



# Social Distancing Device

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# OVERVIEW OF THE PROJECT

This project is about a designing a device which can remind us to maintain social distancing in this pandemic situation of Covid-19. The world has changed, and so have we. Social distancing will remain the reality for a while. To tackle this situation, this Device can be beneficial to maintain social distancing between each other as per the guidelines of WHO.

It is designed to help ensure business continuity, social distancing, safety for doctors, workers safety in the world after COVID-19, the implementations are endless!

The major upper hand in our project is that it can distinguish between living organisms and non-living ones. i.e. it can tell the difference between human and a pole.

## SPECIFICATION OF THE PROJECT

- The device will have 2 ultrasonic sensor, one in front and the other in the rear side.
- The two ultrasonic sensor will be connected with the Arduino Uno.
- The required code is written in Arduino computer IDE and then uploaded to Arduino via a USB cable.
- If the device detects that the distance between two persons becomes less than 1 meter then its emits a warning ( Sound, LED or vibration) in real time, warning the workers to ensure safe distance.
- This device will be in the shape of the belt which can be worn anytime over the regular clothes or it can installed on the helmet.

# ADVANTAGES

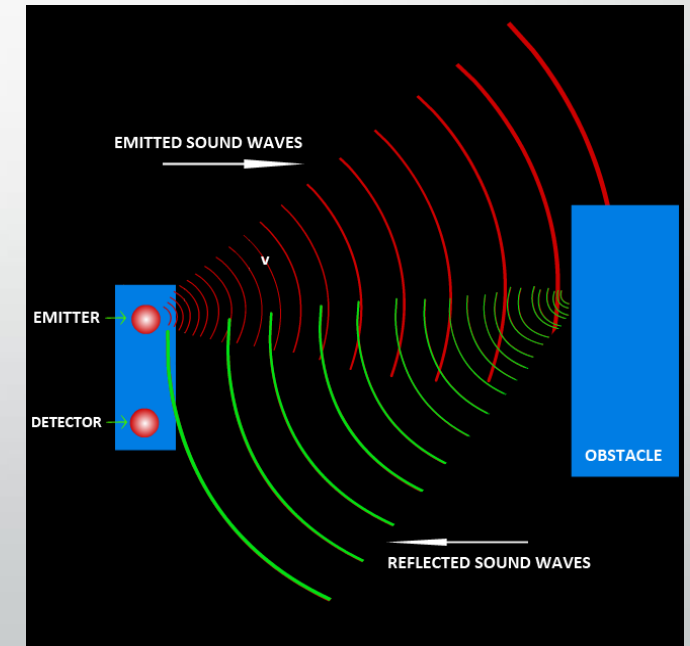
- It will help people to maintain social distancing when they go outside.
- This device uses inexpensive materials resulting in the low cost of the device.
- This device can have other future uses in the factories where there is a need of social distancing.
- The device has a belt like shape so it does not disturb the daily fashion of the people.

# TECHNICAL BACKGROUND

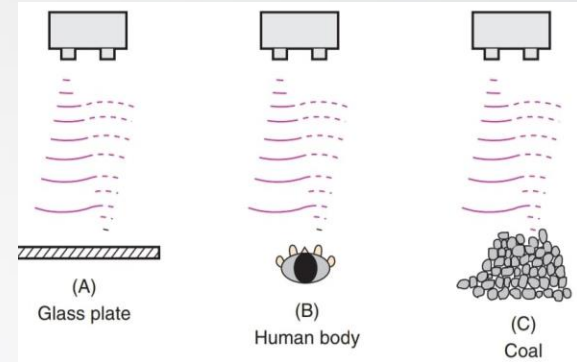
An **ultrasonic sensor** will measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal.

Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).

In order to calculate the distance between the sensor and the object, the sensor measures the time it takes between the emission of the sound by the transmitter to its contact with the receiver. The formula for this calculation is  $D = \frac{1}{2} T \times C$  (where D is the distance, T is the time, and C is the speed of sound  $\sim 343$  meters/second).



The reflective efficiency varies depending on the shape of these objects. In the case of (A), the greatest amount of reflected waves return, however, this is strongly affected by the inclination of the object.



In the case of (B) and (C), stray reflections occur and the reflected light is not uniform, however, the effect of inclination is small. Not only the maximum detection distance but also the minimum detection distance can be adjusted, in connection with or independently of the maximum distance. This detection range is called the limit zone (zone limit).

- **Colors Do**

**Not Influence Detection:** Unlike photoelectric sensors, Ultrasonic Sensors can detect an object without being influenced by its colors. For example, if two objects have the same shape, even if one is transparent, such as glass, and the other is black plastic, they can both be detected with the same settings.

- **Detecting Objects over a Wide Area :** Ultrasonic Sensors detect reflection from a wider area than photoelectric sensors, so they can check a wide area all at the same time.
- **Non-Contact Detection :** Because Ultrasonic Sensors detect sensing objects without touching them, they do not scratch the sensing objects.
- **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.

