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3.	LCD and Ultrasonic Sensor interfacing with Arduino Uno.	05/09/24	13/11/24		
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ID Number: R3IVT0010106

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11.	LED blinking using ESP32 (inbuilt Bluetooth).	31/10/24	13/11/24		
12.	Temperature & humidity display in mobile app through ESP32.	31/10/24	13/11/24		
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ID Number: 23IVT0010106

EXPT NO. : 1

Date : 08/08/2024

Page NO.: 1

Name of the experiment:- LED blinking using Arduino Uno.

Aim:- To determine LED blinking using Arduino Uno.

Apparatus:- Arduino Uno, LED, Wire, breadboard.

Theory:- The Arduino uno is an open-source microcontroller board, based on the Microchip ATmega 328 p microcontroller Arduino Uno can be used to buid many projects including LED blinkers, Robots etc.

Diagram:-

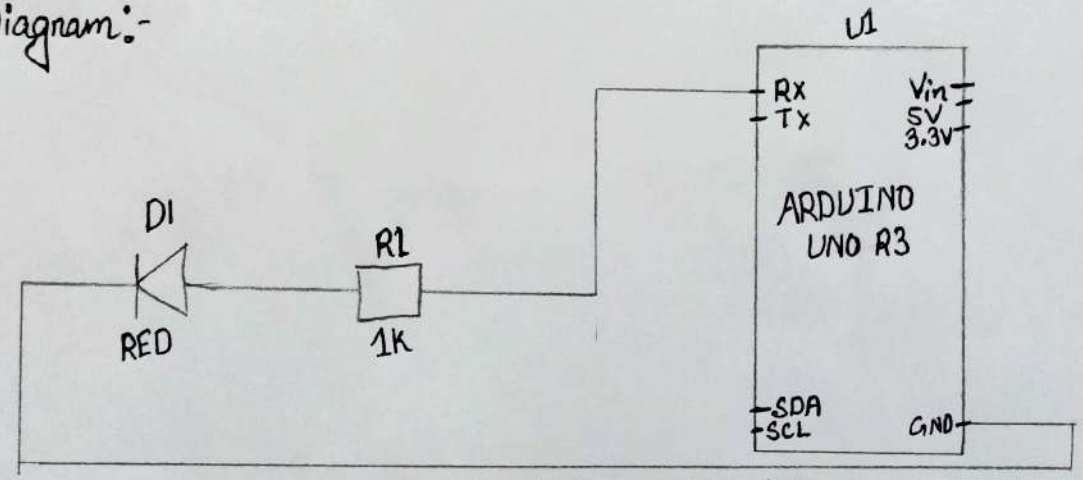
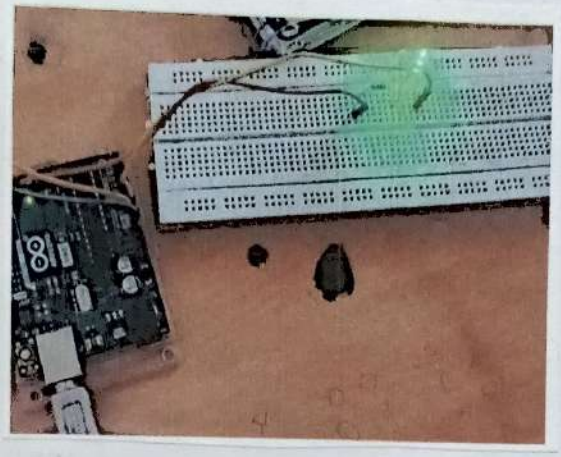


Fig:- Circuit of LED blinking using Arduino Uno.

ID Number: 23UDT0010106

Output:-



EXPT NO. : ...1.....

Date : 08/08/2024.....

Page NO.: .....2.....

Code :-

```
Void Setup () {
    pinMode (2, OUTPUT);
}
Void loop () {
    digitalWrite (2, HIGH);
    delay (2000);
    digitalWrite (2, LOW);
    delay (2000);
}
```

ID Number: 23UU0010106.....

EXPT NO. : 2

Date : 22/08/2024

Page NO.: 3

Name of the experiment :- LCD & PIR Sensor interfacing with Arduino Uno / ESP8266.

Aim :- To determine LCD & PIR Sensor using Arduino Uno / ESP8266

Apparatus :- Arduino Uno, PIR Sensor, LCD, wire, breadboard.

Theory :- A passive infrared Sensor (PIR) is an electronic Sensor that measures infrared (IR) light radiating from objects in its field of view, wiring a PIR Sensor to an Arduino power the PIR with 5V and connect ground to ground. Arduino board can read digital & analog input from the Sensors and the PIR Sensor is a special type of Sensor with is usually used for security purpose.

