



AHSANULLAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

Department of Computer Science and Engineering

CSE 3216

Micro-controller Based System Design

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Sanitizer Dispenser

Submitted To

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1 Objective

Hand liquid soap is formulated to wash and clean hands. Hand sanitizer is a liquid, gel or foam generally used to decrease viruses/bacteria/microorganisms on the hands. An automatic dispenser is a device that dispenses a controlled amount of soap solution or a similar liquid such as a hand sanitizer. There is no hassle of pressing a button or a handle. These dispensers have ultrasonic sensors that release the sanitizer once you keep your hands below the nozzle. It's fast, safe, and simply more efficient.

2 Social Values

Our world has changed so much in 2020. The coronavirus has taught us many different things. It feels like yesterday when we were at the office shaking hands, talking freely, and roaming around at will. And now, we are locked down in our homes, keeping a safe distance from others and using hand sanitizers and soaps after every few minutes. To avoid contact, many people are opting for touch-less automatic dispensers as they are believed to offer an extra layer of protection. An automatic dispenser is an excellent alternative to the traditional ones as it requires zero to no contact

3 Required Components

These following parts and tools are required for building this project.

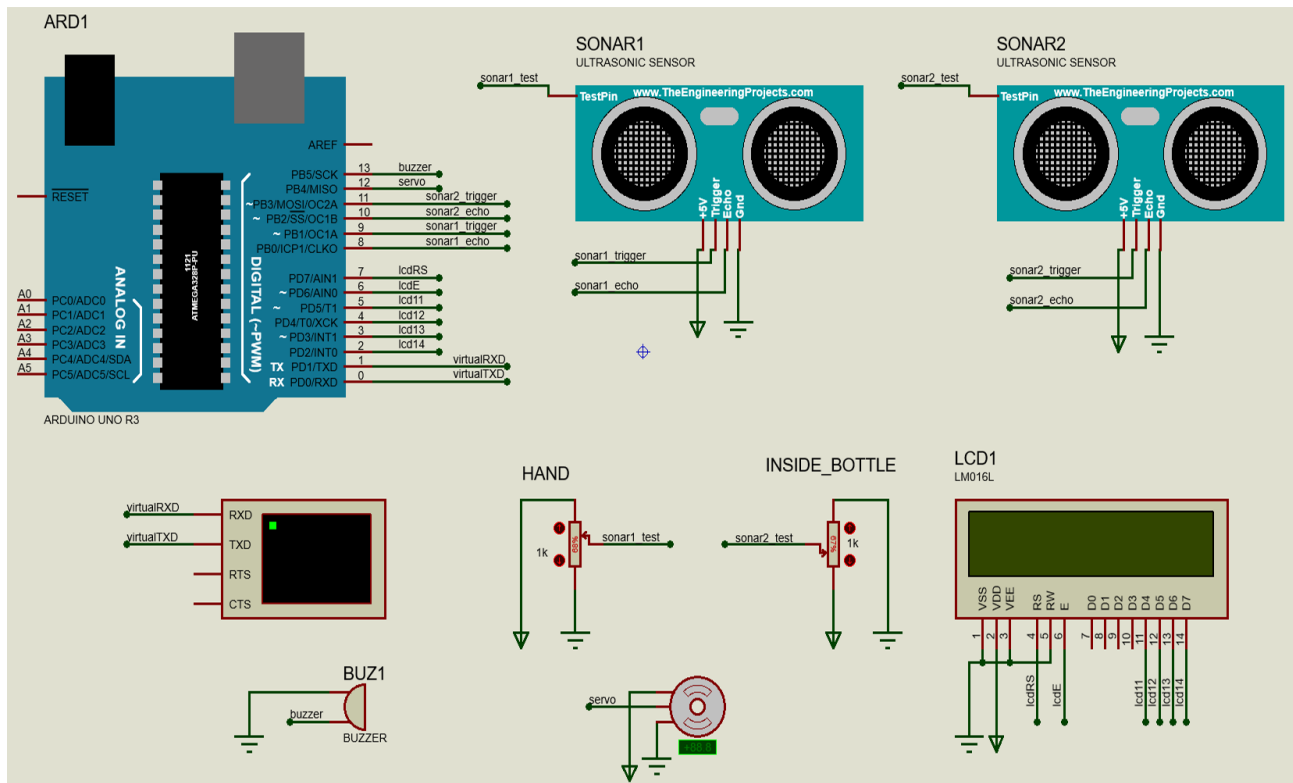
- Arduino Uno R3
- Ultrasonic Sensor HC-SR04
- Jumper Cables
- Servo Motor
- Breadboard
- Buzzer
- 16 x 2 LCD
- 9V Battery

4 Budget

Equipment	Quantity	Budget
Arduino Uno R3	1	450
Ultrasonic Sensor HC-SR04	2	160
Jumper Wire	As required	100
Servo Motor	1	400
Breadboard	1	60
Buzzer	1	20
16*2 LCD	1	160
9V Battery	1	400
Others (Container, Tape, Thread)	As required	100
	Total	1850

5 Design

Here is our project design:



6 Working Procedure

The working procedure of this system is very easy where the basic components that react to the input are:

- Servo Motor
- Buzzer
- 16 x 2 LCD

The components that take stimuli from the environment is:

- Ultrasonic Sensor

An Ultrasonic Sensor will be used to measure the height of soap/sanitizer and it will give feedback to a LCD what percentage is left on the container. User must put his hands under an Ultrasonic Sensor which will make a Servo Motor to rotate and create a downward pressure. Then it will dispense the soap/sanitizer. If the user puts his hand under the sensor and soap/sanitizer is out, then a buzzer will make sound.