# **MATERIALS USED IN THIS PROJECT**

Arduino Uno

Ultrasonic sensors

Buzzer

Plastic casing

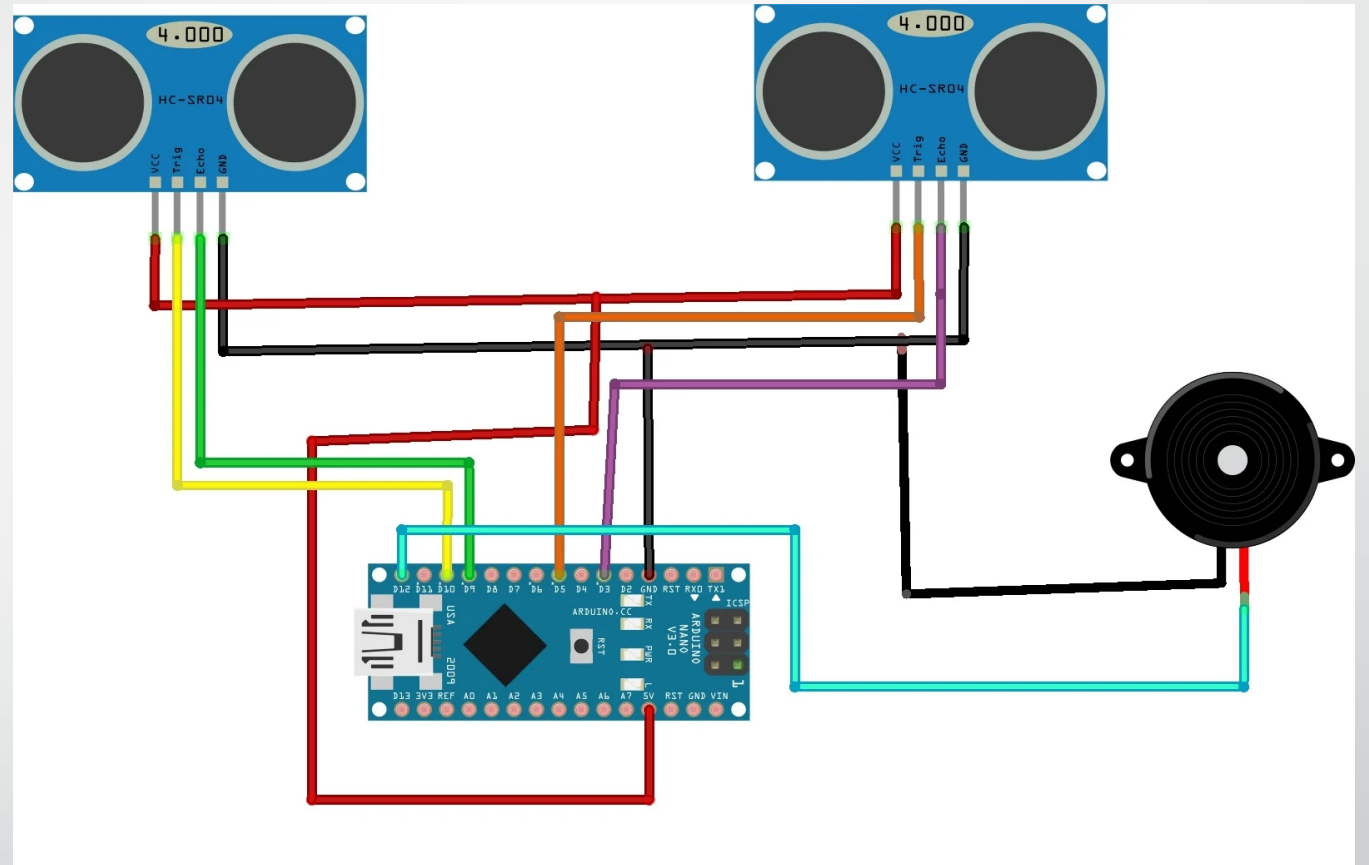
Jumper wires

Universal PCB



# CIRCUIT DIAGRAM

(more complex than it seems!)



# THE PURPOSE BEHIND INNOVATION

- The idea struck our mind after this devastating pandemic, which caused a significant damage to economy plus biodiversity.
- Can be used as an extra protective measure in factories/installment that require hazardous bio organism work(zoonotic),hence minimizing the effect of damage due to distancing maintained by workers.
- Can be implemented in lifestyles of doctors as protective measure who have to deal with patients, which are affected by airborne diseases like TB.
- Can be used in prisons to tackle duels between prisoners and can be especially used for the safety of the staff working, including police officers.
- According to [a research from Bryan College](#), millennial employees/workers cost the global economy around \$450 billion dollars annually because of their multitasking habits. This includes social interaction as well as digital interaction, the sensors helps in cutting/keeping a track at these hours.

# FUTURE ASPECTS

With our ongoing work, an idea struck our minds-can we include tracking and messaging system, so that it can be implemented at a professional stage?

The idea is a simple one. If a factor has 100 workers, and a head(Admin).Our device is used by them and with further progress we were able to add a microcontroller which can send message to the admin regarding who all violated social distancing(maybe by chance) and have a record. Further if any of the employee is found positive, tracking for people who might get affected would be an easy task. It is still a vague idea under progress! The device would then include the following specification, rest with others.

- This device would include in-build messaging system (microcontroller ESP8266).
- A phone with registered and active phone number
- An IFTTT account for sending message to the phone in case of social distancing violation

# REFERENCES USED FOR THE PROJECT

These are some of our research work which we did, before reaching the final conclusion. We had many other ideas regarding the sensors, Arduino but had to scrap them due to several drawbacks.

[basic framework](#)

[gdoc link](#)

[gdoc link2](#)

[messaging system](#)