AUTOMATED HAND SANITIZER AND TEMPERATURE CHECKER

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BONAFIDE CERTIFICATE

Certified that this project report entitled "**AUTOMATED HAND SANITIZER AND TEMPERATURE CHECKER"** is a bonafide work of **GOPIKRISHNAN K – 19BEC1121, UTKARSH MAURYA – 19BEC1308, RAHUL ANIL NAIR – 19BEC1431** who carried out the project work under my supervision and guidance for **ECE2008 – ROBOTICS AND AUTOMATION.**

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ABSTRACT

In this current scenario of global outbreak, COVID-19 is transferrable through touch and contact. it is advised by WHO (world health organization) to maintain healthy hand wash and sanitation habits, but the main problem is the way we do it, that is by physical touch to the bottle, which in short doesn't serve our purpose.

In this paper, we propose a novel plan of a touch-less sanitizer machine to diminish the danger due to contact. The system can detect the proximity with the help of ultrasonic sensor and sends signal to Arduino(microcontroller). The controller processes the sensor data & actuates the pump. The sanitizer liquid dispenses through nozzle or spout.

We have designed an automatic hand sanitizer system that is compatible, easy to refill and also it will occupy less space. When one moves one's hand close to the device sensor, the temperature is observed, the hand sanitizer container is pumped once. If the body temperature is above a certain limit, then a buzzer goes off alerting the person and people nearby.

Conclusions: The automatic hand sanitizer device proposed in this paper is ultimately expected to contribute to contactless hand disinfection in public places and virus infection prevention. Additionally, it is economical and eco-friendly by decreasing waste emissions.

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Gopikrishnan K **Utkarsh Maurya** **Rahul Anil Nair**

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CHAPTER 1

INTRODUCTION

1.1 OBJECTIVES

- In this current scenario of global outbreak, it is advised by WHO (world health organization) to maintain Healthy Hand Wash and Sanitation Habits, but the main problem is the way we do it, that is by physical touch to the bottle, which in short doesn't serve our purpose.
- In this corona period, hand sanitizer is no doubt an essential thing because it can kill the COVID - 19 virus. However, use the of normal sanitizer bottle become very danger. This is because when an infected person presses the bottle trigger, the virus may spread from this hand sanitizer bottle to non-infected person.
- So, we can solve this by using **Automated hand sanitizer dispenser and Temperature checker**. Automatic means, no need to trigger with our hand. Just place your hand near the bottle and the sanitizer machine will automatically do its job.
- The current method by which sanitization is done in malls, offices, restaurants is by employing a guard to check the temp and spray the sanitizer manually. This heavily exposes the guard and also leaves room for manual errors.
- This machine will be cost efficient so that it can be used in every household. Its design will be great so it is easy to refill and also it will occupy less space.

1.2 BENEFITS

- Because of their modern appearance, they attract attention which can increase hand hygiene compliance.
- They are very easy to install.
- They are easy to use, particularly for people that struggle to reach over countertops to access the dispenser.
- They deliver a standardized dose of sanitizer.
- They eliminate a common contact point where germs can be transferred.

1.3 FEATURES

- Sensory device called as ultrasonic sensor to sense hands.
- Use of devices such as water pump and relay
- Microcontroller used is Arduino
- The efficient coding in the software tool called as Arduino IDE
- Use of Temperature Sensor to measure the temperature.

