Smart Climate Control with TinkerCAD Simulation Software

By

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MSCE07 – Internet of Things
PROJECT REPORT

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CENTRAL UNIVERSITY OF TAMIL NADU

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BONAFIDE CERTIFICATE

Certified that this project report "**Smart Climate Control with TinkerCAD Simulation Software**" is the bonafide work of **Gundeti Veena (P191310), Aleena Prakash (P191302),** and **P R Vessesh Krishna Hebbar (P191320)** who carried out the project under my supervision for the course title **MSCE07: Internet of Things**

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DECLARATION

We hereby declare that this project titled “Smart Climate Control with TinkerCAD Simulation Software” submitted for the course MSCE07: Internet of Things, Department of Computer Science, School of Mathematics and Computer Science, Central University of Tamil Nadu, Thiruvarur – 610 005, is a record of bonafide project work carried out by us under the guidance and supervision of Dr.R.Saranya, Department of Computer Science, Central University of Tamil Nadu, Thiruvarur – 610 005. This work is original and has not been submitted, in part or full to this or any other University / Institution.

Place: Thiruvarur
Date: 07-11-2020

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ABSTRACT

This project presents a system that makes use of simulated electronic components to automate the Climate Control process inside the home. The user of this system need not worry about excess power consumption, turning the AC or heater on and off every time they enter and exit the room. This system can be retrofitted in ordinary homes because it does not require specialised equipment like IoT enabled AC/Heaters, etc. Apart from climate control, this module also includes a system for detecting and raising the alarm for high levels of smoke that may be an indication of a fire in the building.

INTRODUCTION

Today, Internet Infrastructure is almost ubiquitous in Human Settlements. And Smartphones, Integrated Circuits are mass manufactured and relatively cheaply available. We humans can make use of this infrastructure to automate our routine tasks like Automating Devices in the Home, etc. This project investigates the possibility of simulating a Home Automation System the Simulation Software called AutoDesk TinkerCAD.

PROPOSED SYSTEM

The proposed system makes use of a Temperature sensor, a PIR Motion Detection sensor, and a Gas Sensor as Sensors. Using these sensors, we can automate Climate Control and Send alarms during Fire Events. The system makes use of Arduino Uno to do the processing. It decides the correct action to be taken depending on the Sensor Data and sends instructions to the Actuators. The actuators used here are a Buzzer for raising the alarm, and 2 Servo Motors each for the AC and Heater respectively. The system mentioned in this project can be implemented by connecting the Servo Motors to switches for AC and Heater mechanically.

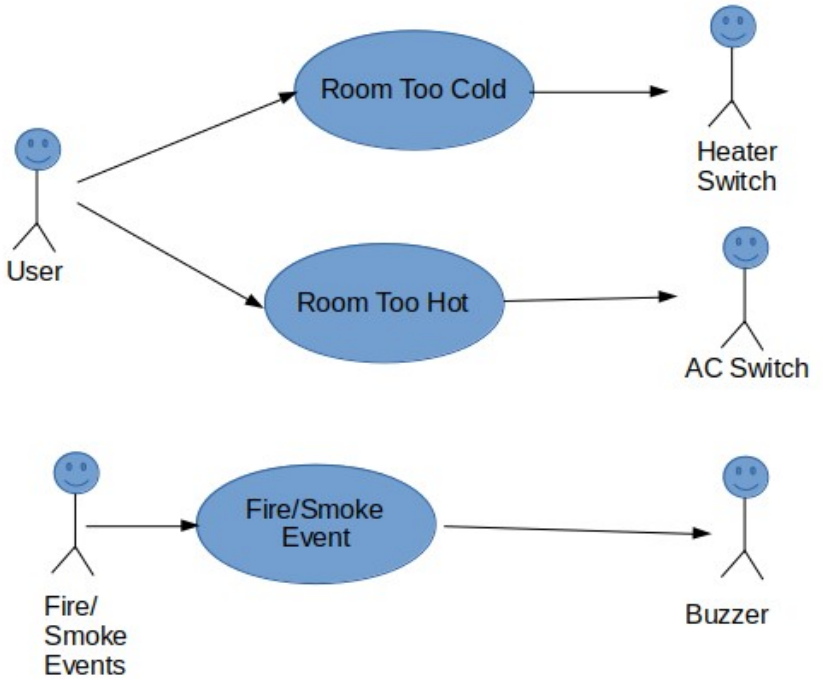
FEATURES

- Easy to Retrofit in Ordinary Homes
- Buzzer raises alarm when the system detects a Fire / Smoke event.