Diagram :-

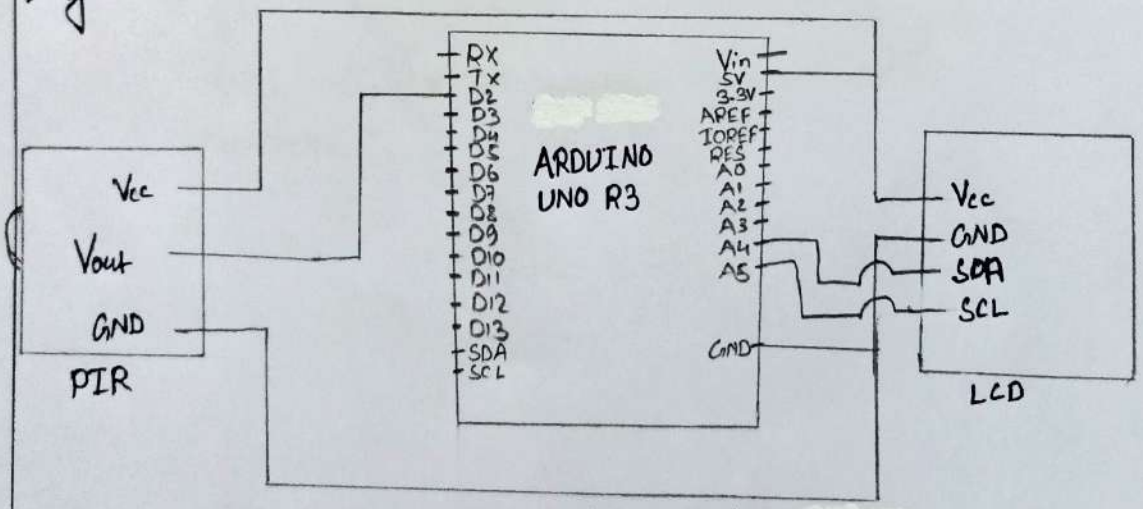
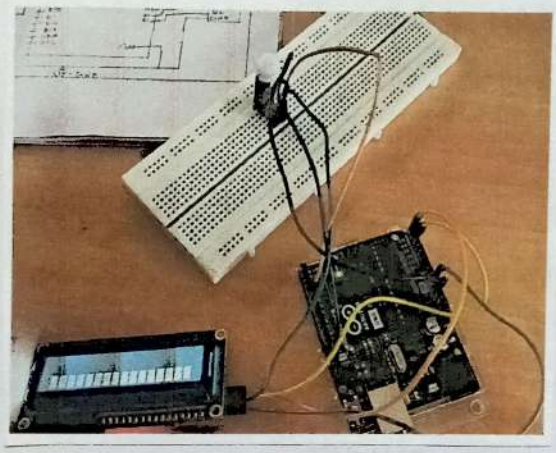


Fig :- Circuit of PIR & LCD using Arduino Uno

ID Number: 22TUTA010106

Output:-



EXPT NO. : 2

Date : 22/08/2024

Page NO.: 4

Code :-

```
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27, 16, 2);

Void Setup() {
    lcd.init();
    lcd.backlight();
    pinMode(2, INPUT);
}

Void loop() {
    if (digitalRead(2) == 1) {
        lcd.print("Motion");
    }
    else {
        lcd.print("No Motion.");
    }
    delay(100);
    lcd.clear();
}
```

ID Number: 23IUIA010106

EXPT NO. : 3.....

Date : 05/09/2024....

Page NO.: ...5.....

Name of the experiment :- LCD and Ultrasonic Sensor interfacing with Arduino Uno.

Aim :- To determine LCD and Ultrasonic Sensor interfacing with Arduino Uno.

Apparatus :- Arduino Uno, LCD Screen, Ultrasonic Sensor, wires, breadboard

Theory :- An ultrasonic sensor measure the distance to the target by measuring the time between the emission and reception.

To interface the ultrasonic sensor to the Arduino, we need to connect sensors TRIG pin to Arduino pin 4. The sensor's echo pin to Arduino pin 5. Sensor's Vcc pin to Arduino 5V output & Sensor GND to Arduino GND pin.

Diagram :-

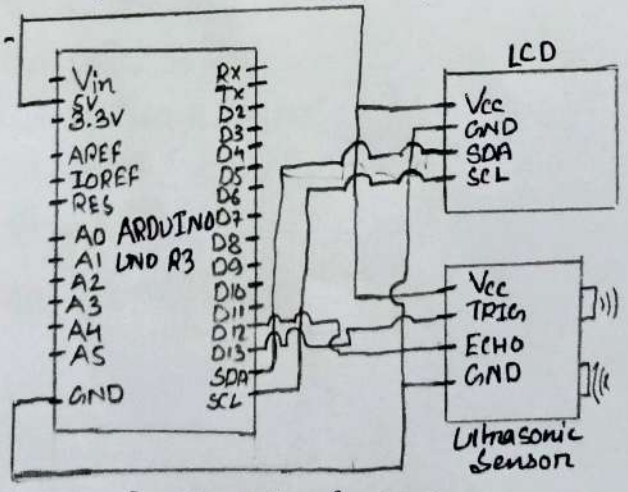
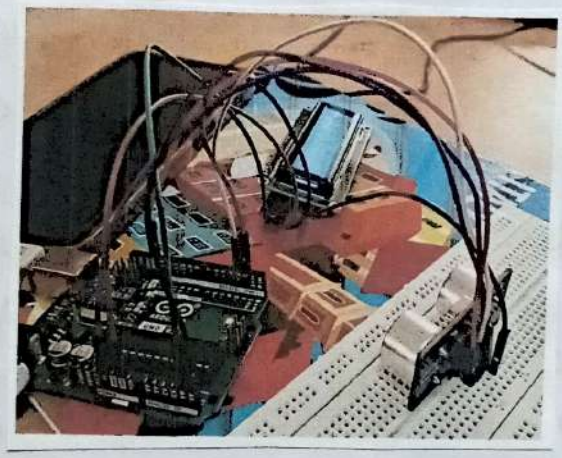


Fig :- LCD & ultrasonic sensor interfacing with Arduino Uno.