CHAPTER 2

AUTOMATED HAND SANITIZER DISPENSER AND TEMPERATURE CHECKER - DESIGN

2.1 BLOCK DIAGRAM

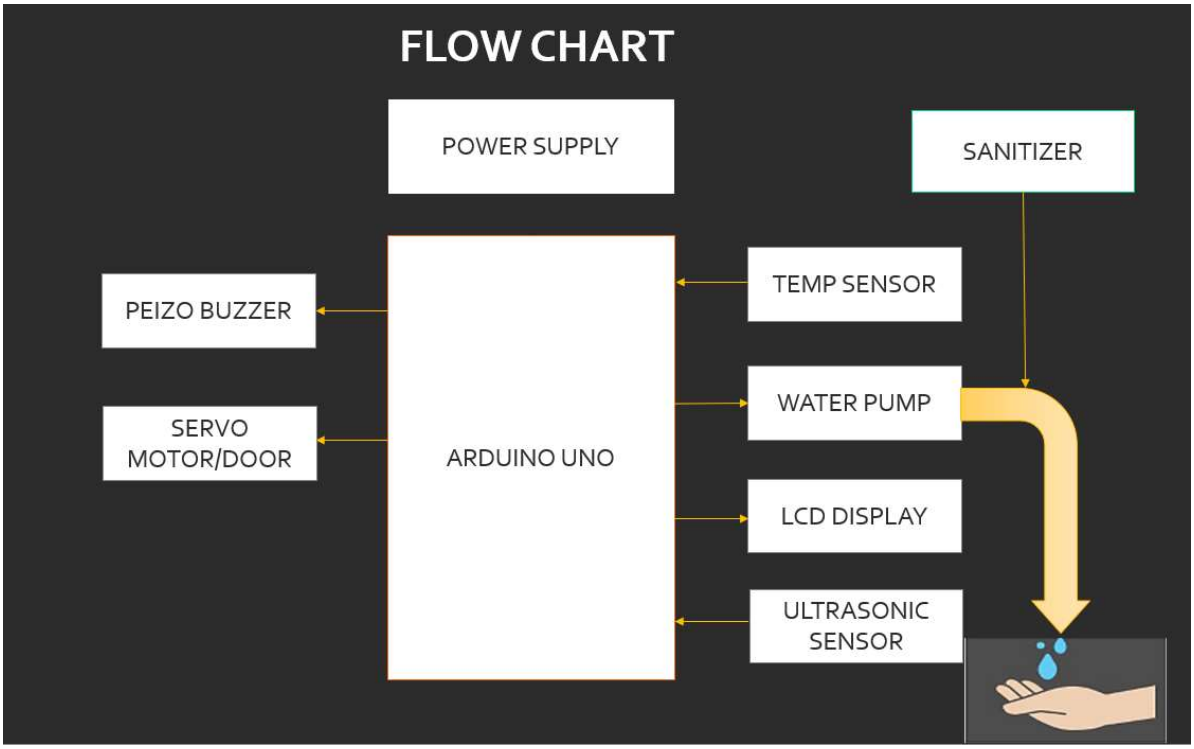


Fig 1: Block Diagram.

2.1.1 DESIGN

- The design encompasses few parameters to be calculated and taken as priority, such as –
- Installation of temperature sensor.
- Installation of LCD to display the sensed temperature.
- Installation of ultrasonic or PIR sensors.
- Installation of Servo motor and Buzzer.
- Synchronizing all the sensors with Arduino UNO R3 microcontroller

