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COVID-19 Indoor Safety Monitoring System

[1]T Happila,[2]J Jemshad, [3]C Sambathkumar,[4]S A Syed Abbas,[5]V Vasanth.

1. Assistant professor, Electronics and Communication Engineering, Karpagam college of Engineering
2. Student, Electronics and Communication Engineering, Karpagam college of Engineering
3. Student, Electronics and Communication Engineering, Karpagam college of Engineering
4. Student, Electronics and Communication Engineering, Karpagam college of Engineering
5. Student, Electronics and Communication Engineering, Karpagam college of Engineering

ABSTRACT

This proposed methodology aims at creating an integrated system that performs automatic hand sanitation for cleansing number of persons entered the monitoring area and temperature detection for prevention and identification of infections respectively. During the pandemic time of covid-19 it essential to monitor the crowd followed by temperature detection of each person. This methodology is smart way of treating covid-19 affected person with less human intervention. These actions will be conducted in an organised environment which maintains the required distance between two individuals to avoid infections. We centre on most normal indoor measures - individuals with high internal heat level should remain Stay at home, it is necessary to wear a mask and the distance between people ought to be 1.5-2meters apart. Here the proposed system is based on Arduino nano micro-controller board with contact less Temperature sensors and ultrasonic sensors for effective monitoring of Covid affected person where gadgets used are of small size and can be easily implemented.

1 METHODOLOGY OF THE PROPOSED SYSTEM

This paper tells about how to monitor a Covid-19 affected person without contact so as to avoid infections and decrease the spread of Corona virus. This is really helpful for the people who are working close to a virus affected persons such as doctors, nurses. This system mainly focuses on contact less monitoring.

Our solution incorporates the accompanying subsystems:

1) Temperature estimation subsystem dependent on Arduino Uno.

2) No. of persons entering the monitoring area is checked using Ultrasonic sensors.

First, We need to check the affected person's Temperature Regularly. For that reason, we depend on Arduino Nano prepared LM35 temperature sensor or infrared thermometer (such as MLX906148). If individual has internal heat level higher than typical, the buzzer will begin signalling to show the overseers.

After that, we need to check the number of persons entering the monitoring area.

For this task, we use Arduino Nano equipped with two ultrasonic sensors which will be placed on the one-way entrance/exit.

For the case where more number of individual enters the observing zone, safety officers will be educated by means of signalling the buzzer, so they can bring caution that extra individuals have to leave.

Furthermore, once they enter the room, the automatic hand sanitizer dispenser will dispense.

The proposed course of action desires to guarantee that COVID-19 security rules are applied appropriately inside.

1.1 MERITS OF PROPOSED SYSTEM

The proposed system has a dedicated module to count the number persons entering the room. The temperature sensor measures the body temperature of the patient and beeps, if the temperature is high. An automatic sanitizer dispenser is also installed in the monitoring room/area.

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1.2 COMPARISON BETWEEN EXISTING AND PROPOSED SYSTEM

EXISTING SYSTEM	PROPOSED SYSTEM
It has only sanitizer dispenser which isImplemented by Microcontroller.	It has the system to monitor a person who is affected.
There is no feature of detecting no. of persons and social distancing.	Dedicated sensors to detect no. of persons entered and social distancing.

INTRODUCTION

Fighting against the rapid spread of corona virus is a challenging task where it needs to be handled with concern towards safety. The front-line health workers are giving a valiant effort to battle this pandemic situation. These workers discover troubles to monitor the patients since the number of cases goes high day by day as the workers supposed to come in contact with the affected people daily. The pandemic situation can be handled by adopting a smart way of treating the covid affected person. This proposed system has an been brought intentionaly for the fair treatment of covid affected person without being in touch with the person.

This system has bidirectional counter to avoid crowding inside the monitoring area. This will be really helpful; they don't have to keep an eye on how many people are entering the area. Everyone will be sanitised as there is an automatic sanitizer dispenser in the room/area. The patient's body temperature will be monitored continuously; the buzzer will be turned ON, if the temperature is high.

