CSE 360

Project

Group 5

Section 07

Members:

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Project Name: Smart Room

Part 1: Door Lock

Briefing:

We'll add a keypad-based keyless door lock system to our home automation system. We'll be using 4x4 keypad to enter a unique password known by the owner of the house and a DC lock to open and close the door. As display well be using a 16x2 LCD.

Application area:

1. Added security to the house
2. No more fear of losing keys

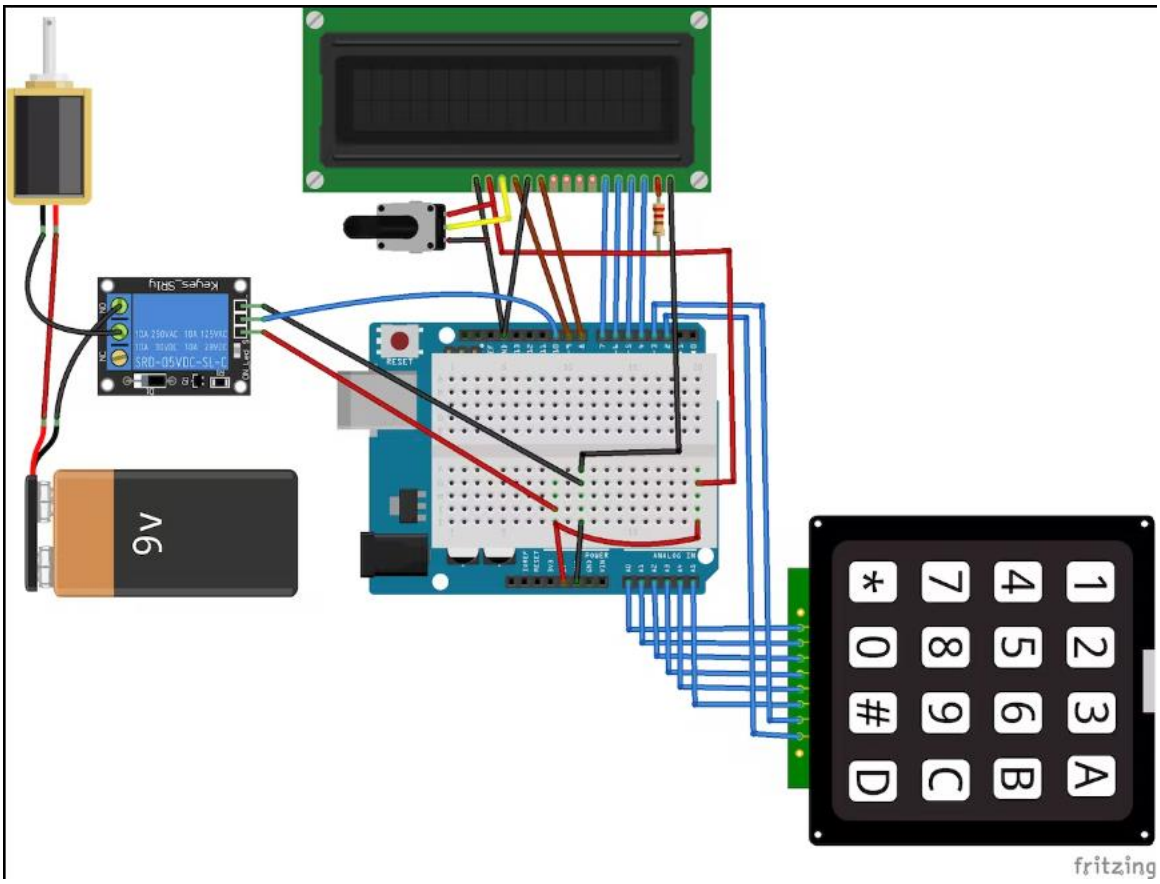
Tech and Tool:

First of components,

1. Arduino
2. 4X4 keypad
3. LCD
4. DC Lock
5. Relay
6. 9V battery
7. 10k potentiometer
8. 220-ohm resistor

As for software well be using Arduino IDE. We'll be using C language.