7 Code

```
#include <LiquidCrystal.h>;
#include <Servo.h>
long duration;
int distance_us1;
int distance_us2;
const int minHandDistance=12;
const int unitDividor=10;
const int rs = 7, en = 6, d4 = 5, d5 = 4, d6 = 3, d7 = 2;
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
const int us1_triggerPin = 9;
const int us1_echoPin = 8;
const int us2_triggerPin=11;
const int us2_echoPin=10;
const int servoPin = 12;
const int buzzerPin = 13;
Servo Myservo;

void setup(){
    Serial.begin(9600);
    lcd.begin (16,2);
    pinMode(us1_triggerPin, OUTPUT);
    pinMode(us1_echoPin, INPUT);
    pinMode (us2_triggerPin, OUTPUT);
    pinMode (us2_echoPin, INPUT);
    Myservo.attach(servoPin);
}

void loop(){
    digitalWrite(us2_triggerPin,LOW);
    delayMicroseconds(2);
    digitalWrite(us2_triggerPin,HIGH);
    delayMicroseconds(10);
    digitalWrite(us2_triggerPin,LOW);
    duration = pulseIn(us2_echoPin, HIGH);
    distance_us2= duration*0.0340/2;
    distance_us2 = distance_us2/unitDividor;
    Serial.print("Liquid: ");
    Serial.print(distance_us2);
    Serial.print("Cm");
    Serial.println();
    delay(100);
    if(distance_us2 <=99 ){
        lcd.clear();
        lcd.setCursor(0,0);
        lcd.print("Liquid:");
        lcd.print(100 - distance_us2);
        lcd.print("%");
    }
    else{
        lcd.clear();
        lcd.setCursor(0,0);
        lcd.print("BOTTLE EMPTY");
        delay(300);
        lcd.setCursor(0,1);
        lcd.print("PLEASE REFILL");
    }
}
```

```
pinMode(us1_triggerPin, OUTPUT);
digitalWrite(us1_triggerPin, LOW);
delayMicroseconds(2);
digitalWrite(us1_triggerPin, HIGH);
delayMicroseconds(10);
digitalWrite(us1_triggerPin, LOW);
pinMode(us1_echoPin, INPUT);
duration = pulseIn(us1_echoPin, HIGH);
distance_us1 = duration*0.0340/2;
distance_us1 = distance_us1/unitDividor;
Serial.print("Hand: ");
Serial.print(distance_us1);
Serial.print("Cm");
if(distance_us1 < minHandDistance && distance_us2 <=99){
    Myservo.write(180);
}
else if (distance_us1 < minHandDistance && distance_us2 > 99){
    Myservo.write(90);
    tone(buzzerPin, 200);
    delay(500);
    noTone(buzzerPin);
    delay(500);
}
else{
    Myservo.write(90);
}
Serial.println();
delay(100);
}
```

8 Members Contribution

Contribution of every group member is given below:

Member 1: Mainul Sajid

- Looking for right components and setting up the budget
- Designing the circuit on Proteus
- Writing and testing code of Servo Motor

Member 2: Adnan Saki

- Coordinating the project idea
- Designing the circuit on Proteus
- Writing and testing code of LCD displays

Member 3: Julfikar Ibnul Hoque

- Designing the circuit on Proteus
- Writing and testing code of Ultrasonic Sensor
- Fixing Errors in codes and fixing issues with Proteus Library

9 Difficulties

In this current pandemic situation, we weren't able to build our project by meeting in person. So we had implemented the project in Proteus software. The first problem we faced while implementing the project was the crashing of software constantly. It was due to Proteus version 8.9 and Arduino Libraries. We had to fix the problem by researching it on the internet. The second problem we were facing was setting up the correct distance in potentiometer. The distance was changing rapidly while changing the value slightly in the potentiometer. We came up with a solution later and fixed the problem.

10 Future Work

In future we are planning to implement it on hardware. We will use this project in our residence. Then we will take feedback and make any changes if necessary. After that, we will use it commercially.

11 Conclusion

In this current pandemic situation, hand sanitizer is the most important thing to everyone. Hospitals, shopping mall, restaurants can use this device because this very tough for a worker to sanitize each people come to their hospital, mall or restaurants. We hope that our device will be helpful to maintain hygiene. Thus, we are positive that the proposed project will help people widely.