ID Number: 231U10010106.....

Output:-



EXPT NO. : 3

Date : 05/09/2024

Page NO.: 6

Code:-

```
#include <LiquidCrystal_I2C.h>
#include <NewPing.h>
NewPing ultra(2, 3, 500);
LiquidCrystal_I2C lcd(0x27, 16, 2);
int d;
Void Setup() {
    lcd.init();
    lcd.backlight();
}
Void loop() {
    d = ultra.ping_cm();
    lcd.SetCurson(0,0);
    lcd.print("Distance:");
    lcd.SetCurson(10,0);
    lcd.print(d);
    lcd.SetCurson(13,0);
    lcd.print("C.m");
    delay(100);
    lcd.clear();
}
```

ID Number: 23121001106

EXPT NO. : 4

Date : 12/09/24

Page NO.: 7

Name of the experiment:- Temperature & humidity display using DHT 11/22 Sensor and Arduino Uno.

Aim:- To determine Temperature & humidity display using DHT 11/22 Sensor and Arduino Uno.

Apparatus:- Arduino Uno, DHT22, LCD, Wires, Breadboard.

Theory:- As the humidity rises, the substrate absorbs water vapour, resulting in the release of ions and a decrease in the resistance between the two electrons. DHT Sensors are low-cost digital temperature and humidity sensors.

Diagram:-

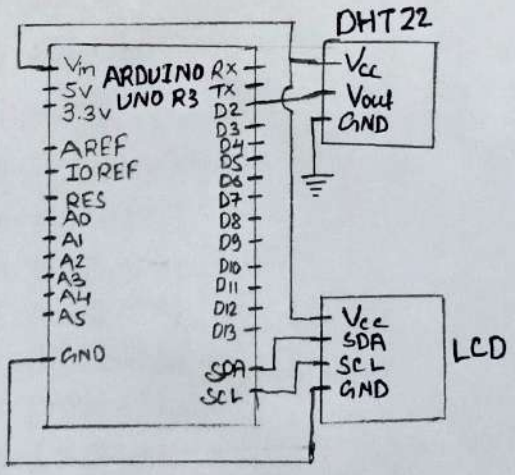
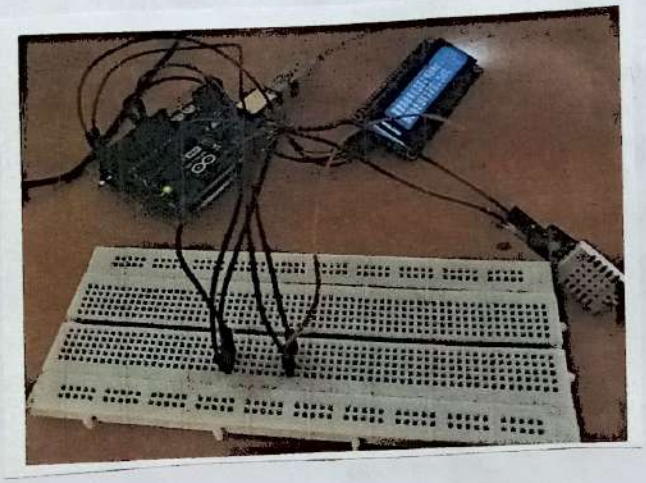


Fig:- DHT22 & LCD interfacing with Arduino Uno.

ID Number: 23JUTOO10106

Output :-



EXPT NO. : 4

Date : 12/09/24

Page NO.: 8

Code:-

```
#include <LiquidCrystal_I2C.h>
#include <DHT.h>
DHT dht (2, DHT22);
LiquidCrystal_I2C lcd (0x27, 16, 2);
float t, h;
Void Setup() {
    lcd.init();
    lcd.backlight();
    dht.begin();
}
Void loop() {
    t = dht.readTemperature();
    h = dht.readHumidity();
    lcd.SetCursor (0,0);
    lcd.print("Temp: ");
    lcd.SetCursor (6,0);
    lcd.print(t);
    lcd.SetCursor (11,0);
    lcd.print("°C");
    lcd.SetCursor (0,1);
    lcd.print("Humid: ");
    lcd.SetCursor (7,1);
    lcd.print(h);
    lcd.SetCursor (12,1);
    lcd.print("%");
    delay (100);
    lcd.clear();
}
```

ID Number: 23IU2I001010106

EXPT NO. : 5

Date : 12/09/24

Page NO. : 9

Name of the experiment:- IR Sensor interfacing using Arduino Uno.

Aim:- To determine IR Sensor interfacing using Arduino Uno.

Theory:- An infrared detector is a detector that reacts to infrared radiation. The two main types of detectors are thermal and photonic. The thermal effect of the incident IR radiation can be followed through many temperature dependent phenomena.

Apparatus:- IR Sensor, Arduino Uno, LED, wires, breadboard.