Circuit Diagram:



Data Flow:

First, connect the 4X4 keypad to the Arduino; connect the first six pins on the 4X4 keypad with the A0 and A5 pins on the Arduino. Then connect the last two pins on the 4X4 keypad module to digital pins 3 and 2 on the Arduino. After that, connect the LCD to the Arduino. The connections for connecting the LCD with the Arduino are as follows

1. Connect pin 1 on the LCD, which is the VSS pin, to GND on the Arduino
2. Connect pin 2, which is the VDD pin, to the 5V pin on the Arduino
3. Connect pin 3, which is the V0, to the middle of the 10k potentiometer and connect the other two pins on the potentiometer to 5V and GND on the Arduino. This pin is for setting the LCD's contrast.
4. Connect pin 4, which is the RS pin, to pin 7 on the Arduino
5. Connect pin 5, which is the R/W pin, to the GND pin on the Arduino
6. Connect pin 6, which is the Enable pin, to pin 6 on the Arduino
7. Connect pins 11, 12, 13, and 14 which are the data pins, to the pins 5, 4, 3, and 2 on the Arduino
8. Connect pin 15, which is the LCD's backlight pin, to 5V on the Arduino through the 220-ohm resistor

9. Connect pin 16 on the Arduino, which is the negative pin of the backlight, to GND on the Arduino

Last, we will connect the DC lock with the Arduino. The Lock operates on a voltage from 7 to 12V, so we cannot directly connect it to the Arduino. To connect it to the Arduino, we will require a relay and a battery. Connect the signal pin of the relay to pin 10 on the Arduino and the lock's VCC and GND to 5V and GND on the Arduino. Then on the other end of the relay, connect the negative of the battery to the common on the relay and the NO (Normally open) on the relay to one side of the lock. Then connect the other side of the lock to the positive terminal on the battery.

Estimated cost: onek taka lagbe.

Part 2: Automatic Room Lights

Introduction

This project is based Arduino & ultrasonic sensor. Amazing thing of this project is it will automatically On/Off the room lights depending on presence of human in the room.

Application

We can implement this project in our garages, staircase, bathrooms, etc. where we generally forget to turn off the lights. Also, it will save electricity, lights automatically turn on only if there is anyone in the room.

This circuit can be used to count the number of persons entering a hall/mall/home/office in the entrance gate and it can count the number of persons leaving the hall by decrementing the count at same gate or exit gate and it depends upon sensor placement in mall/hall. It can also be used at gates of parking areas and other public places.

Components

1.Solderless Breadboard

2. Arduino Uno

3. ultrasonic sensor hc-sr04 x 2

4. 16×2 LCD Display

5. 100R Resistor

6. 4.7k Resistor

7. 1k Resistor

8. 1-Channel 5v Relay Module,

9. Male to Male Jumper Wire

10. Male to Female Jumper Wires

11. Bulb Holder

12. 220v LED Bulb

13. 5v 2Amp Power Adapter

Software:

1. Arduino IDE
2. Tinkercad

Packages :

1. LiquidCrystal

Languages:

1. C/C++

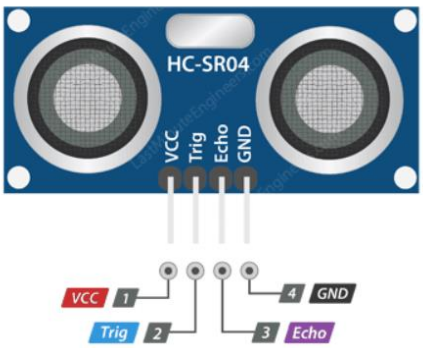
Working mechanism of used sensors:

HC-SR04: An HC-SR04 ultrasonic distance sensor actually consists of two ultrasonic transducers. ne acts as a transmitter that converts the electrical signal into 40 KHz ultrasonic sound pulses. The other acts as a receiver and listens for the transmitted pulses.When the receiver receives these pulses, it produces an output pulse whose width is proportional to the distance of the object in front.This sensor provides excellent non-contact range detection between 2 cm to 400 cm (~13 feet) with an accuracy of 3 mm.

Suppose we have an object in front of the sensor at an unknown distance and we receive a pulse of 500µs width on the echo pin. Now let's calculate how far the object is from the sensor. For this we will use the below equation.