2.2 SOFTWARE CIRCUIT

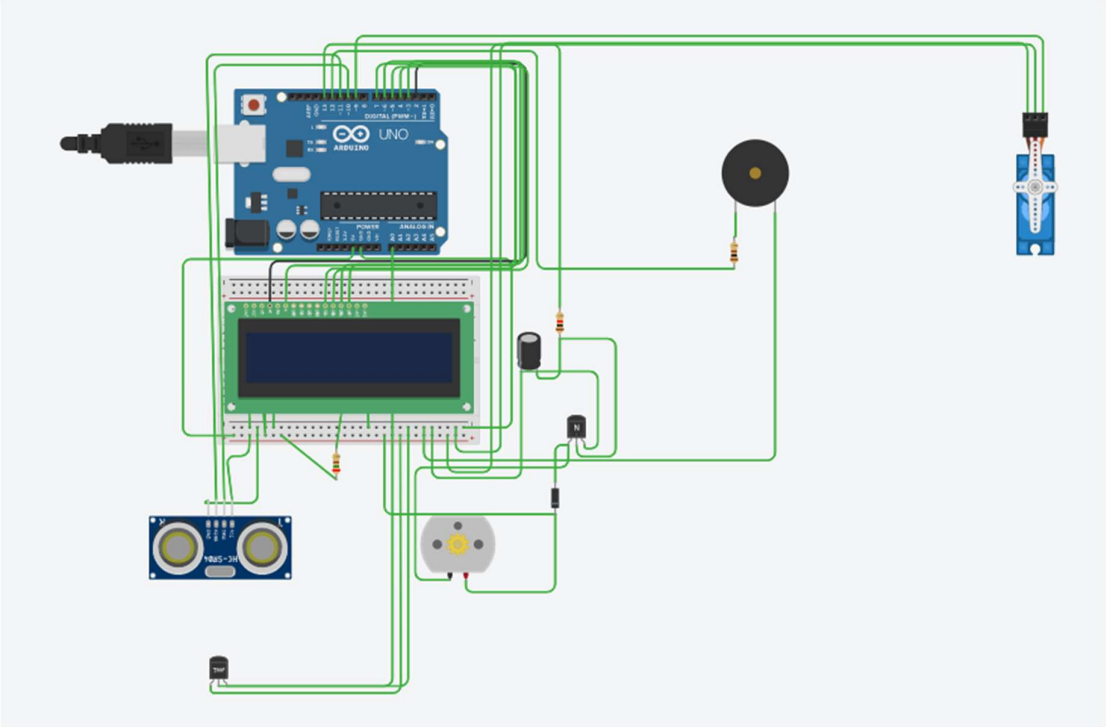


Fig 2: Circuit Diagram

2.3 HARDWARE SPECIFICATIONS

In this project, we will build an **Automatic Sanitizer Machine and Temperature Checker.** An Ultrasonic sensor is used to check the presence of hands below the outlet of the sanitizer machine. It will continuously calculate the distance between the sanitizer outlet and hand and accordingly tells the water pump whenever the distance is below 10 cm to check the temperature and spray the sanitizer of 1 second. The detected temperature is displayed on the LCD screen and if it exceeds 38°C, the buzzer turns on and servo motor is switched on indicating closing of a door.

Components Required

- Ultrasonic Sensor
- Arduino
- Water Pump with driver circuit.
- Hand Sanitizer
- Servo Motor
- Piezo Buzzer
- Temperature Sensor

Ultrasonic Sensor

Fig3: Image of Ultrasonic Sensor

As shown above the **HC-SR04 Ultrasonic (US) sensor** is a 4-pin module, whose pin names are Vcc, Trigger, Echo and Ground respectively. This sensor is a very popular sensor used in many applications where measuring distance or sensing objects are required. The module has two eyes like projects in the front which forms the Ultrasonic transmitter and Receiver. The sensor works with the simple high school formula that

$$\textbf{Distance} = \textbf{Speed} \times \textbf{Time}$$

The Ultrasonic transmitter transmits an ultrasonic wave, this wave travels in air and when it gets objected by any material it gets reflected back toward the sensor this reflected wave is observed by the Ultrasonic receiver module as shown in the picture below

Fig 4: Image showing how the Ultrasonic Sensor works.

Now, to calculate the distance using the above formulae, we should know the Speed and time. Since we are using the Ultrasonic wave, we know the universal speed of US wave at room conditions which is 330m/s. The circuitry inbuilt on the module will calculate the time taken for the US wave to come back and turns on the echo pin high for that same particular amount

of time, this way we can also know the time taken. Now simply calculate the distance using a microcontroller or microprocessor.

