

Social Distancing ID Card

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Abstract— Social distancing has gotten into the light, it refers to the practice of keeping a safe distance (usually at least 6 feet) between individuals to reduce the spread of infectious diseases, such as COVID-19. We have seen the situation in the country and the world due to the contagious spread of COVID in 2020-2022. We have also seen the importance and impact simple practices like social distancing have brought. This calls for a smart solution through which safety is maximized. Overall, the problem statement of a Social Distancing ID card is to detect any human in its range and avoid contact by alerting them. It is made of basic components like Arduino Nano, a buzzer, an infrared sensor, an LED, and a battery. The paper further describes how all these are used, how the flow and working of the said device is how it can be implemented on various individual and social level to protect people from airborne diseases and reduce the effects of upcoming pandemics and viral infections.

Index Terms— Arduino Nano, Social Distancing, Covid-19 Precautions, IR Sensor

I. INTRODUCTION

Social distancing and its importance have gotten an immense spotlight since the COVID period. It stands as a prominent non-pharmaceutical measure employed to combat the spread of the COVID-19 pandemic. The inclusion criteria for effectiveness encompassed investigations on social distancing measures such as interpersonal distancing, school closures, workplace or business closures, restrictions on public transport, and partial or full lockdowns. Sufficient empirical evidence supported the effectiveness of social distancing measures at the individual level, as well as partial or full lockdowns at the community level. However, when considering social settings, the evidence for school closures as a standalone intervention was moderate, while the evidence for workplace or business closures was limited. Additionally, there was no available evidence indicating a distinct impact of public transport restrictions.

The idea behind our project is very simple and helpful at the same time. Its purpose is to alert the user when the distance is close. This could be achieved by using Arduino Nano, a buzzer, an infrared sensor, an LED, and a battery. The individual description of above mentioned is given further. This makes a very easy way to overcome the problem of forgetting to follow social distancing. The ID card is lightweight, easy to make as well as use, and it could be incorporated into the normal ID card. Due to the multiple mentioned advantages, it proves to be a very good and feasible option to be used.

II. NEED

Following are some of the case study that shows some airborne diseases and infections and its effect on people

and nation :

To present the need for social distancing, let's study the case of Corona. COVID-19 is an infectious illness caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It originated in Wuhan, China, and was first identified in December. Since then, it has rapidly spread worldwide. The virus primarily spreads between individuals through close contact, often through small droplets produced when a person sneezes or coughs. These droplets can be inhaled by others or can contaminate surfaces and objects, posing a risk of transmission if they come into contact with the respiratory system of a human. During the initial three days of infection, the virus is most contagious. Common symptoms include nausea, dry cough, and fatigue. The severe and harmful consequences of this disease have caused a global standstill. Other symptoms that may be present include a sore throat and headache. The recovery period for individuals with mild symptoms typically spans two weeks. For those with severe symptoms, the duration of recovery depends on the severity and the individual's immune response. The primary diagnostic method involves a nasopharyngeal swab analysis using real-time reverse transcription-polymerase chain reaction (RT-PCR). Chest CT imaging is also helpful in diagnosing individuals with a higher likelihood of infection based on symptoms and risk factors. Given the rapid spread of the disease, the World Health Organization (WHO) has recommended the practice of social distancing to mitigate transmission. Maintaining a physical distance of two meters between individuals is crucial for staying safe and returning to a semblance of our previous way of life. Following the COVID-19 pandemic, the Centres for Disease Control and Prevention (CDC) expanded the concept of social distancing to include avoiding crowded places, cancelling public gatherings, and maintaining a distance of approximately six feet or two meters from others when necessary. Recent research has indicated that respiratory droplets from a sneeze or deep breath can travel over six meters during physical activity. Therefore, adhering to social distancing norms is essential for our well-being and safety. In our study, we aim to determine whether individuals are adhering to the social distancing guidelines. We verify our findings using both live streaming and video feeds. By measuring the distance between centroids of individuals in two consecutive frames, we can assess whether a person is maintaining social distancing. Individuals are then labelled as either safe or unsafe based on these measurements.