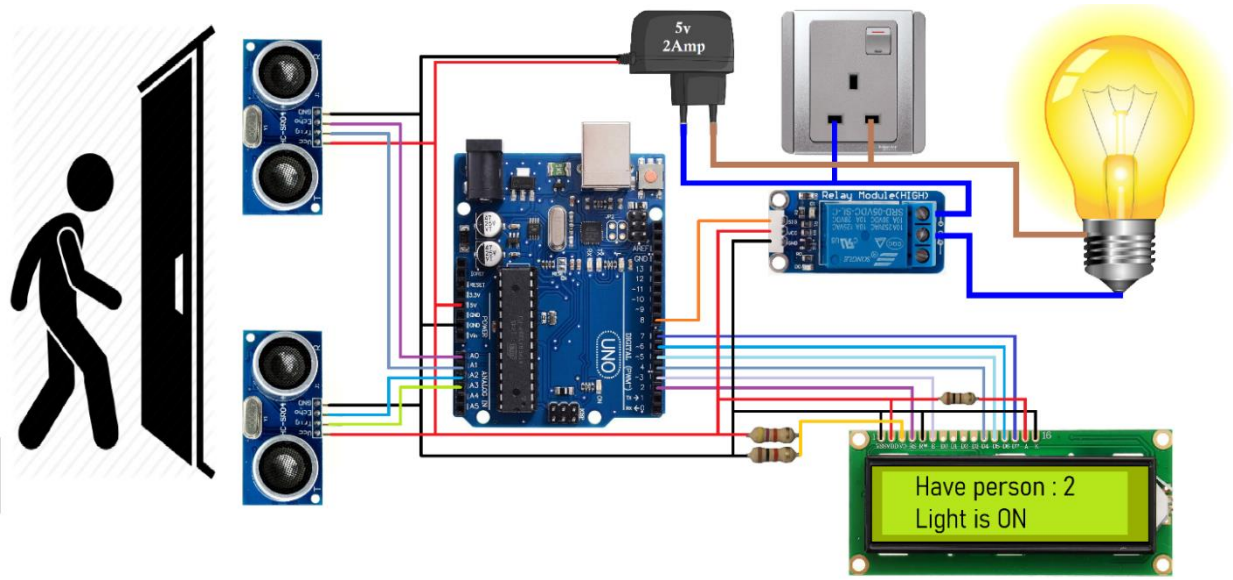
Distance = Speed x Time

Here we have the value of time i.e. 500 µs and we know the speed. Of course it's the speed of sound! It is 340 m/s. To calculate the distance we need to convert the speed of sound into cm/µs. It is 0.034 cm/µs. With that information we can now calculate the distance!



HC-SR04 Ultrasonic Sensor Pinout

Connection with ICS



Estimated cost:

Component	Price(BDT)
Standard LCD 16x2 Display	250
Ultrasonic sensor	95
Resistors	120
1 channel 5v Relay module	215
LED BULB	150
LED holder	50
Total	880 BDT

Part 3: IR Remote Controlled Home Automation

Introduction:

Most remote controls around us, use IR for signal transmission. An IR remote control for home appliances helps us connect to our devices at ease and operate them from the comfort of your bed or your chair. Here we try to build an IR remote control for home appliances that can be used in our home.

Application

This system resolves the problem by combining house hold appliances to control unit which will be operated by a MP3 IR remote. For example: lighting in the house may now be adjusted automatically to meet the demands of the individual. Moreover we can control almost all electronic devices in our home like using IR remote. Like TV, fan,AC etc

Components:

Solderless Breadboard, Arduino Nano, IR Receiver, MP3 Player IR Remote, 4-Channel 5v Relay Module, Male to Female jumper Wires, Bulb Holder x 2, 220v LED Bulb X 2, AC Fan 220v, 5v 2Amp Power Adapter.