Arduino Uno

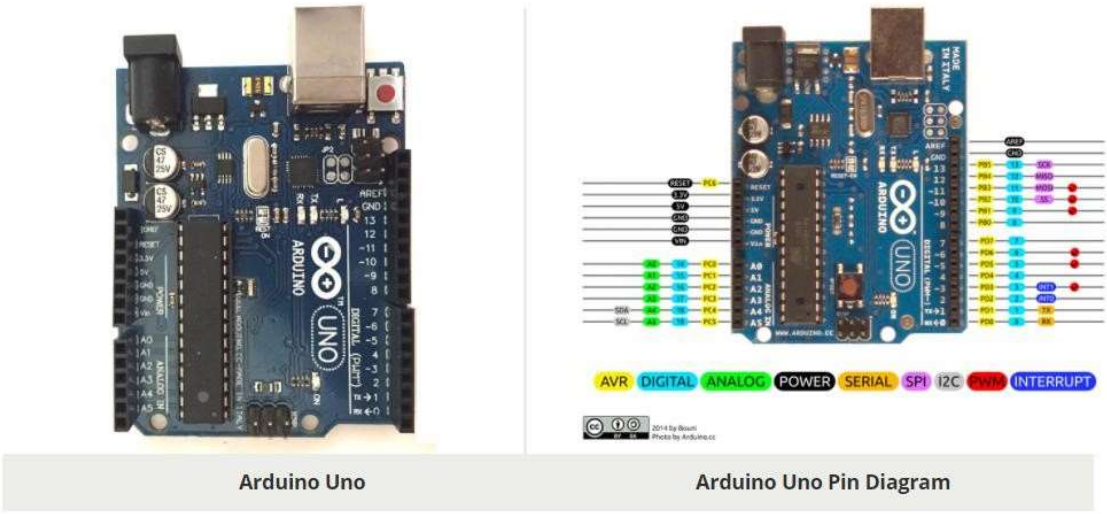


Fig5: Image of Arduino

Arduino Uno is a microcontroller board based on 8-bit ATmega328P microcontroller. Along with ATmega328P, it consists other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the microcontroller. Arduino Uno has 14 digital input/output pins (out of which 6 can be used as PWM outputs), 6 analog input pins, a USB connection, A Power barrel jack, an ICSP header and a reset button.

Arduino IDE (Integrated Development Environment) is required to program the Arduino Uno board.
Arduino can be used to communicate with a computer, another Arduino board or other microcontrollers. The ATmega328P microcontroller provides UART TTL (5V) serial communication which can be done using digital pin 0 (Rx) and digital pin 1 (Tx). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The ATmega16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. There are two RX and TX LEDs on the Arduino board which will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (not for serial communication on pins 0 and 1). A Software Serial library allows for serial communication on any of the Uno's digital pins. The ATmega328P also supports I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus.

Water pump

The working principle of a water pump mainly depends upon the positive displacement principle as well as kinetic energy to push the water. These pumps use AC power otherwise DC power for energizing the motor of the water pump whereas others can be energized other kinds of drivers like gasoline engines otherwise diesel.
The water pump is a portable device and can be applied in several household applications. These pumps are used for pumping the huge amount of water from one place to another. The main purpose of a water pump is versatile. A quality pump which can be selected carefully may be perfect for draining water from a low flooded region, refilling the swimming pool, and bathtub, circulating pesticides otherwise fertilizers.
A polarized capacitor, a NPN transistor and a diode has been used as the driven circuit or the pump.

Fig6: Image of Water Pump Motor

Piezo Buzzer

Piezo buzzers are simple devices that can generate basic beeps and tones. They work by using a piezo crystal, a special material that changes shape when voltage is applied to it. If the crystal pushes against a diaphragm, like a tiny speaker cone, it can generate a pressure wave which the human ear picks up as sound.

Fig7: Image of piezo Buzzer

Servo Motor

The servo motor is a closed-loop mechanism that incorporates positional feedback in order to control the rotational or linear speed and position. The motor is controlled with an electric signal, either analog or digital, which determines the amount of movement which represents the final command position for the shaft.

Fig8: Image of servo motor

Power supply

As we have used Arduino Uno in our project and Arduino Uno works on (7-12V) power supply so our project can work on 7-12V but the recommended power rating is 12V, 1.5A.