That all being said, there have been lots of negative effects of social distancing and quarantine situations. To see from another view, socialization has immense power over the strengthening of a community. Even if we see in history, social gatherings have always been significant in terms of strength, power, and knowledge. People have planned revolutions by gathering, and many educational and religious preachers have educated the masses on various topics. Human interaction is very important and has various positive effects on individuals. We prefer each other, judge each other, and choose our companions and enemies based on the way we interact. This isn't the only factor affecting above mentioned things but it surely does play an important role. Since the schools and colleges had to be shut down, many of the children and teenagers fell behind in social skills.

Due to this condition, we had to choose our higher priority option which is health. Hence social distancing was enforced while being aware of the disadvantages.

Swine Flu, a respiratory infection caused by the H1N1 influenza virus caused a pandemic in 2009. It was the first influenza pandemic in 40 years. Just like any other airborne case of flu, it spreads majorly from sneezing, coughing, contact with the infected, or contact with contaminated surfaces. Worldwide, it caused the death of nearly 151,000 to 575,000 people. In India, the flu created a lot of impact. The virus spread rapidly and more than 1,00,000 cases were seen in India by June 2009. Not only has this caused fear and panic in people, it is estimated that nearly \$10 billion of the Indian economy has been affected. The businesses, tourism, shops, schools, colleges, everything was shut down. To restrict the spread of this even further, the government used measures like quarantine, vaccination, and travel restrictions. Not soon after this, slowly the restrictions were removed and people were no longer afraid to visit public places. After taking these appropriate steps, Swine Flu is considered a seasonal illness with its vaccinations. The swine flu pandemic of 2009 was a significant event in India's history. It highlighted the importance of public health preparedness and the need for countries to have effective systems in place to respond to outbreaks of infectious diseases.

Here are some of the specific effects of the swine flu pandemic on people and India:

Increased death and illness. The swine flu pandemic caused an estimated 151,000 to 575,000 deaths worldwide, and over 100,000 cases were reported in India. The virus was particularly deadly for young children, pregnant women, and people with underlying health conditions.

Economic disruption. The swine flu pandemic had a significant economic impact on India. The tourism industry was hit hard, as people were afraid to travel. Businesses also suffered, as people were reluctant to go out and shop. The pandemic is estimated to have cost the Indian economy \$10 billion.

Fear and anxiety. The swine flu pandemic caused widespread fear and anxiety among people in India. Many people avoided public places and social gatherings, and there was a shortage of masks and other personal protective equipment. Increased awareness of public health. The swine flu pandemic raised awareness of public health issues in India. People became more aware of the importance of handwashing, vaccination, and other measures to prevent the spread of infectious diseases. The swine flu pandemic of 2009 was a challenging time for India, but the country responded effectively and learned valuable lessons from the experience. These lessons will help India to be better prepared for future outbreaks of infectious diseases.

1. *Spanish Flu (H1N1 Influenza)*: The Spanish flu pandemic of 1918-1919 affected India and other parts of the world, caused by the H1N1 influenza A virus. It is estimated to have infected one-third of the global population and resulted in millions of deaths worldwide.
2. *Asian Flu (H2N2 Influenza)*: The Asian flu pandemic emerged in 1957-1958 and was caused by the H2N2 influenza A virus. India was also affected during this pandemic, resulting in significant morbidity and mortality.
3. *Hong Kong Flu (H3N2 Influenza)*: The Hong Kong flu pandemic emerged in 1968-1969 and was caused by the H3N2 influenza A virus. It spread globally, including in India, causing substantial illness and death.
4. *Chickenpox*: Chickenpox is a highly contagious viral illness caused by the varicella-zoster virus. It can spread through respiratory droplets produced when an infected person coughs or sneezes, or through direct contact with the fluid from chickenpox blisters. Chickenpox is usually a mild illness, but it can be serious in some people, especially young children and people with weakened immune systems.