Diagram:-

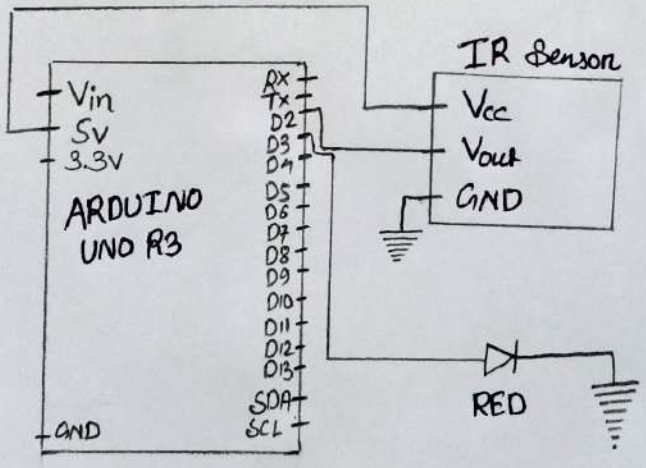
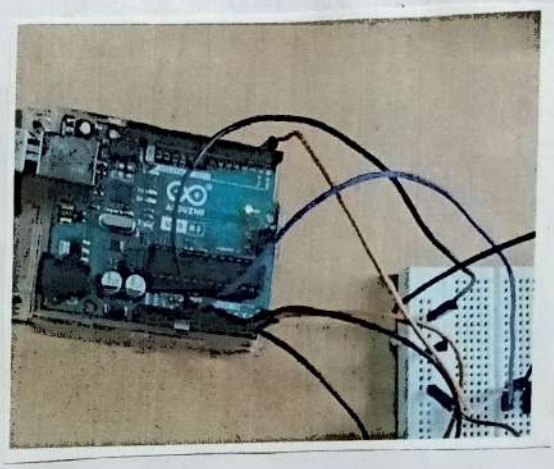


Fig:- IR Sensor interfacing using Arduino Uno.

ID Number: 23UT00101065

Output:-



EXPT NO. : ...5.....

Date : 12/09/2024.....

Page NO.: ....10.....

Code:-

```
Void setup() {
    pinMode (2, INPUT);
    pinMode (3, OUTPUT);
}
Void loop() {
    if (digitalRead (2) == 0) {
        digitalWrite (3, HIGH);
    }
    else {
        digitalWrite (3, LOW);
    }
}
```

ID Number: 23IVI0010106..

EXPT NO. : ....6A....

Date : 12/09/2024....

Page NO.: ..11.....

Name of the experiment:- Counter design using microbit.

Aim:- To determine counter design using microbit.

Theory:- The BBC micro-bit is a pocket-sized computer that's designed to help learn about coding and how software and hardware work together.

Radio and Bluetooth Antenna:- Microbit can communicate with other microbits by radio, and with other devices via bluetooth.

Processor and Temperature:- The microbit processor is its brain fetching, decoding and carrying out your instructions. It also contains a temperature sensor so we can measure how warm or cold our environment is.

Apparatus:- Microbit

Diagram:-

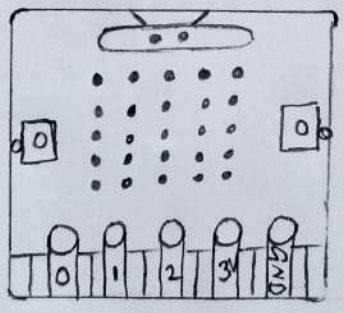
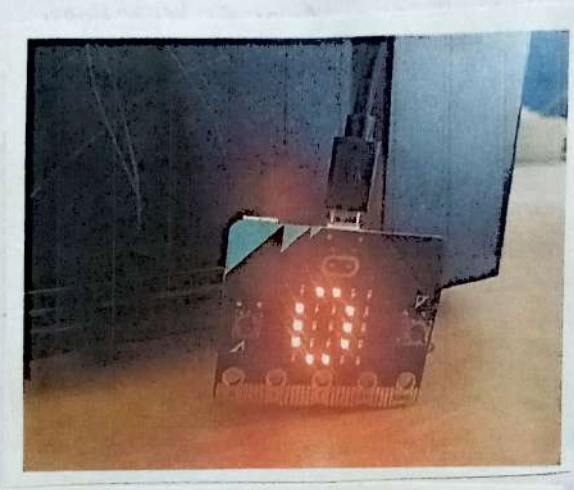
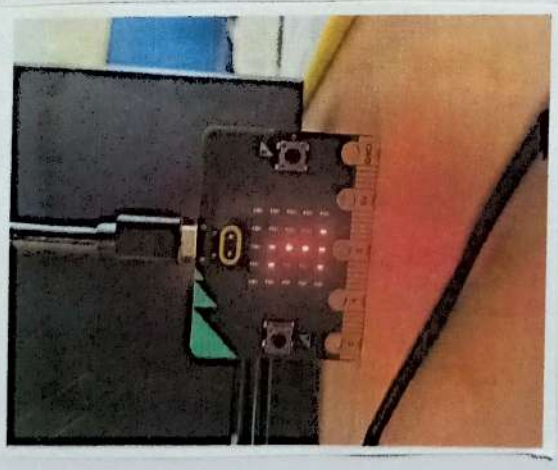


Fig:- Microbit

ID Number: 23UT0010106....

Output:-





EXPT NO. : 6A

Date : 12/09/2024

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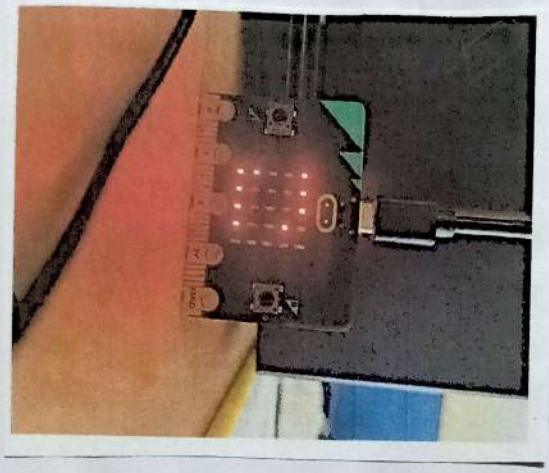
Code :-

```
from microbit import *
value = 0
while True:
    if (value < 10):
        display.show(value)
    else
        display.scroll(value)
    if (value < 50):
        value += 1
    else
        value = 0
    sleep(1000)
```

ID Number: 23IU10010106.