Software:

1. Arduino IDE
2. TInkercad

Packages:

1. IRRemote by Arminjo
2. LiquidCrystal
3. EEPROM

Languages:

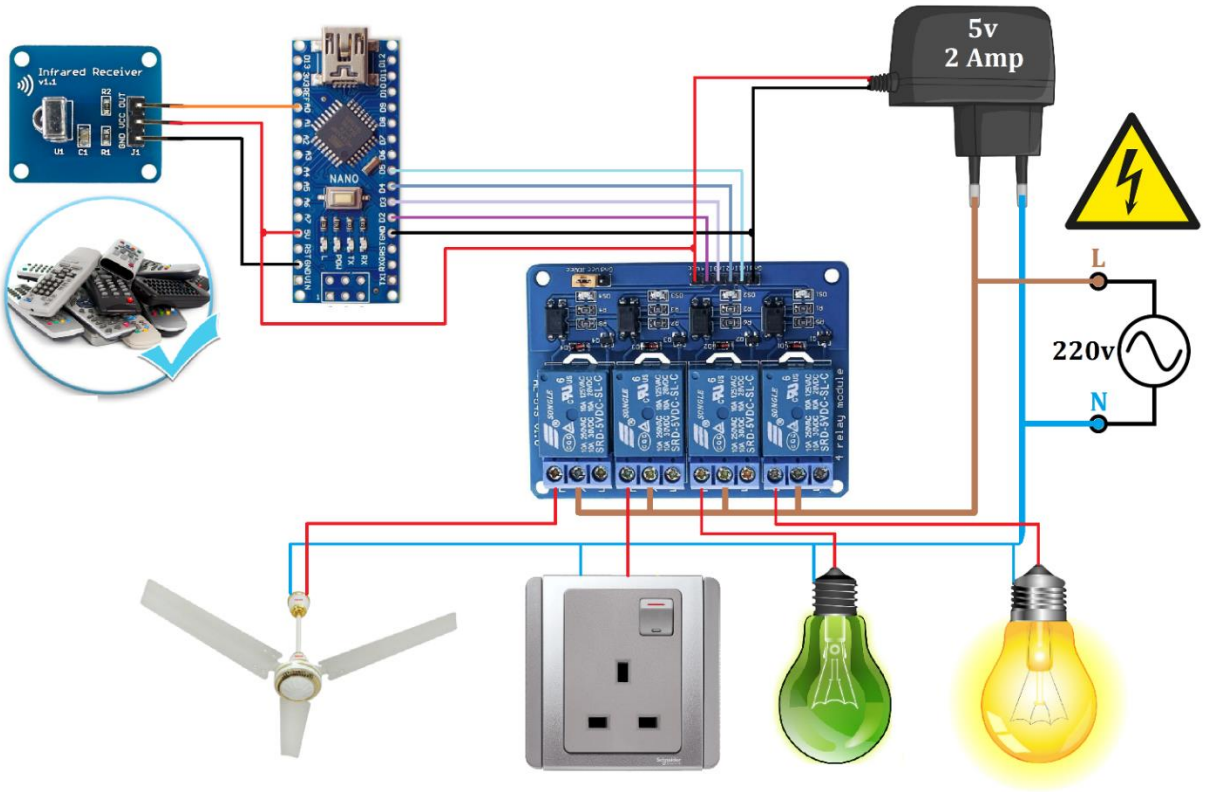
1. C/C++

Working mechanism IR remote:

Working of this project is easily understandable. When we press any button of IR Remote then remote sends a code in form of train of encoded pulses using 38Khz modulating frequency. These pulses are received by TSOP1738 sensor and read by Arduino and then Arduino decodes received train of pulse into a hex value and compares that decoded value with the predefined hex value of the pressed button. If any match occurs then Arduino perform relative operation and the corresponding result is also displayed on 16x2 LCD by using appropriate commands. Here in this project we have used 3 bulbs of different colors, for demonstration which indicates Fan, Light and TV.

There are many types of IR Remote are available for different device but most of them are worked on around 38KHz Frequency signal. Here in this project we control home appliances using IR TV remote. For detecting IR remote signal, we use TSOP1738 IR Receiver. This TSOP1738 sensor can sense 38Khz Frequency signal.

Circuit Diagram:



Estimated Cost:

Component	**Quantity**	**Price in BDT**
Arduino Nano	1	900
Breadboard	1	150
HX1838 NEC Code Infrared Remote Control Module DIY Kit	1	400
4 Channel 5V Relay Board Module	1	290
5V 2A AC to DC Adapter Power Supply adapter	1	250
AC FAN	1	150
Male to female wire	50	100
Total		2240 BDT

Part 4: Humidifier

Introduction: It is used to automatically adjust humidity of certain area through the help of Arduino, USB Humidifier and BME280 Sensor.