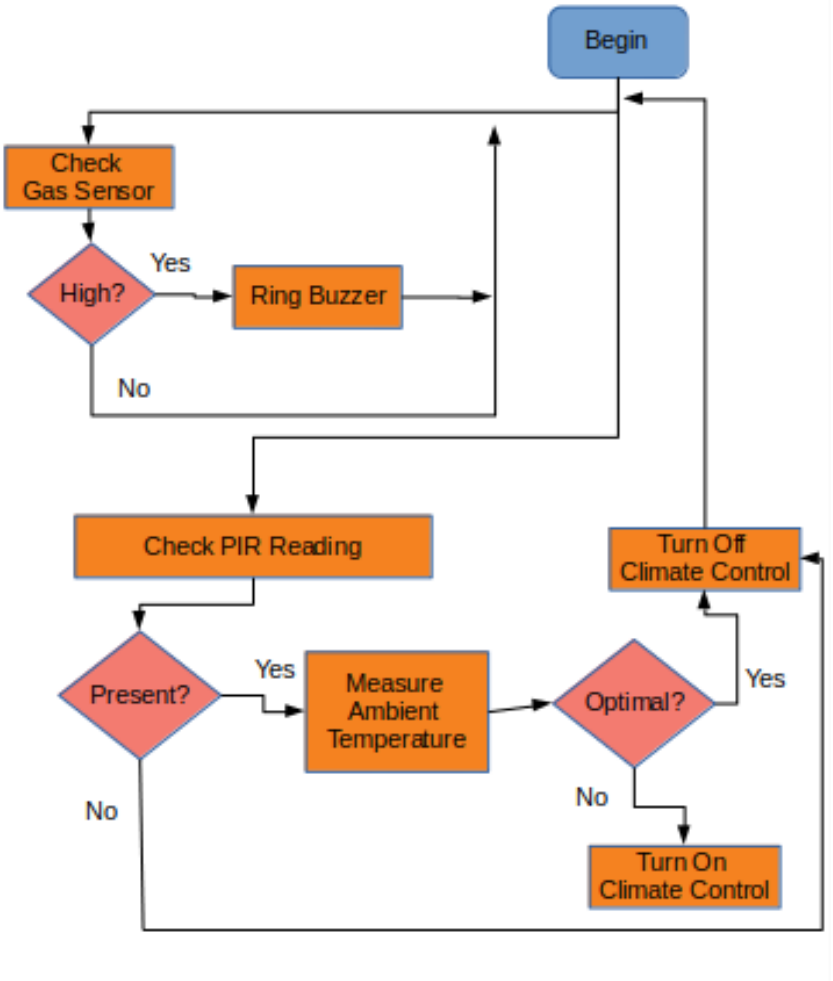
REQUIREMENT SPECIFICATION

1. Should be able to Retrofit the equipment in ordinary homes.
2. Automatic Sensing of people in the room
3. Automatic Temperature Sensing