It's important to note that not all pandemics are solely airborne; they can spread through various transmission routes, including respiratory droplets, contaminated surfaces, or direct contact. Additionally, there may have been other local outbreaks or epidemics of airborne diseases in India's history, but they might not have reached pandemic proportions.

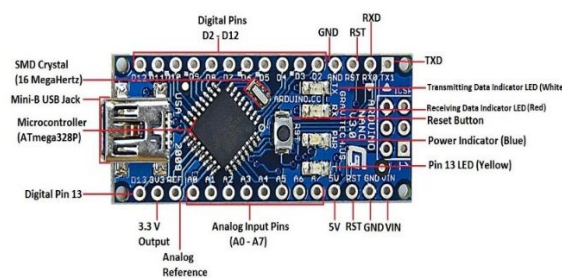
III. COMPONENTS

1. Arduino nano

In this sub-section, we will be discussing the main features of Arduino Nano and what made it best to be used in the module. It is a part of the microcontroller series based on ATmega328p, released in 2008 by Arduino. cc. It allows the users the same work as on any other Arduino board on a much smaller size. Its input voltage is 5-20V and its operating voltage is 5V. It has 8 analogy pins and 14 digital pins. The clock speed is 16 MHz The flash memory of 32 KB. The main feature of the board is a length of 45 mm, a width of 18 mm, and a mass of 7g. It also has the advantage of very little power consumption. This size enables fitting into the ID card slot easily and minimizing the size and weight. It costs around 500₹ and hence also is cost-effective.

The purpose of the board in the model is to process and act according to the given instructions. It works as the code fed in the Arduino IDE whose features will be further discussed. It takes input as attached to it, works on it, and produces output based on the code. This allows the lightening up of the LED and beeping of the buzzer as it comes into the range which is an output, based on the input of the infrared sensor and ultrasonic sensor.

Following is its pin diagram:



Arduino Nano V3.0 Pinout

Fig 1.1 Arduino nano

2. Infrared Sensor

The infrared sensor is a radiation-sensitive sensor that detects a wavelength range of 780 nm - 50 μm. As mentioned these are radiation sensitive, it senses temperature (heat as the temperature of that spectrum is higher) and is widely

used in devices like burglar alarm and motion detectors. It is used to detect objects within a range of 150 cm. It consists of 2 parts, an LED and a photodiode. The LED emits infrared rays and when it comes across any object, the rays reflect to the photodiode. These are Active Infrared sensors that emit as well as detect radiation. For some modules, only the photodiode part is there and these are called Passive Infrared Sensors. They only detect the radiation and do not emit it. This costs around 120 ₹.

In the project, we have used an infrared sensor to detect the presence of a human as we have to make sure that it does not buzz in the presence of any object.

3. Ultrasonic Sensor

The sensor uses sound waves of a range of 20 kHz or more to detect objects near them. It can normally measure up to 70 feet (21 m). Hence it is not affected by factors like the texture or color of an object or dust but is affected by air temperature, wind, and shape of the object. It uses 2 methods to measure distance, the pulse-echo method and the continuous wave method. There are some additional measures taken for accuracy like Kalman filters. We have used an infrared sensor to detect the presence of humans as it only detects objects in a certain temperature range. However, it is a proximity sensor and not a distance sensor, which means it only detects the object and does not calculate the distance. For this, we use an ultrasonic sensor. The device will beep faster as the distance gets closer due to this. And costs nearly 150 ₹ to 200 ₹.

4. LCD

Liquid Crystal Display (LCD) does the identification part of the ID card. It will display the personal information of the user. Such as name, class, and roll number. It is fixed at the front side of the ID Card with an Arduino nano board on the back. It costs around 120 ₹ and is of dimensions 10.5 cm 7.5 cm.

5. Arduino IDLE

One of the main reasons for including the Arduino board as the microprocessor is its open-source platform for programming it, Arduino IDE. It also uses the language C/C++ which is relatively common in use. It also runs on a variety of operation systems as well as online. It is also easy to use and more portable than other microcontrollers. This makes Arduino suitable for the project.

