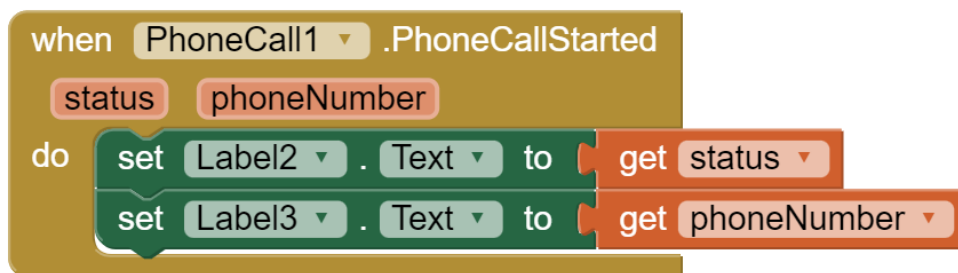
➔ Sample code to connect the app via Bluetooth to the HC05 module(Tried
   and tested on the HC05 module)

```
when  ListPicker1 ▾ .BeforePicking
do   set  ListPicker1 ▾ . Elements ▾ to   BluetoothClient1 ▾ . AddressesAndNames ▾
```

```
when  ListPicker1 ▾ .AfterPicking
do   set  Label1 ▾ . Text ▾ to   " Connect your Device "
```

```
when  connectBtn ▾ .Click
do   set  ListPicker1 ▾ . Selection ▾ to   call  BluetoothClient1 ▾ .Connect
                                                            address  ListPicker1 ▾ . Selection ▾
     set  Label1 ▾ . Text ▾ to   " Connected "
```

```
when  DisconnectBtn ▾ .Click
do   call  BluetoothClient1 ▾ .Disconnect
     set  Label1 ▾ . Text ▾ to   " Disconnected "
```