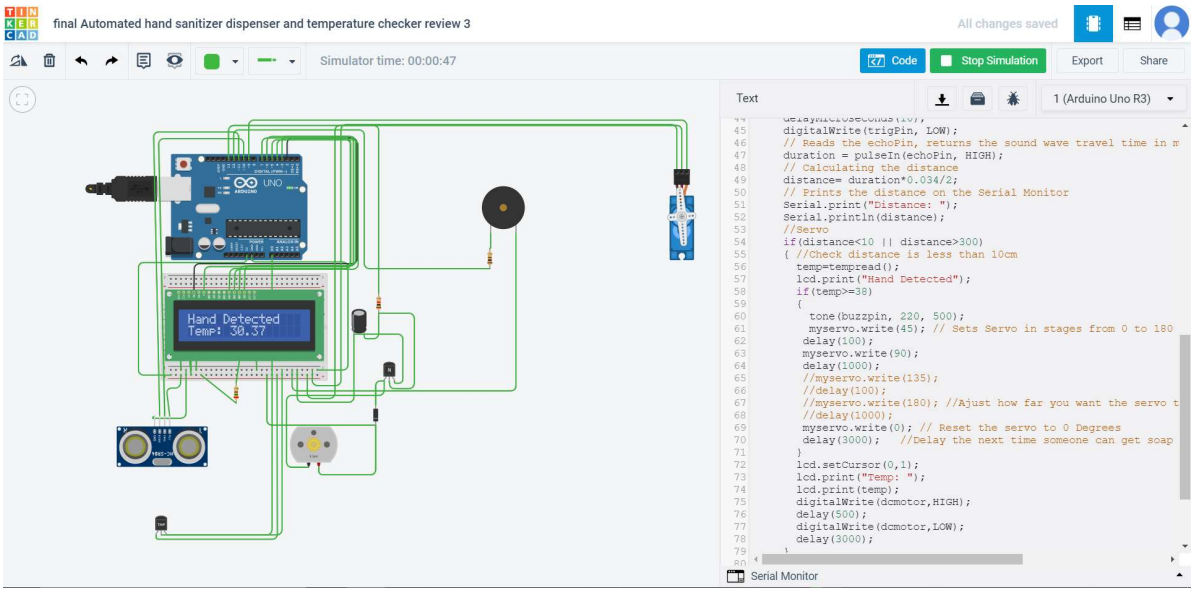
2.4 SOFTWARE SPECIFICATIONS

Code:

```
// defines pins numbers
const int servo = 9;
const int trigPin = 10;
const int echoPin = 11;

// defines variables
long duration;
int distance;

#include <Servo.h>
#include<LiquidCrystal.h>

Servo myservo;  // create servo object to control a servo
// twelve servo objects can be created on most boards
LiquidCrystal lcd(2,3,4,5,6,7);
int tempin=A0;
double temp=0;
int pos = 0;    // variable to store the servo position
int buzzpin=12;
int dcmotor=13;
void setup() {
  pinMode(trigPin, OUTPUT); // Sets the trigPin as an Output
  pinMode(echoPin, INPUT); // Sets the echoPin as an Input
  myservo.attach(servo);  // attaches the servo on pin 9 to the servo object
  myservo.write(0);   // Sets Servo to initially 0 degrees
  Serial.begin(9600); // Starts the serial communication
  lcd.begin(16,2);
  pinMode(tempin,INPUT);
  pinMode(buzzpin,OUTPUT);
  pinMode(dcmotor,OUTPUT);
}

void loop()
{
    lcd.print("Hand Sanitizer");
    lcd.setCursor(0,1);
    lcd.print("Insert Hand");
    delay(500);
    lcd.clear();
    digitalWrite(trigPin, LOW);
    delayMicroseconds(2);
    // Sets the trigPin on HIGH state for 10 micro seconds
    digitalWrite(trigPin, HIGH);
    delayMicroseconds(10);
    digitalWrite(trigPin, LOW);
    // Reads the echoPin, returns the sound wave travel time in microseconds
    duration = pulseIn(echoPin, HIGH);
    // Calculating the distance
    distance= duration*0.034/2;
    // Prints the distance on the Serial Monitor

    Serial.print("Distance: ");
    Serial.println(distance);
```

```
  //Servo
  if(distance<10 || distance>300)
  { //Check distance is less than 10cm
    temp=tempread();
    lcd.print("Hand Detected");
    if(temp>=38)
    {
     tone(buzzpin, 220, 500);
     myservo.write(45); // Sets Servo in stages from 0 to 180 degrees so soap does not pitch out.
    delay(100);
    myservo.write(90);
    delay(1000);
    //myservo.write(135);
    //delay(100);
    //myservo.write(180); //Ajust how far you want the servo to go.
    //delay(1000);
    myservo.write(0); // Reset the servo to 0 Degrees
    delay(3000);   //Delay the next time someone can get soap
    }
    lcd.setCursor(0,1);
    lcd.print("Temp: ");
    lcd.print(temp);
    digitalWrite(dcmotor,HIGH);
    delay(1000);
    digitalWrite(dcmotor,LOW);
    delay(3000);
  }
 lcd.clear();
}
double tempread()
{
 temp=analogRead(tempin);
 temp=temp*0.4878-49.6325;
 return temp;
}
```