BLOCK DIAGRAM:

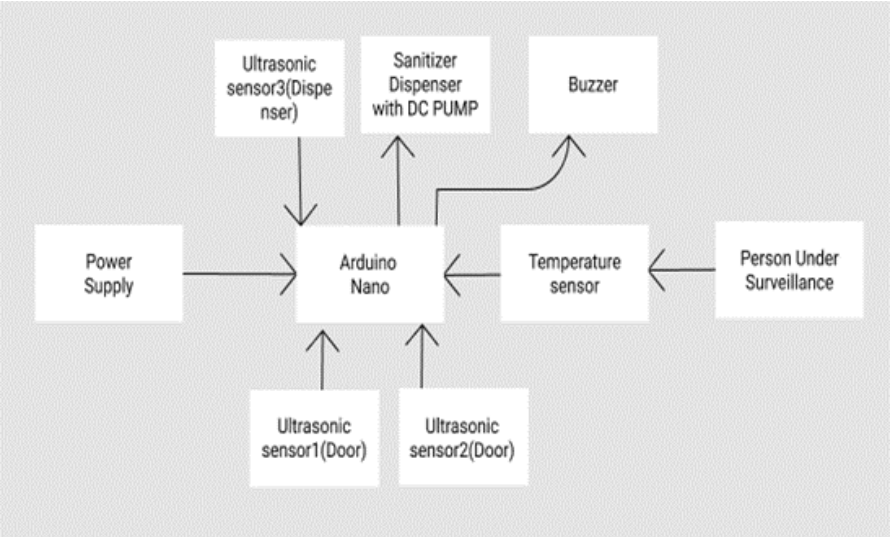

Fig-1: Block diagram

HARDWARE UNITS:

a) Arduino Nano

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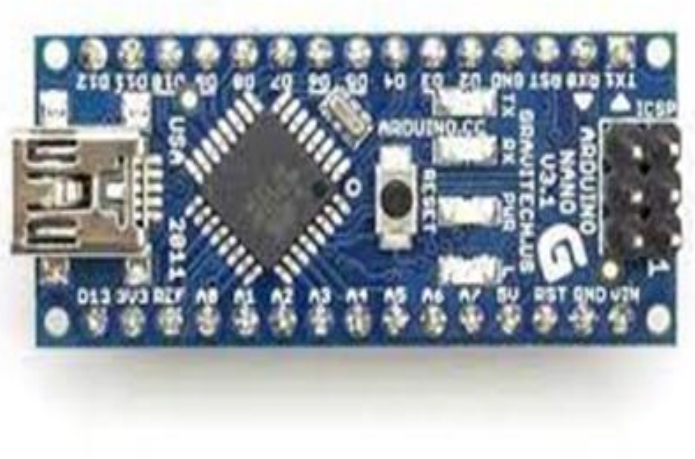
The Arduino Nano is, in fact, the breadboard-beaning board theme under ATmega328 (Arduino Nano 3.x). This is a comparative evaluation of the Arduino Duemilanove yet in an optional pack at a very basic level. It requires a DC power jack, and works with a Mini-B USB interface as opposed to a standard one.



a) Ultrasonic sensor

An ultrasonic sensor is an electronic contraption that rehearses the distance of a target article by passing on ultrasonic sound waves, and converts the reflected sound into an electrical sign. Ultrasonic waves travel quicker than the speed of undisputed sound (for instance the sound that individuals can hear).

b) Temperature sensor

A temperature sensor is an electronic differentiation that initiates the temperature of its present status and converts data information into electronic information to record, screen, or sign a temperature change. There are various sorts of temperature sensors. Some temperature sensors require direct contact with the genuine article that is being checked (contact the temperature sensor), while others measure the temperature of an article (non-contact temperature sensor) indirectly.

d) DC pump

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DC controlled siphons use direct current from engine, battery, or sun based ability to move from multiple points of view. They are less difficult to work and control, since AC siphons routinely require a controller to supervise speed.

e)Buzzer

A buzzer is a sound transmitting device that can be mechanical, electromechanical or piezoelectric (abbreviated piezo). Typical uses of signals and beepers incorporate thieves, clocks, and insistence of client data, for instance, a mouse snap or keystroke.

2. OVERVIEW OF Arduino Nano MICROCONTROLLER

The Atmel The ATmega328P AVR is a low-power CMOS 8-digit microcontroller dependent on improved RISC plan. By executing astonishing headings in a dull clock cycle, the ATmega328P accomplishes throughput going to 1 MHz per MHz, which allows the framework originator.upgrade power utilization as opposed to preparing speed.

STEP WISE EXPERIMENTAL SETUP:

1) Temperature estimation subsystem dependent on Arduino Uno.

2) No. of persons entering the monitoring area is checked using on Ultrasonic sensors.

