Internet of Things: Project - 1

Circuits

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Question 1:

Here the system detect the presence/absence of humans in a room with the help of

a. **PIR sensor:** It detects any human motion relying upon the temperature difference at two points.
b. **Ultrasonic sensor (HC-SR04):** It is a 4-pin ultrasonic sensor that depends upon ultrasonic sound waves to bounce off the surface of the object to calculate its distance from the sensor.
c. **Temperature sensor (TMP36):** This temperature sensor measures the room temperature.

The program below prints the **room status** (temperature, presence/absence, distance) **on the Serial interface** and **presence/absence and distance on the LCD**.

The output on the LCD is cleared every 2 seconds and the new output is logged, similarly, a new output is logged on the serial monitor every 2 seconds but, the previous outputs are kept.

Code for the circuit mentioned above is:

```
//Ajay Choudhury (18018)
//Project-1 (IoT)

// library for LCD display
#include <LiquidCrystal.h>

// initialize the library with the numbers of the interface pins
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);

// constants for ultrasonic sensor
const int trigPin = 8;
const int echoPin = 9;

// variables for ultrasonic sensor
long duration;
int distance;

// variable for temperature sensor
```

```
float temp;

// setup function
void setup() {
  // set up the LCD's number of columns and rows:
  lcd.begin(16, 2);

  // define output and input pin for ultrasonic sensor
  pinMode(trigPin,OUTPUT);
  pinMode(echoPin,INPUT);

  // define input pin for PIR sensor
  pinMode(6, INPUT);

  // begin serial monitor
  Serial.begin(9600);
}

// loop function
void loop() {
  // initialize trigger pin of ultrasonic sensor
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);

  // turn on the trigger to initialize the sensor
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);

  // receive the signal on echo
  duration = pulseIn(echoPin, HIGH);

  // calculate the distance of the object with reference to the
  // speed of sound and double distance travelled by sound
  distance = duration * 0.034 / 2;

  // read PIR's output
  int value;
  value = digitalRead(6);

  // read temperature and convert it to celsius
  temp = map(((analogRead(A0) - 20)*3.04), 0, 1023, -40, 125);
```

```
  // printing temperature on the serial monitor
  Serial.print(temp);
  Serial.print(", ");

  // printing presence/absence on serial monitor and LCD
  if(value == 1)
  {
    Serial.print("Present, ");
    lcd.print("Present, ");
  }
  else
  {
    Serial.print("Absent, ");
    lcd.print("Absent, ");
  }

  // print distance calculated on serial monitor and LCD
  Serial.println(distance);
  lcd.print(distance);
  lcd.print(" ");

  // delay of 2 seconds
  delay(2000);

  // set the cursor to column 0, line 0 to clear the previous output
  // and log new output
  lcd.setCursor(0, 0);
}
```