AMERICAN INTERNATIONAL UNIVERSITY–BANGLADESH (AIUB)

FACULTY OF ELECTRICAL AND ELECTRONIC ENGINEERING

EEE 4103: Microprocessor and Embedded Systems Laboratory

Fall 2023-2024

Section: L, Group:

LAB REPORT OEL:
Implementation of automated door using Arduino UNO.

Supervised By

PROTIK PARVEZ SHEIKH

Group members:

Name	ID	Department
HOSSAIN, SAKIB	21-45388-3	CSE
JOY, BADHON NATH	21-45390-3	CSE
NAWAR, MARIA	21-45394-3	CSE
TASNIM, JANNAT ARA	21-45667-3	CSE
PRITY, SUBRINA ISLAM	21-45813-3	CSE

Date of Performance: 09/12/23

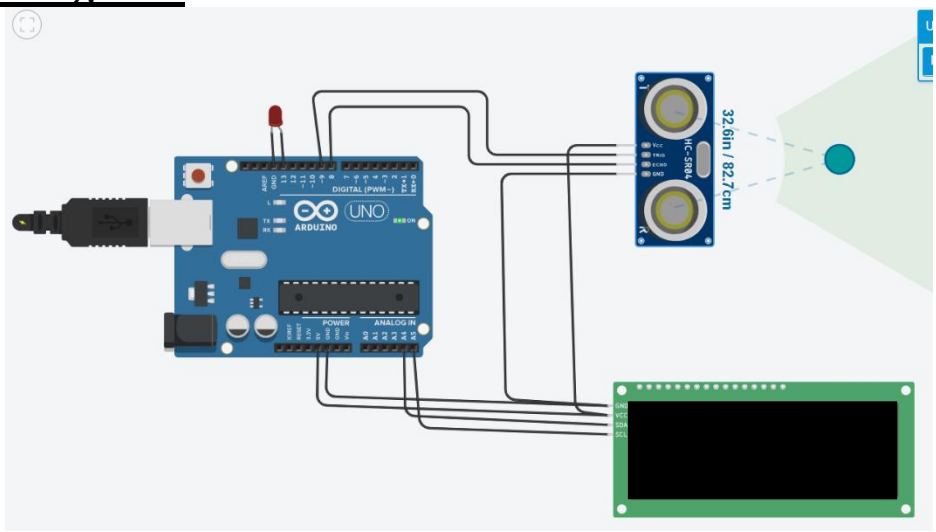
Title: Implementation of automated door using Arduino UNO.

Introduction: The implementation of an automated door using Arduino UNO integrates a sonar sensor (HCSR04) to measure distance. When the distance is within a predefined range, the system activates an LED, simulating a door opening mechanism. This project showcases the application of Arduino in creating a simple yet effective automated entry system.

Apparatus:

- Arduino IDE (2.0.1 or any recent version)
- Arduino UNO (R3) board
- Sonar Sensor (HCSR04)
- Breadboard
- LEDs
- Jumper Wires.
- OLED display.

Circuit Diagram:



Code:

```
#include <SPI.h>
#include <Wire.h>
#include <Adafruit_GFX.h>
#include <Adafruit_SSD1306.h>

#define trigPin 9
#define echoPin 8
#define LED_PIN 13

#define OLED_RESET 4
Adafruit_SSD1306 display(OLED_RESET);

void setup() {
Serial.begin (9600);
pinMode(trigPin, OUTPUT);
pinMode(echoPin, INPUT);
```

```
display.begin(SSD1306_SWITCHCAPVCC, 0x3C); //initialize with the I2C addr 0x3C (128x64)
display.clearDisplay();
pinMode(LED_PIN, OUTPUT);
}
void loop() {
float duration;
float distance_cm;
float distance_in;

digitalWrite(trigPin, LOW);
delayMicroseconds(2);
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);

duration = pulseIn(echoPin, HIGH);

distance_cm = (duration/2) / 29.1;
distance_in = (duration/2) / 73.914;

display.setCursor(25,0); //oled display
display.setTextSize(1);
display.setTextColor(WHITE);
display.println("Distance Meter");

display.setCursor(10,20); //oled display
display.setTextSize(2);
display.setTextColor(WHITE);
display.println(distance_cm);
display.setCursor(90,20);
display.setTextSize(2);
display.println("cm");

display.setCursor(10,45); //oled display
display.setTextSize(2);
display.setTextColor(WHITE);
display.println(distance_in);
display.setCursor(90,45);
display.setTextSize(2);
display.println("in");
display.display();
delay(500);
display.clearDisplay();

Serial.println(distance_cm);
Serial.println(distance_in);

 if (distance_cm <= 10)
 {
   digitalWrite(LED_PIN, HIGH);
 }
 else
 {
   digitalWrite(LED_PIN, LOW);
 }
}
```

Simulation:

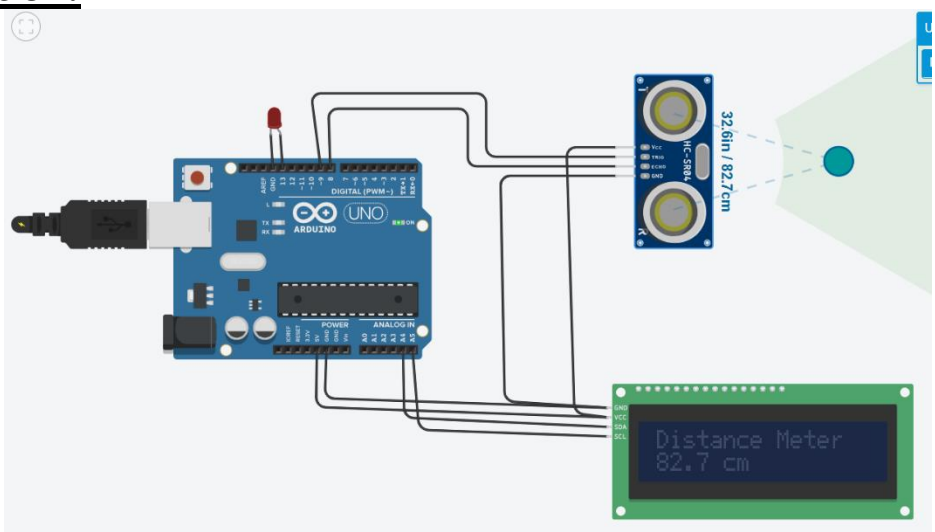


Fig: The LED turns off at a distance greater than 10 cm.