- First, We need to check the affected person's Temperature Regularly.
- For that reason, we depend on Arduino Nano prepared LM35 temperature sensor or infrared thermometer (such as MLX906148).
- In case the body temperature of that person is higher than normal, buzzer will start beeping to indicate the care takers.

After that, we need to check the no. of persons entered the monitoring area.

- For this task, we use Arduino Nano equipped with two ultrasonic sensors will be placed on the one-way entrance/exit.
- In case more no. of person enters the monitoring area, Security guards will be notified through beating the buzzer, so they can warn that person to leave.
- Furthermore, once they enter the room, automatic hand sanitizer dispenser will dispense.
- The proposed Solutions that aim to guarantee that COVID-19 wellbeing rules are appropriately applied inside.

3D MODEL:

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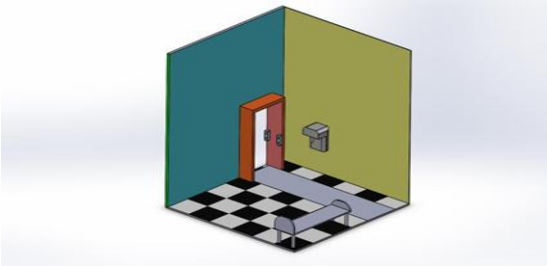


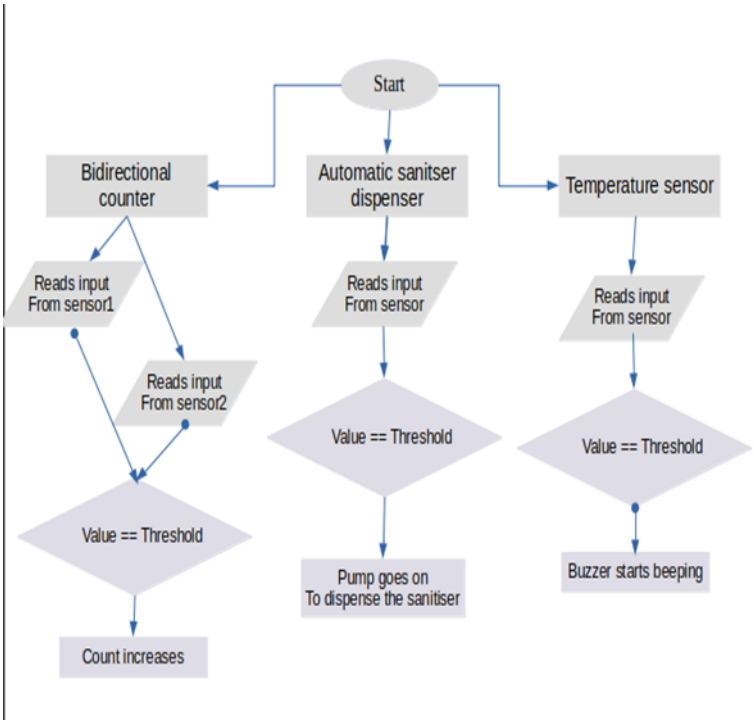
Figure-1: 3D model

REAL-TIME CONNECTION:

Figure-2 & 3: Real-time connections

Flow Chart:

Fig-2: Flow chart



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program

```
const int lm35_pin = A1; // LM35 O/P pin
const int pingPin1 = 3; // Trigger Pin of Ultrasonic Sensor1
const int echoPin1 = 2; // Echo Pin of Ultrasonic Sensor1
const int pingPin2 = 4; // Trigger Pin of Ultrasonic Sensor2
const int echoPin2 = 5; // Echo Pin of Ultrasonic Sensor2
const int pingPin3 = 6; // Trigger Pin of Ultrasonic Sensor3
const int echoPin3 = 7; // Echo Pin of Ultrasonic Sensor3
const int buzzer = 8; // Digital I/O Pin of Buzzer
const int pump = 11; // Digital I/O Pin of pump


void setup() {
  Serial.begin(9600);
  pinMode(pingPin1, OUTPUT);
  pinMode(echoPin1, INPUT);
  pinMode(pingPin2, OUTPUT);
  pinMode(echoPin2, INPUT);
  pinMode(pingPin3, OUTPUT);
  pinMode(echoPin3, INPUT);
  pinMode(buzzer, OUTPUT);
  pinMode(pump, OUTPUT);
}
```

```
const int lm35_pin = A1; // LM35 O/P pin
const int pingPin1 = 3; // Trigger Pin of Ultrasonic Sensor1
const int echoPin1 = 2; // Echo Pin of Ultrasonic Sensor1
const int pingPin2 = 4; // Trigger Pin of Ultrasonic Sensor2
const int echoPin2 = 5; // Echo Pin of Ultrasonic Sensor2
const int pingPin3 = 6; // Trigger Pin of Ultrasonic Sensor3
const int echoPin3 = 7; // Echo Pin of Ultrasonic Sensor3
const int buzzer = 8; // Digital I/O Pin of Buzzer
const int pump = 11; // Digital I/O Pin of pump


void setup() {
  Serial.begin(9600);
  pinMode(pingPin1, OUTPUT);
  pinMode(echoPin1, INPUT);
  pinMode(pingPin2, OUTPUT);
  pinMode(echoPin2, INPUT);
  pinMode(pingPin3, OUTPUT);
  pinMode(echoPin3, INPUT);
  pinMode(buzzer, OUTPUT);
  pinMode(pump, OUTPUT);
}
```