Output :-



EXPT NO. : 6B

Date : 12/09/2024

Page NO.: 13

Name of the experiment :- Updown Counter using button of Microbit.

Code :-

```
from microbit import *

Val = 0
while True:
    if (button_a.was_pressed()):
        Val += 1
        display.show(val)
    elif (button_b.was_pressed()):
        Val -= 1
        if (Val < 10):
            display.show(Val)
        else:
            display.scroll(Val)
    sleep(1000)
```

ID Number: 23IUT0010106

EXPT NO. : 7

Date : 19/09/2024

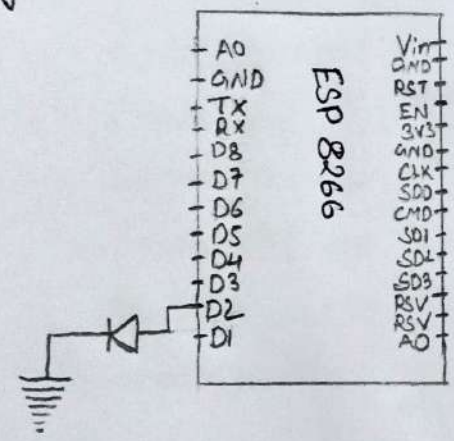
Page NO.: 14

Name of the experiment:- LED blinking through WiFi (ESP8266).

Aim:- To determine LED blinking through wifi (ESP8266).

Apparatus:- ESP8266, LED, wires, breadboard.

Diagram:-

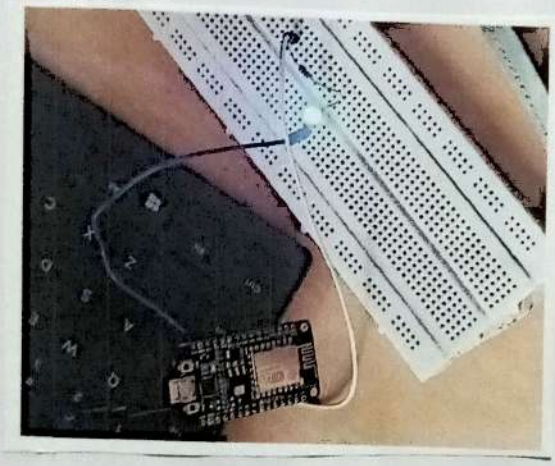


Code:-

```
#include <ESP8266WiFi.h>
#include <ESP8266WebServer.h>
Const Char *Ssid = "SuperAxid";
Const Char *Password = "SuperAxid";
ESP8266WebServer Server(80);
#define LED_BUILTIN D2
Const int ledPin = LED_BUILTIN;
```

ID Number: 23IUI0010106

Output:-



EXPT NO. : 7

Date : 19/09/2024

Page NO.: 15

```
Void Setup() {
    Serial.begin(115200);
    pinMode (ledPin, OUTPUT);
    WiFi.begin(ssid, password);
    while (WiFi.Status() != WL_CONNECTED) {
        delay(1000);
        Serial.println("Connecting to WiFi...");
    }
    Serial.println("Connected to WiFi");
    Server.on("/", HTTP_GET, handleRoot);
    Server.on("/on", HTTP_GET, handleOn);
    Server.on("/off", HTTP_GET, handleOff);
    Server.begin();
    Server.println("HTTP Server Started");
}
Void loop() {
    Server.handleClient();
}
Void handleRoot() {
    String htmlPage = "<html><head><style>";
    htmlPage += "body {font-family: Arial, Sans-Serif;
                text-align: center;}";
    htmlPage += "h1 {color: #333333;}";
    htmlpage += "a {display: inline-block; padding: 10px
```

ID Number: 23IUT0010106

EXPT NO. : 7 Date : 19/09/2024

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```
20 px; margin: 10 px; text-decoration : none; front-size:
18 px; color: #ffffff; background-color : #4CAF50;
border-radius : 5px; }";
htmlpage = " </Style> </head> {body}";
htmlPage += "<h1> Node MCU LED Control </h1>";
htmlPage += "<form action = 'ion'> <input type =
'Submit' value = 'Turn On'> </form>";
htmlPage += "<form action = 'ioff'> <input type = 'submit'
value = 'Turn off'> </form>";
htmlPage += "</body> </html>";

Server.Send (200, "text/html", htmlPage);
}

Void handleOn() {
    digitalWrite (ledPin, HIGH);
    Send.Send (200, "text/plain", "LED turned on");
}