Application Area:

Humidifier will be used to check and maintain humidity in a certain room. It can be used personally, for simply, increasing comfort, to avoid contracting allergy, respiratory problems Also it can be used in Hospitals where you have to improve patients' situation in certain huminites, where we have to store medicines in certain temperature and humidity. For production purposes, it can be widely used in mushroom production. To cultivate mushroom, humidifier are required to maintain humidity level of 95%rH.

Technology and Tools:

Components:

1. Arduino Nano (1000 Tk)
2. BME280 Humidity Sensor. (700 Tk)
3. Breadboard (100 Tk)
4. Power Supply (200 TK)
5. Ultrasonic Humidifier. (300-400 TK)
6. 5V Relay (300 TK)
7. USB Female. (100 tk)
8. 7805 voltage regulators. (20tk)
9. OLED (650 TK).
10. Cooling Fan (150 TK)
11. BC547 NPN Transistor (20TK).
12. Capacitors (50-100tk).

Software:

1. Arduino IDE
2. Tinker Cad
3. Fritzing

Packages:

1. Adafruit BME280
2. Adafruit Unified Sensor
3. Adafruit SH1106

Languages:

1. C/C++

Working Mechanism of Used Sensors:

BME280: An integrated environmental sensor with minimal battery consumption, the BME280 Humidity Sensor was created primarily for mobile applications. The device combines individual pressure, humidity, and temperature sensors with outstanding linearity and precision into an 8-pin metal-lid LGA box. Low current consumption (3.6A at 1Hz), long-term stability, and strong EMC robustness are all features of the BME280 Humidity Sensor's design.

The humidity sensor has good accuracy across a broad temperature range and a quick response time that fulfills performance requirements for applications like context awareness. Absolute barometric pressure sensor with high accuracy and resolution at low noise is the humidity/pressure sensor. It can be used to determine the ambient temperature in addition to temperature correction for the pressure and humidity sensors.