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```
  }
  else
  {
    fever_high = 0;
    noTone(buzzer);
  }
  delay(1000);
}

int count=0;
boolean state1 = true;
boolean state2 = true;
int i=1;
void count_persons() {
  long cm1, cm2;

   cm1 = measureDistance(pingPin1, echoPin1);
   cm2 = measureDistance(pingPin2, echoPin2);
   if (cm1 < 30 && i==1 && state1){
     delay(100);
     i++;
     state1 = false;
  }

  if(cm >= minimum_distance && cm <= max_distance && flag == 0)
  {
   Serial.print("pump on");
   Serial.println();
   digitalWrite(pump, HIGH);
   delay(3000);
   Serial.print("pump off");
   Serial.println();
   digitalWrite(pump, LOW);
   flag = 1;
  }
  if(!(cm >= minimum_distance && cm <= max_distance))
  {
     flag = 0;
  }
}
```

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```
void loop() {

  count_persons();
  temperature_sensing();
  sanitiser_dispenser();
}

int fever_high = 0;
void temperature_sensing() {
  int temp_adc_val;
  float temp_val;
  /* Read Temperature */
  temp_adc_val = analogRead(lm35_pin);
  /* Convert adc value to equivalent voltage */
  temp_val = (temp_adc_val * 4.88);
  /* LM35 gives output of 10mv/°C */
  temp_val = (temp_val/10);
  /*Serial.print("Temperature = ");
  Serial.print(temp_val);
  Serial.print(" Degree Celsius\n");*/
  if(temp_val > 38.5)
  {
    tone(buzzer, 2000); //continues sound
    fever_high = 1;
  }
```

```
    }

      if (cm1 > 30){
       state1 = true;
      }

       if (cm2 > 30){
       state2 = true;
      }
     if(count > 2 && fever_high != 1)
     {
        digitalWrite(buzzer,HIGH);
        delay(1000);
        digitalWrite(buzzer,LOW);
        delay(1000);
     }
  }

  int minimum_distance = 5;
  int max_distance = 10;
  int flag = 0;
  void sanitiser_dispenser() {
    long duration, cm;
     cm = measureDistance(pingPin3, echoPin3);
```

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```
  if(cm >= minimum_distance && cm <= max_distance && flag == 0)
  {
   Serial.print("pump on");
   Serial.println();
   digitalWrite(pump, HIGH);
   delay(3000);
   Serial.print("pump off");
   Serial.println();
   digitalWrite(pump, LOW);
   flag = 1;
  }
  if(!(cm >= minimum_distance && cm <= max_distance))
  {
     flag = 0;
  }
}


int measureDistance(int ping, int echo) {
  pinMode(ping, OUTPUT);
  digitalWrite(ping, LOW);
  delayMicroseconds(2);
  digitalWrite(ping, HIGH);
  delayMicroseconds(10);
  digitalWrite(ping, LOW);
  pinMode(echo, INPUT);
  long duration = pulseIn(echo, HIGH, 100000);
  return duration / 29 / 2;
}
```

CONCLUSION AND FUTURE SCOPE:

As per the accomplished outcomes, as proposed arrangement is usable for motivation under certain presentation limits, (for example, cover discovery). In addition, it depends on both open equipment and free programming, being done clear and alluring benefit for such frameworks. In future, it is wanted to explore different avenues regarding different significant Learning and PC vision structures for object disclosure on Raspberry Pi to oblige high casing rates. Moreover, work will be continued to make this system wider climate detecting systems for versatile structure cooling and ventilation airborne assurance to diminish the spread of Covid inside, particularly during summer.

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