Void handleOff() {
    digitalWrite (ledPin, LOW);
    Server.Send (200, "text/plain", "LED turned off");
}
```

ID Number: 231UIC010106

EXPT NO. : 8

Date : 19/09/2024

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Name of the experiment :- Wireless data communication using Microbit.

Aim :- Wireless data communication using Microbit.

Apparatus :- Microbit

Theory :- Microbit can communicate wirelessly with other microbits using radio, radio is a way of sending and receiving messages and BBC microbits can use radio waves to communicate with each other.

Diagram :-

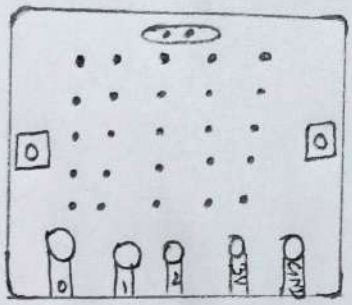


Fig :- Microbit

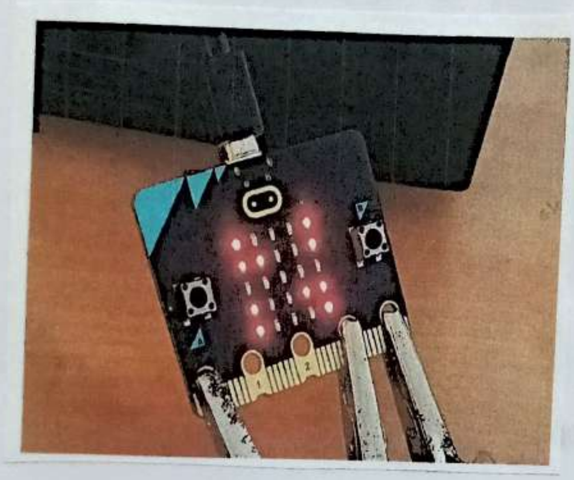
Code :-

Transmission Code :-

```
from microbit import *
import radio
radio.config(group33)
radio.on()
while True:
    radio.send('Hi Guys')
```

ID Number: 231U1A0416

Output:-



EXPT NO. : 8

Date : 19/03/2024

Page NO.: 18

Receiving Code:-

```
from microbit import *
import radio
radio.config(group=33)
radio.on()
while True:
    msg = str(radio.receive())
    display.scroll(msg)
```

ID Number: R23EUTO010106

EXPT NO. : 9

Date : 03/10/2024

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Name of the experiment :- Text message display using bluetooth module and Node MCU ESP8266.

Aim :- To Create a System that wirelessly transmits and display text message using bluetooth module and Node MCU + ESP8266.

Apparatus :- Node MCU ESP8266, Bluetooth Module, LCD, Wires, Breadboard

Theory :- The experiment integrates microcontroller programming, wireless communication. The Node MCU ESP8266 Servers as the main controller, processing text message Sent from a mobile app via a bluetooth module like HC-05. Upon receiving the message the ESP8266 displays them on connected LCD.

Diagram :-

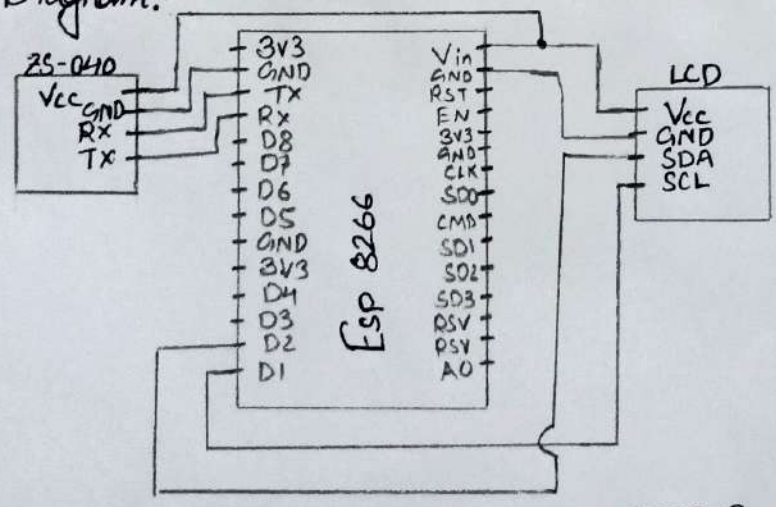
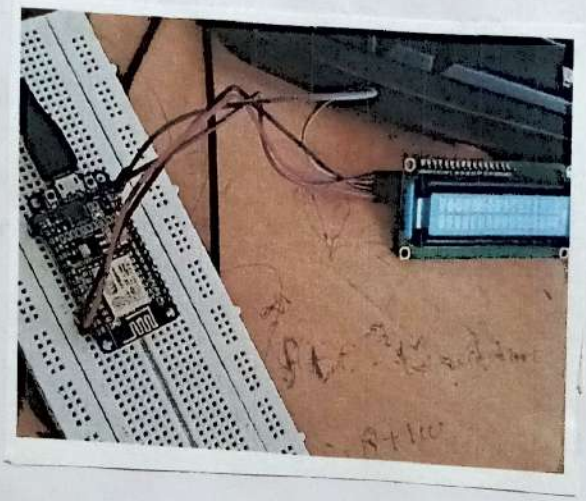


Fig :- ESP8266 interfacing with BT & LCD for text display.

ID Number: 23IUT0010106

Output:-



EXPT NO. : 9

Date : 03/10/2024

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Code:-