➔ Sample code to share the image of the intruder and make a phone call if manually trigerred.(Tried & tested!)

```
when  Button1 ▾ .Click
do   call  PhoneCall1 ▾ .MakePhoneCall
     call  Camera1 ▾ .TakePicture
     call  Camcorder1 ▾ .RecordVideo
```

```
when  Camera1 ▾ .AfterPicture
     image
do   call  Sharing1 ▾ .ShareFileWithMessage
                                    file  get image ▾
                                 message  " ALERT!!INTRUDER "
```

```
when  Camcorder1 ▾ .AfterRecording
     clip
do   call  Sharing1 ▾ .ShareFile
                                file  get clip ▾
```
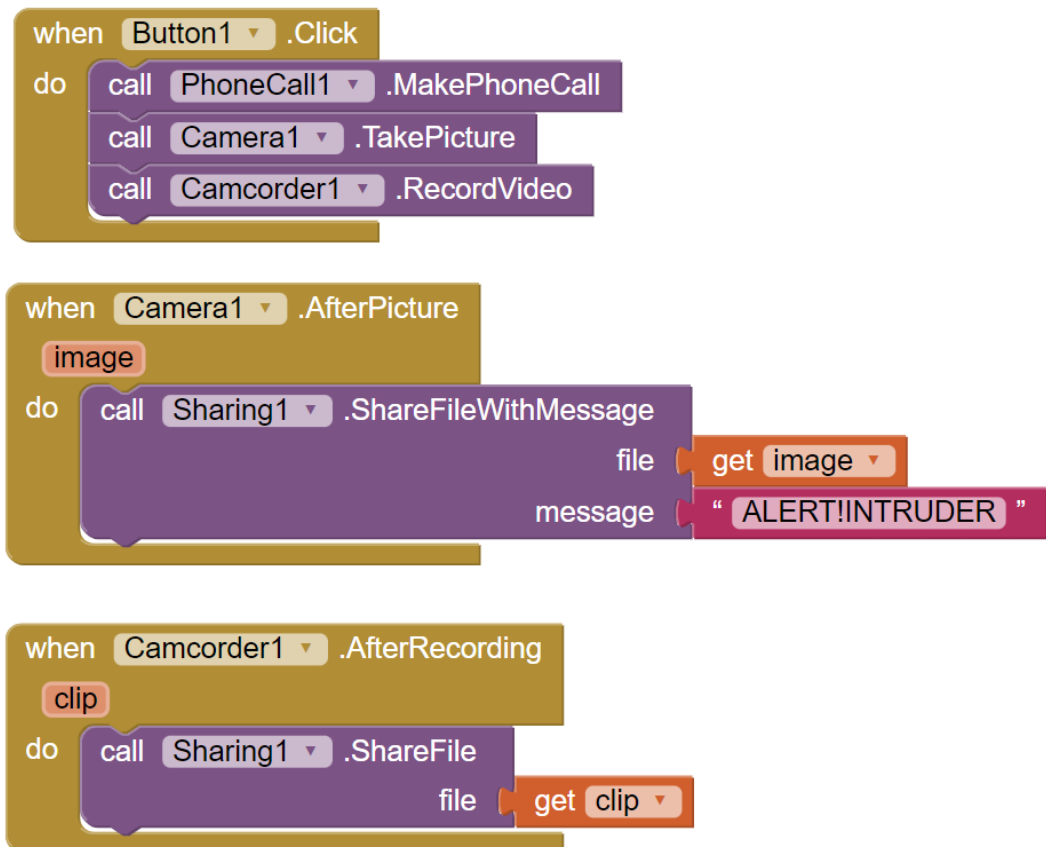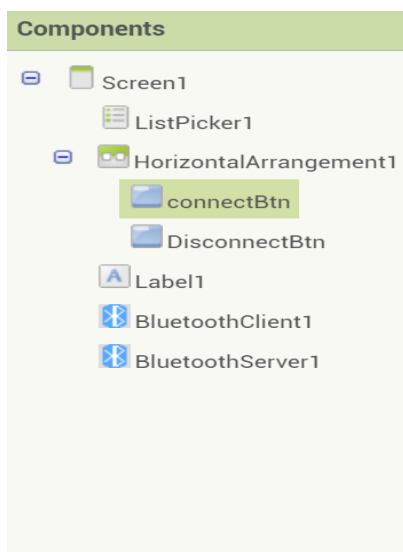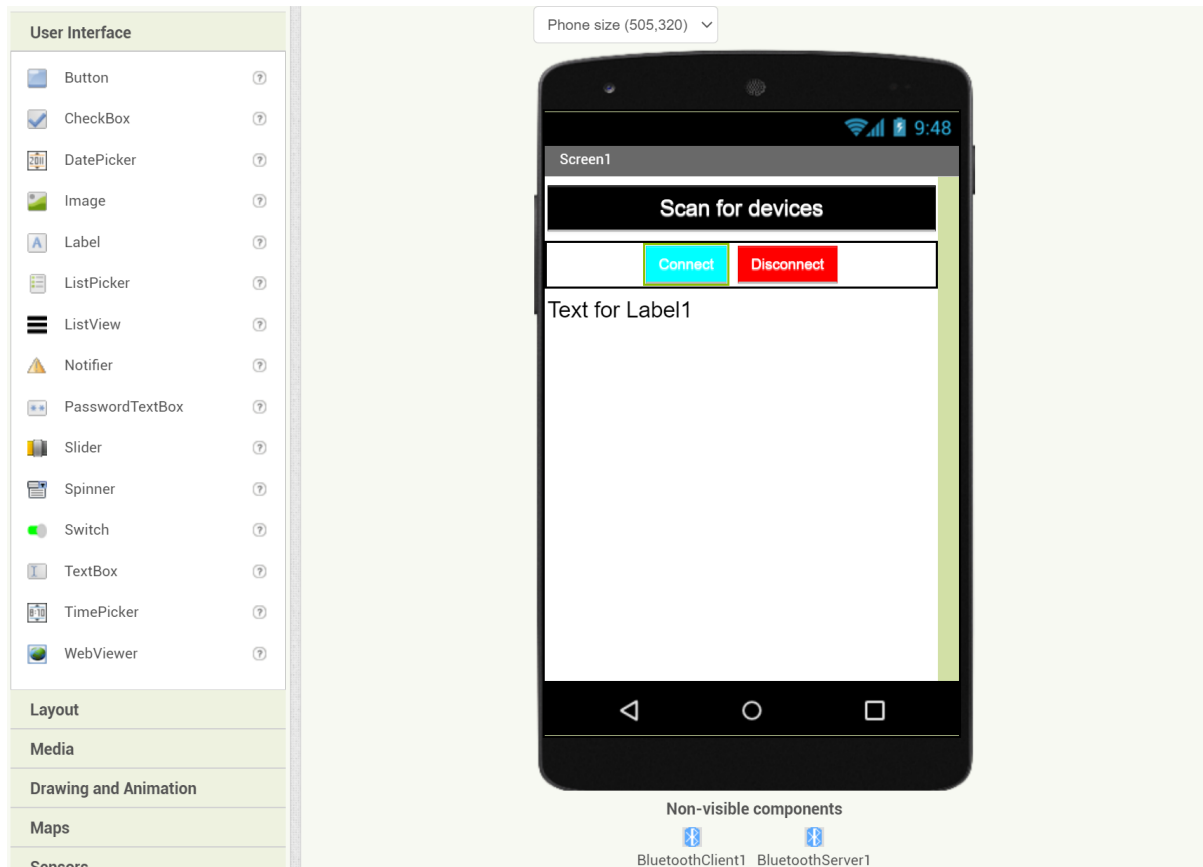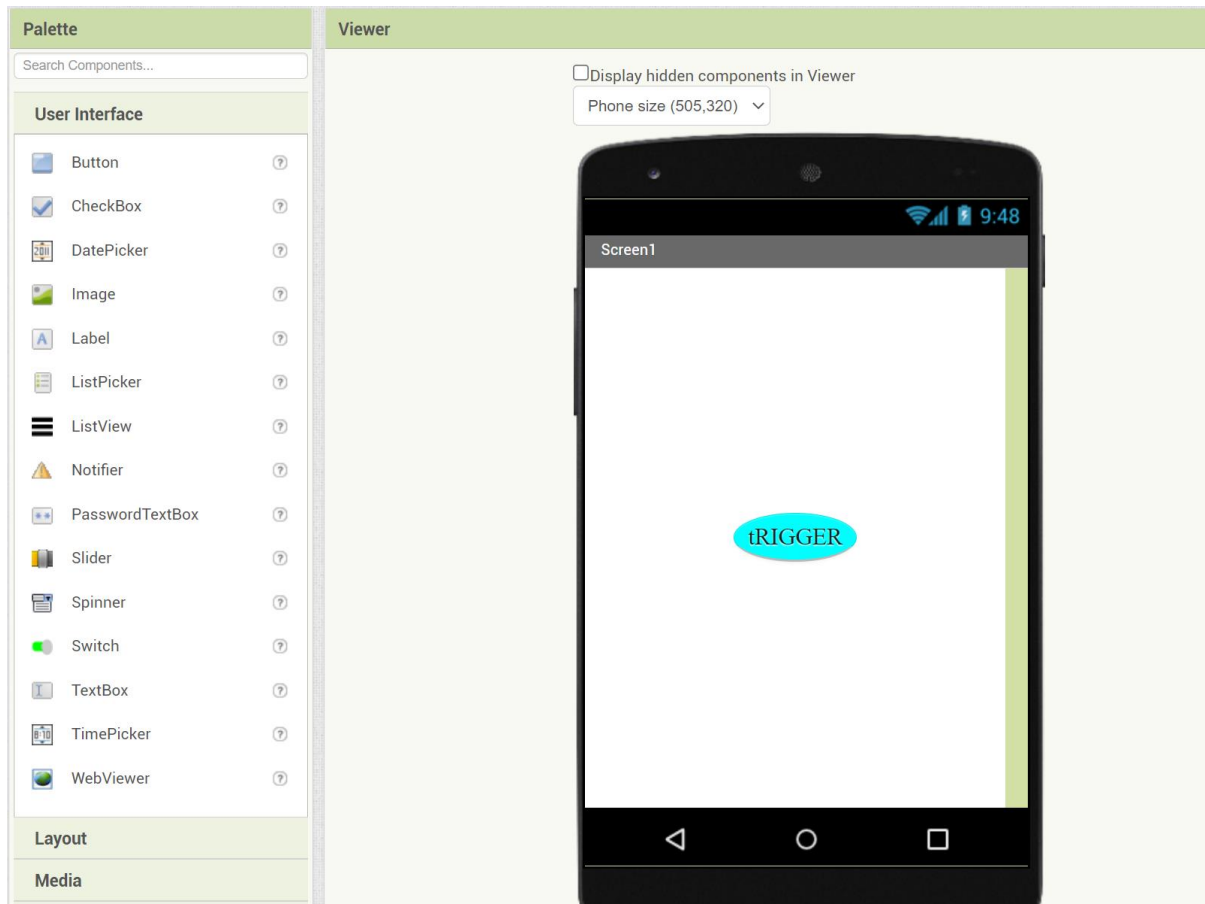
Snapshots of the app interface:

The main screen
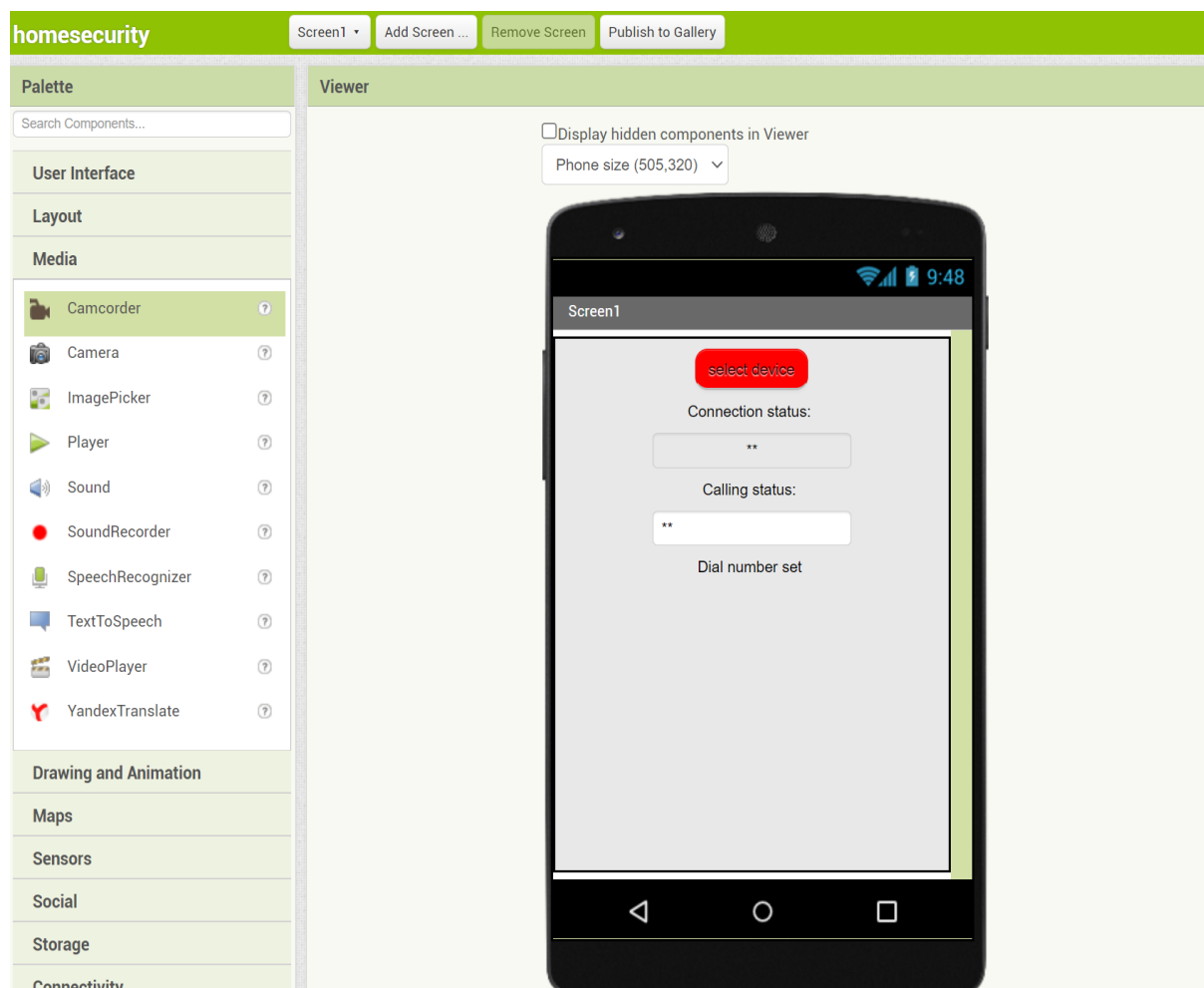
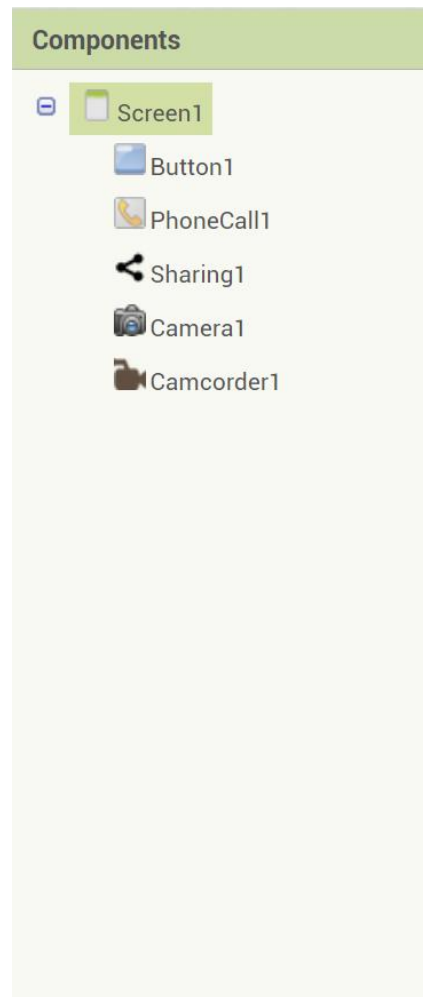**The sample app for connecting the HC05 to the device using Bluetooth.**