USE CASE DIAGRAM

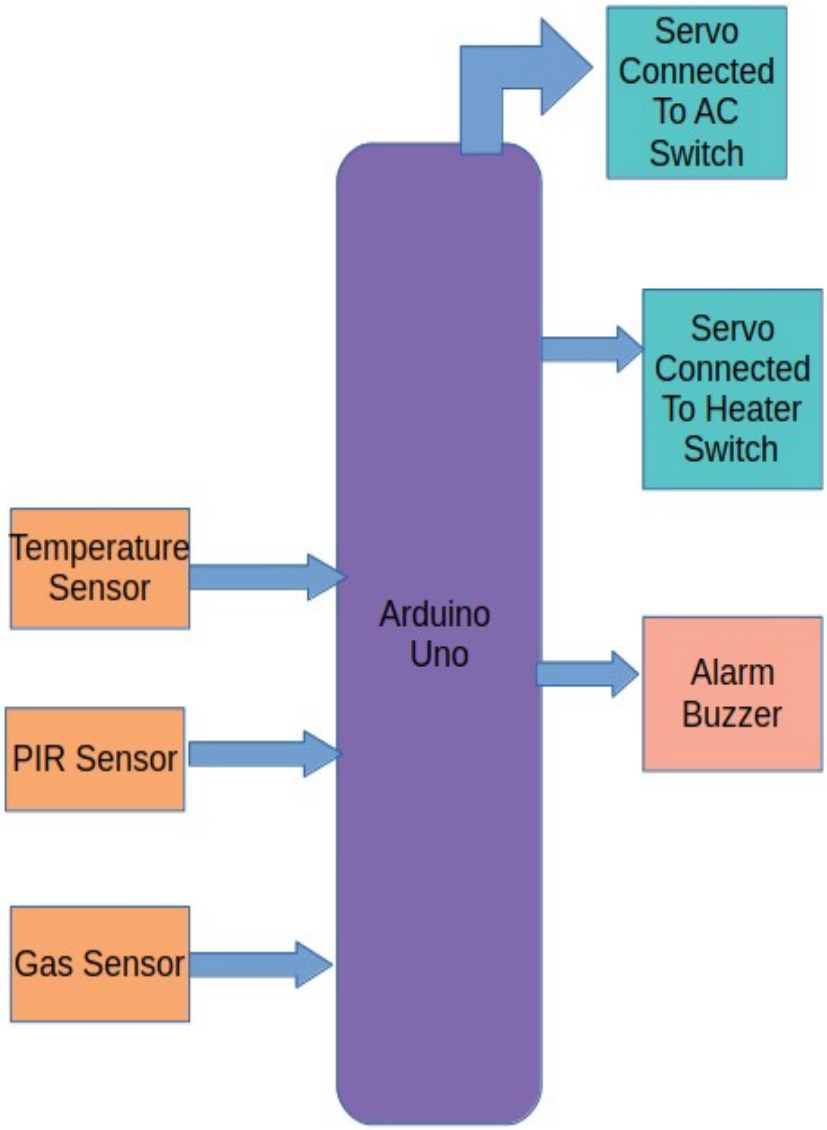


ACTIVITY DIAGRAM

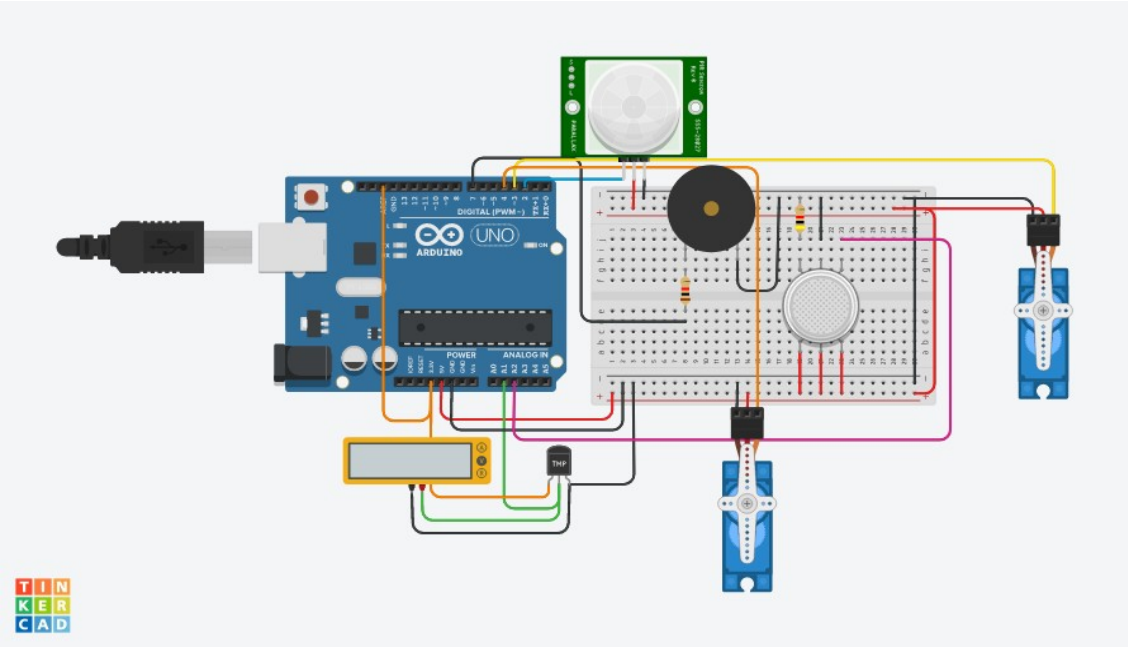


SYSTEM DESIGN:

ARCHITECTURE DIAGRAM



IMPLEMENTATION AND SCREENSHOTS:



CODE

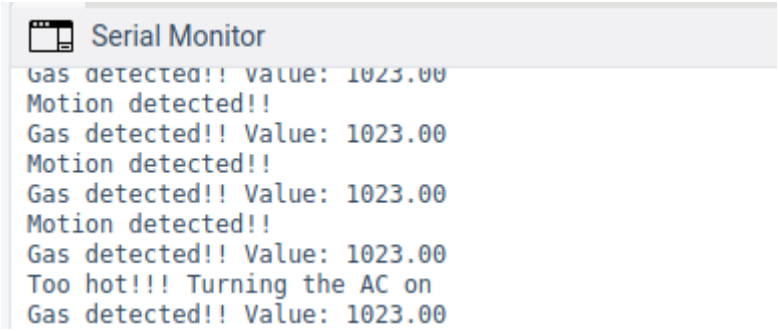
```
#include <Servo.h>
#define REF_VOLTAGE 3.3

Servo acSwitch;
Servo heaterSwitch;

int tempPin = 1;
int tempReading = 0;
int pirPIN = 2;
int detected = 0;
float gasReading = 0;
int gasPin = 2;
int buzzer = 7;
int ACPin = 3;
int HeaterPin = 4;

void setup()
{
  Serial.begin(9600);
  pinMode(2, INPUT);
  pinMode(7, OUTPUT);
  analogReference(EXTERNAL);
  acSwitch.attach(ACPin);
  heaterSwitch.attach(HeaterPin);
}
void loop()
{
  tempReading = analogRead(tempPin);

  //Calculate the Temperature in Celcius, based on reference voltage,
  float volts = (tempReading * REF_VOLTAGE ) / 1024.0;

  float celcius = (volts - 0.5) * 100 ;

  detected = digitalRead(pirPIN);
  if(detected==HIGH){
        Serial.println("Motion detected!!");
        if(celcius > 30)
        {
          Serial.println("Too hot!!! Turning the AC on");
          acSwitch.write(90); //Set motor angle 90 degrees
          heaterSwitch.write(0); //Set motor angle 0 degrees
          delay(2000);
        }
        else if(celcius < 20)
        {
          Serial.println("Too cold!!! Turning the Heater on");
          acSwitch.write(0); //Set motor angle 0 degrees
          heaterSwitch.write(90);  //Set motor angle 90 degrees
          delay(2000);
        }
```

```
        else
        {   acSwitch.write(0);  //Set motor angle 0 degrees
            heaterSwitch.write(0); //Set motor angle 0 degrees
        }
  }
  else{
        acSwitch.write(0); //Set motor angle 0 degrees
        heaterSwitch.write(0); //Set motor angle 0 degrees
  }

  gasReading = analogRead(gasPin);

  if(gasReading >= 512){
        Serial.print("Gas detected!! Value: ");
        Serial.println(gasReading);
        tone(buzzer, 220);

  }
  else {
          noTone(buzzer);
  }
}
```

TinkerCAD Link:

https://www.tinkercad.com/things/2t7vaVOkALE-climate-control

OUTPUT



CONCLUSION

The Home Automation project has been carried out. The Circuit is able to automatically detect whether to turn Climate Control On or Off using Servos. The Circuit is also able to detect fire/smoke events and ring buzzer.

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