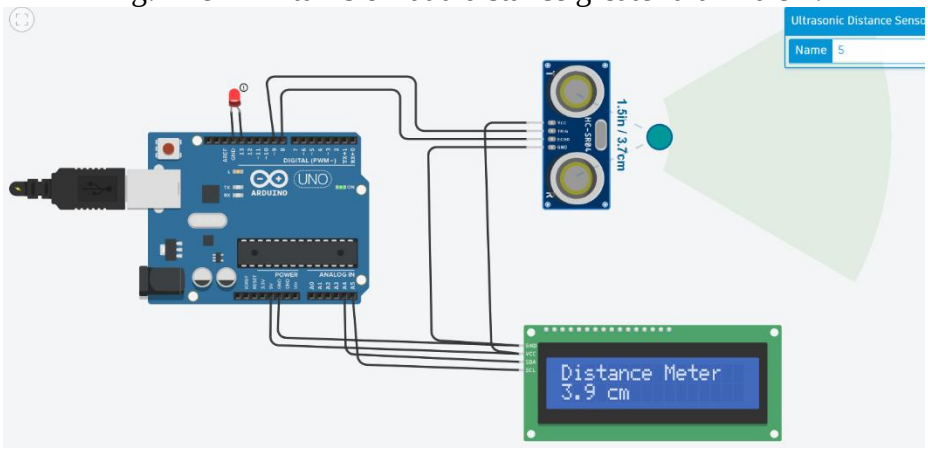


Fig: The LED turns on at a distance less than equal 10 cm.

Hardware Result:

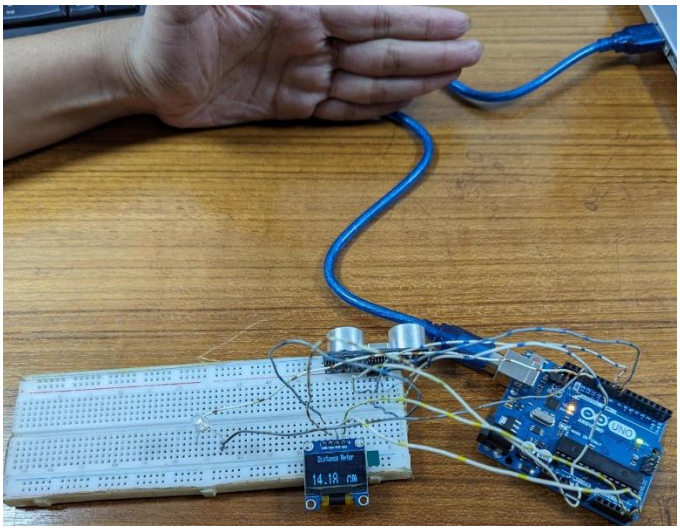


Fig: The LED turns off at a distance greater than 10 cm.

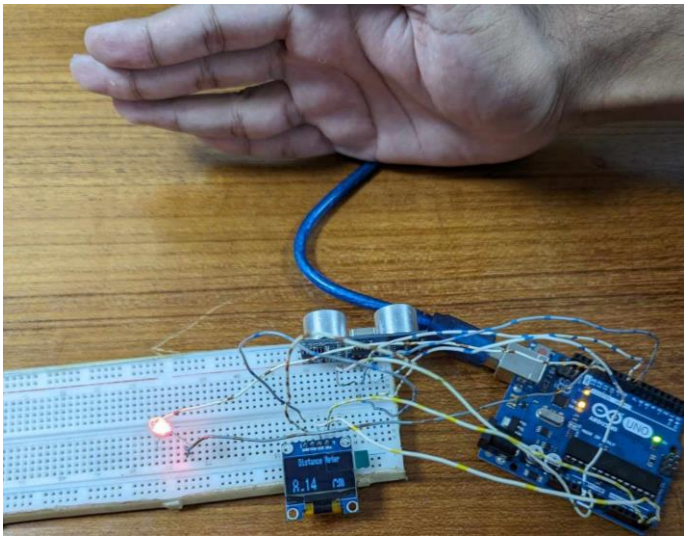


Fig: The LED turns on at a distance less than equal 10 cm.

Discussion & Conclusion:

The automated door implementation using Arduino UNO and a sonar sensor proves to be a practical and versatile project. The system accurately measures distances and triggers an LED when someone is within a specified range. This project demonstrates the potential for Arduino-based solutions in creating efficient and cost-effective automated systems for various applications, including security and convenience. Further enhancements could involve integrating additional sensors or expanding the automation capabilities for broader functionality.

Reference(s):

[1] Arduino IDE, https://www.arduino.cc/en/Main/Software accessed on May 3, 2019.
[2] Arduino and Proteus Library, https://etechnophiles.com/add-simulate-ultrasonic-sensorproteus-2018-edition/ accessed on May 3, 2019.
[3] Ultrasonic Distance Sensor in Arduino With TinkerCad https://www.instructables.com/id/Ultrasonic-Distance-Sensor-Arduino-Tinkercad/ accessed on May 3, 2019.