```
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd (0x27, 16, 2);
String t;
Void Setup() {
    Serial.begin(9600);
    lcd.init();
    lcd.backlight();
}
Void loop() {
    if (Serial.available()) {
        t=Serial.readString();
    }
    lcd.print(t);
    delay(100);
    lcd.clear();
}
```

ID Number: 23IUT0010106

EXPT NO. : 10

Date : 03/10/2024

Page NO.: 21

Name of the experiment:- LED blinking using bluetooth based mobile application using Arduino Uno.

Aim:- To blink a LED using bluetooth based mobile application using Arduino Uno.

Apparatus:- Arduino Uno, Bluetooth module, wires, breadboard, LED

Theory:- This experiment demonstrate a practical application of IoT, using a Smartphone to control an LED connected to an Arduino board via bluetooth.

Diagram:-

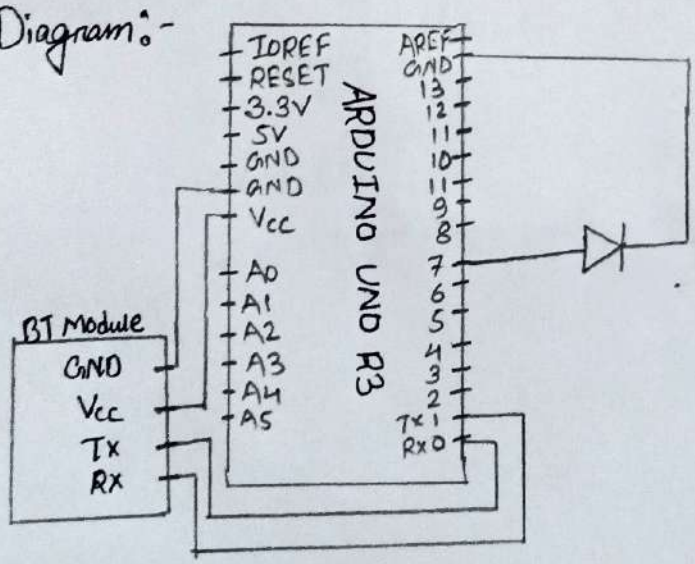
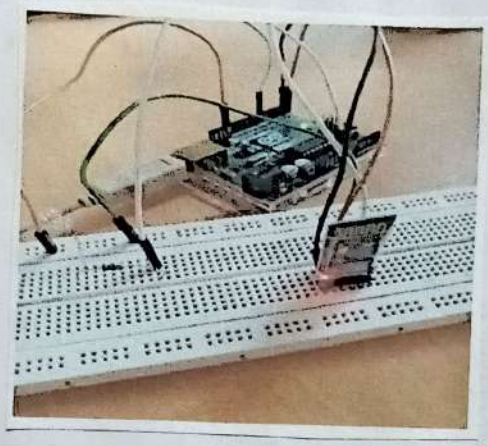


Fig:- LED blinking using bluetooth based mobile application.

ID Number: 23TD1A01A106

Output:-



EXPT NO. : 10

Date : 03/10/2024

Page NO.: 22

Code:-

```
String st;
Void setup() {
    Serial.begin(9600);
    pinMode(7, OUTPUT);
}
Void loop() {
   if(Serial.available()) {
        st=Serial.readString();
    }
    if(st=='on') {
        digitalWrite(7,HIGH);
    }
    else if(st=='OFF') {
        digitalWrite(7,LOW);
    }
}
```

ID Number: 23IT10010106

EXPT NO. : ...11.....

Date : 31/10/2024.....

Page NO.: ...23.....

Name of the experiment:- LED blinking using ESP32 (inbuit bluetooth)

Aim:- To demonstrate the ESP32 microcontrollers capabilities by programming it to blink an LED.

Apparatus:- ESP32, LED, wires, Breadboard

Theory:- This experiment demonstrate basic microcontroller programming and digital output. The ESP32 controls an LED through GPIO pins by toggling the pin between high and low state, while its wi-fi capabilities help it to communicate with the app.

Diagram:-

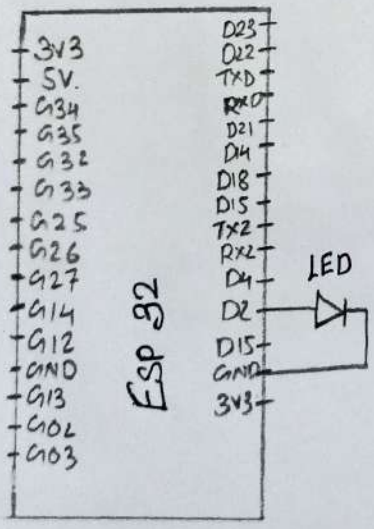
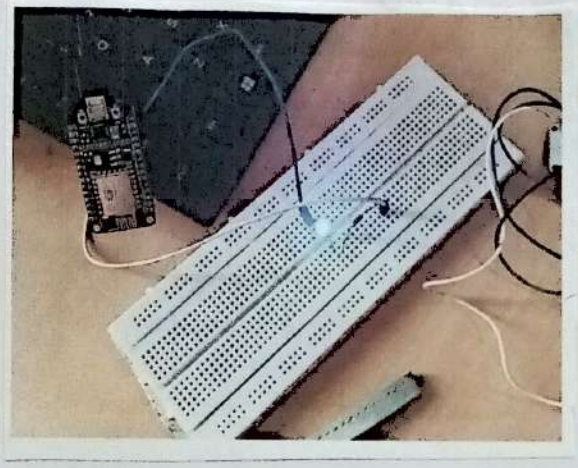


Fig:- ESP32 interfacing with LED.

ID Number: 23IU1A0101046...

Output:-



EXPT NO. : 11

Date : 31/10/2024

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Code:-