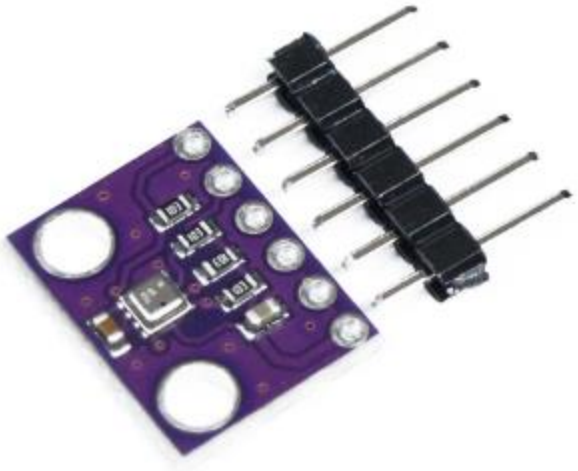
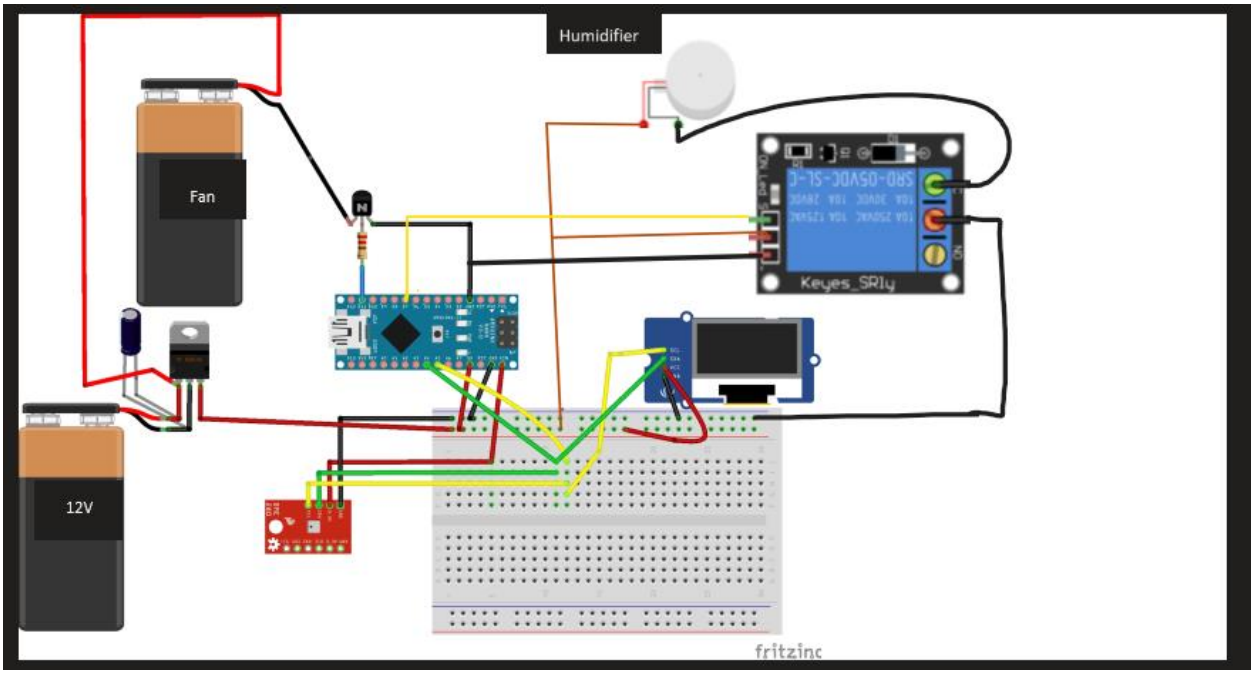
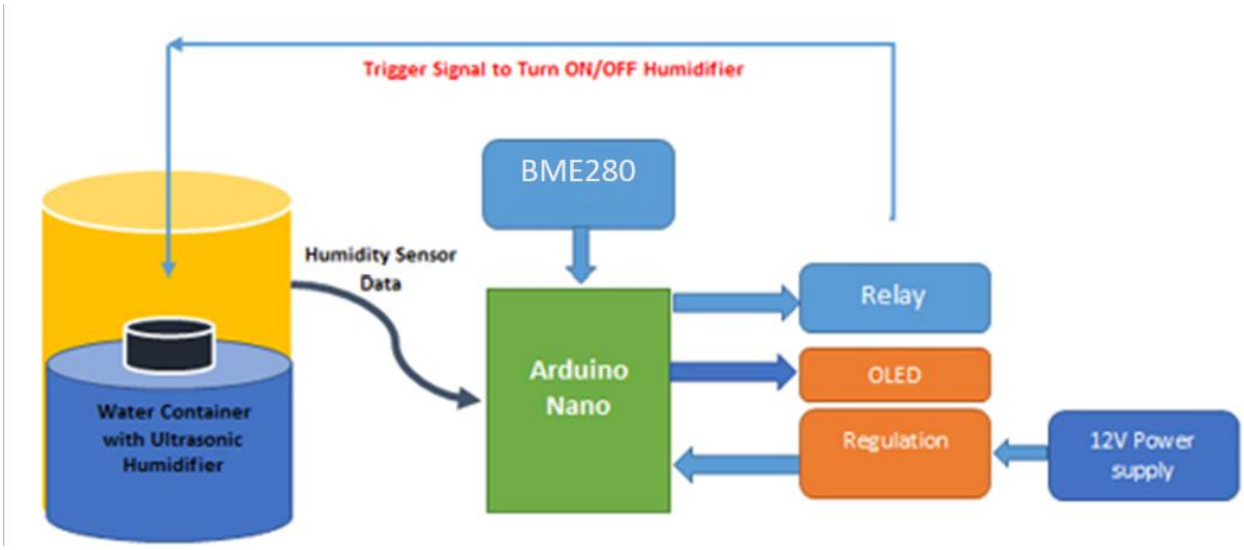


Diagram:



Data Flow:



Estimated Cost:

Humidifier Cost : 4000

Responsibilities of Each Member:

Project title : Home Automation

TASK	Name
Keyless Door lock system with keypad and LCD	Sajid Mahmud
Automatic Room Lights with ultrasonic sensor	Rakib Hasan Rahad
IR Remote controlled home automation	Rakib Hasan Rahad
Automatic Humidifier	Monthasir Delwar Afnan

Grant Chart:

Tasks	WEEK 1	WEEK 2	WEEK 3	WEEK 4
Research				
Planning				
Designing Circuit				
Collecting equipment				
Implementation and coding				
Bug fix and tests				