OUTPUT:



CHAPTER 3

WORKING OF THE SYSTEM

Block diagram of the system is in page no. 7. The sensor senses the proximity of hands when placed under the machine. It works on ultrasonic waves reflection principle. Ultrasonic sensor detects object ranging from 5 to 8 cm. The modules include ultrasonic transmitters, receiver and control circuit. The basic principle of work:

- THE LCD is an electronic display module that uses liquid crystal to produce a visible image. The 16×2 LCD display is a very basic module commonly used in circuits.
- The ultrasonic sensor operates by transmitting an ultrasound and receiving the echo as it bounces back against an obstacle (in our case being the person's hand) after a certain time and calculates the distance of the object. The sensors send the ultrasound and senses the echo with the same pin to the Arduino board.
- Temperature Sensor -The sensor works on the property of diode, as the temperature changes in the diode the voltage also changes at a constant rate according to the input taken.
- The sensors connected to the Arduino will start working when the device is activated.

As the controller receive High signal from the sensor module the input from temperature sensor is taken and displayed on the LCD screen. It also triggers the pump to pull water from storage area and send to the nozzle in mist form. The program runs the pump for 1 second. It has been seen during testing 1 second is sufficient to sanitize the hands with mist spray. Even we can change the time as per user need through program.

CHAPTER 4

RESULTS, CONCLUSION AND POTENTIAL BUSINESS IMPACT

4.1 RESULT

Hence, we have made the Automated Hand Sanitizer Dispenser and Temperature Checker as per our needs. Therefore, in this period of global pandemic, the purpose of our machine is fulfilled as it supports the backbone of the human being which is the basic sanitization required in today's world.

4.2 CONCLUSION

An automatic sanitizer dispensing machine is designed and developed. The machine is placed on the ground or table stand at entrance gates of society, schools, colleges or any commercial building. It can eject sanitizer solution with 1 second delay and is effective in optimize use of liquid sanitizer. It helped to reduce the contact for getting sanitizer and also reduce man power employed to spray sanitizer with a spray bottle.
The control circuit is small in size and low cost as compared to available controllers. The power consumption is low and the system can help to achieve contactless sanitizer dispenser. It reduces the risk of community transmission of the virus.

4.3 POTENTIAL BUSINESS IMPACT

- The Covid-19 has made us understand the importance of sanitization in our life. The Automated System will be more efficient in this time and hence will provide better sanitization as compared to manual sanitizer dispenser.
- As it will be more efficient, it can be placed at entrance gates of society, schools, colleges or any commercial building, which will reduce the risk of virus getting inside them, safeguarding everyone, and hence indirectly boosting the economy.
- As the sanitization machine is needed everywhere, nowadays, so first its demand and secondly its cost efficiency will attract more and more customers towards it, again boosting the economy.

CHAPTER 5

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