Has been tested on the HC05 module and works perfectly.

User Interface	
Button	?
CheckBox	?
DatePicker	?
Image	?
Label	?
ListPicker	?
ListView	?
Notifier	?
PasswordTextBox	?
Slider	?
Spinner	?
Switch	?
TextBox	?
TimePicker	?
WebViewer	?

Layout

Media

Drawing and Animation

Maps

Sensors

Phone size (505,320)

Screen1

Scan for devices

Connect   Disconnect

Text for Label1

Non-visible components

BluetoothClient1 BluetoothServer1

Components

- Screen1
  - ListPicker1
  - HorizontalArrangement1
    - connectBtn
    - DisconnectBtn
  - Label1
  - BluetoothClient1
  - BluetoothServer1

Sample app to make phone call and share image in case of a trigger.

Here, it has been triggered manually but in the final app, it will be triggered automatically.

RATANPALKE KAVYA   419MA5060

Components

- Screen1
  - Button1
  - PhoneCall1
  - Sharing1
  - Camera1
  - Camcorder1

The future of smart homes:

Homes are things we own that we can interact with a lot more, and from a distance too! ''Smart homes'' refer to smart home devices like the Philip hue lights you can automate and control using Wi-Fi/BLUETOOTH.

The onset of COVID-19 accelerated the adoption of the smart home. Due to the pandemic, people are spending most of their time at home. Trends such as working from home, education from home, shopping from home, and healthcare from home, are driving the consumer adoption of technologies such as remote monitoring, video conferencing, vital signs monitoring and more. While COVID-19 has significantly reduced consumer spending on travel and hospitality, the savings from unspent holiday money is going into home improvement projects, making homes smarter and more comfortable.

As security is one of the key features of a safe household, this project is a step in the similar direction!