In the project, idle is used to program the Arduino board in such a way that when the infrared sensor detects human heat, it makes LED on and buzzer beep proportional to how close the distance is which is calculated by the ultrasonic sensor.

IV. WORKING

We will be using an infrared sensor to detect. It will be connected to an Arduino nano board through which we can program it to make a beeping noise by attaching it to the buzzer and LED to alert the user. It will be programmed using Arduino IDE. All this will be fitted in an ID card case and covered up to have a simpler and decent look.

Following is the circuit diagram of the model

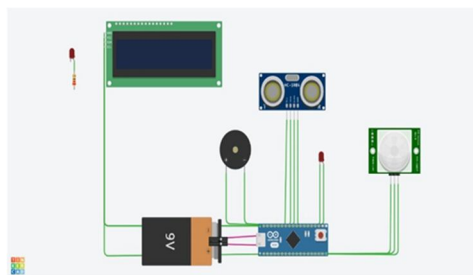


Fig 1.2 the above diagram depicts the circuit diagram of our project

The process in which the device will work will be in the following steps:

Step 1: Detection

The infrared sensor detects human if is present in the given range.

Step 2: Processing

If it detects, it sends a signal to Arduino Nano as input. As coded, the output will be given by the led and buzzer.

Step 3: Alerting

The LED on detection will turn on and the buzzer will buzz with a delay proportional to the distance of how much it is near (it will buzz faster with a lesser delay as nearer it is) which is done with the help of an ultrasonic sensor. And side by side, the LCD will continue displaying the information of card holder.

V. IMPLEMENTATION

This is just the basic prototype for suggesting how this could be implemented into action. The idea could be used in many ways.

For implementation on an individual level, it could be distributed among the office worker force similarly to the normal ID cards. This could be also used in schools by ensuring that the model distributed is stronger and well-protected. Also, it could be firstly distributed to the hospital workers and police who worked as front-line forces throughout the wave of the corona.

For implementation on a public level, the circuit could be used in structures like poles and they could be installed in public spaces like grocery marts, airports, etc. This could also be installed into the ceiling of low-height rooms and places like those of offices, school corridors, etc. They could also be placed one layer under tiles and used at places like shopping centres and canteens. It could be used in various ways further on.

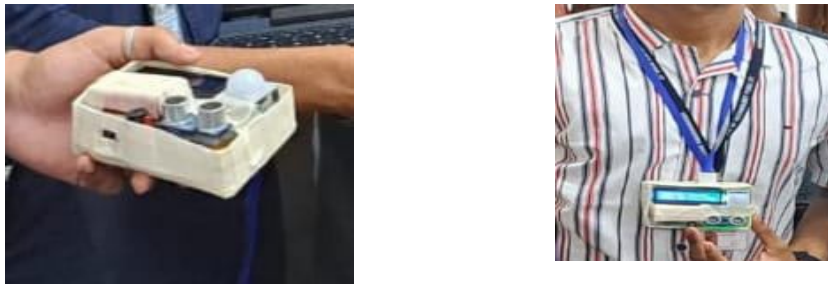


Fig 1.3 The above images are the pictures of our project

VI. CONCLUSION

The social distancing card is a great way to remind people to keep their distance and to help ensure public safety. It is an easy and effective way to help people stay safe and to help prevent the spread of disease. This is just a small measure with a large impact socially. It serves a great major to keep reminding people to have a safe distance to be maintained. Not only in times of pandemic but also for viral infections spreading into a locality. It could also be used by people who have fragile health have weak immunity and get sick frequently. On an industrial note, if we look at the overall cost of the product will be 1000 ₹. This leads to safety from the spread of viral infectious disease not just on an individual level but on a social level and reduces pressure on the health care system as well as officials who ensure the social distancing laws are followed. This impacts the national level of health security and other things like the national economy, national GDP (Gross Domestic Product), employment rate, etc.

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