```
#include <BTAddress.h>
#include <BTAdvertisedDevice.h>
#include <BTScan.h>
#include <BluetoothSerial.h>
BluetoothSerial blt;
Char St;
Void Setup() {
    blt.begin("ESP32 DEVKIT V1");
    pinMode (2, OUTPUT);
}
Void loop() {
    if(blt.available()) {
        St = blt.read();
    }
    if (St == 'h') {
        digitalWrite(2, HIGH);
    }
    else if (St == 'l') {
        digitalWrite (2, Low);
    }
}
```

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Name of the experiment :- Temperature and humidity display in mobile app through ESP32.

Aim:- To demonstrate the ESP32 sending temperature & humidity data to mobile application using bluetooth.

Apparatus:- ESP32, DHT 22, wires, breadboard.

Theory:- This experiment demonstrate ESP32 microcontroller programming and digital output. The ESP32 is connected to DHT22 senson which sends temperature & humidity to the microcontroller then the data is fetched in mobile app via inbuilt bluetooth.

Diagram:-

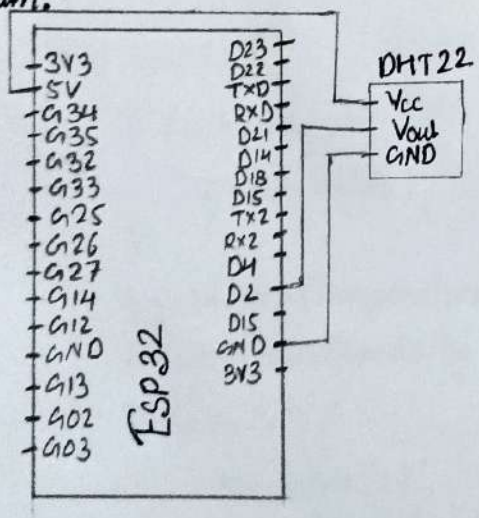

Fig: DHT22 interfacing with ESP32.

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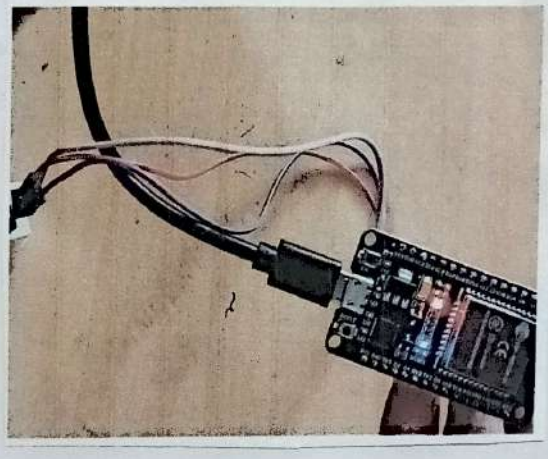
Output:-



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Code:-

```
#include <DHT.h>
#include <BTAddress.h>
#include <BTAdvertisedDevice.h>
#include <BTScan.h>
#include <BluetoothSerial.h>

BluetoothSerial blt;
DHT dht(2, DHT11);
float t, h;
char c;
Void Setup() {
    blt.begin("ESP32 DEVKIT V1");
    dht.begin();
}
Void loop() {
    if(blt.available()) {
        c = blt.read();
    }
    t = dht.readTemperature();
    h = dht.readHumidity();
    if(c == '1') {
        blt.print(t);
        blt.print("*C");
    }
```

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```
    else if (c == '2') {
        blt.print(h);
        blt.print(".1.");
    }
    delay(1000);
    blt.flush();
}
```

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Name of the experiment:- PIR Sensor interfacing with microbit.

Aim:- To interface PIR with microbit.

Apparatus:- Microbit, PIR Sensor, wires, breadboard.

Theory:- The microbit is a small digital device which we can use to control physical computing projects. In this experiment a PIR Sensor that consists of two pyro-electric electric elements that generates a voltage when they detect any change in infrared level, is interfaced with microbit.

Diagram:-

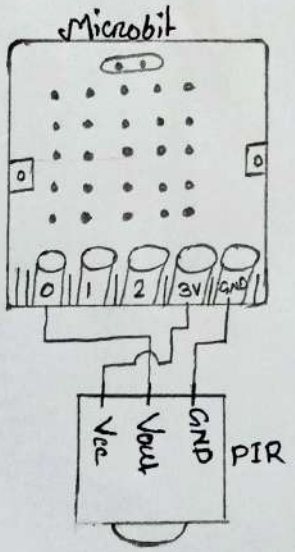

Fig:- Interfacing Microbit with PIR.

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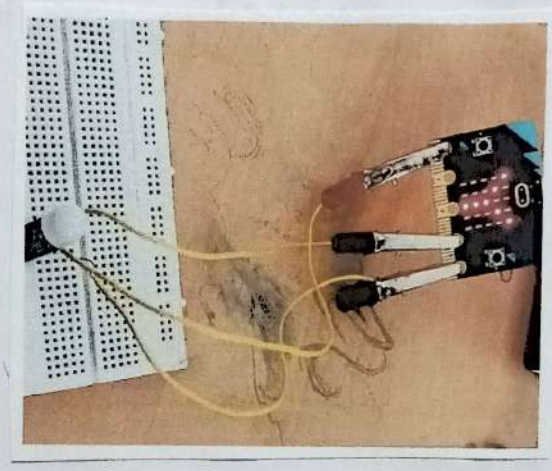
Output:-



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Code:-

```
from microbit import *
while True:
    if (pin0.read_digital==1);
        pin1.write_digital(1)
        display.show("Y")
    else:
        pin1.write_digital(0)
        display.show("N")
```

ID Number: 23UU10010106