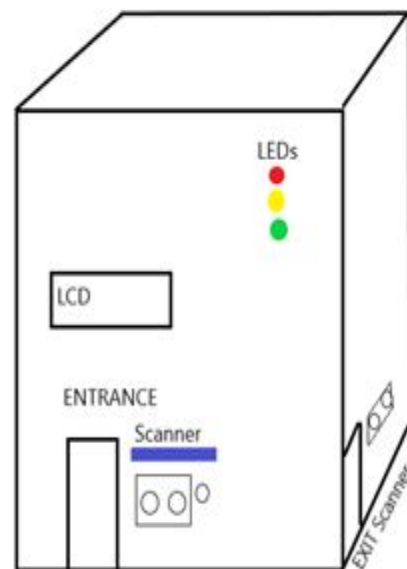


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# COVID-19 SPREAD BREAKING DEVICE FOR PUBLIC PLACES



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## Abstract

As the coronavirus (Covid-19) pandemic intensifies, technological applications and initiatives are multiplying in an attempt to limit the spread of the disease, treat patients and facilitate the work of overworked healthcare workers. This analysis examines in detail how technology can help limit the spread of pandemic disease by means of innovative applications.

It is well-known that the spread of the Covid-19 is increasing due to contact between a healthy and an affected person mostly at the public places such as educational institutions, shops or department stores, religious places, public parks, hospitals, public vehicles and many other places. Having lockdown and restricting access to these places may be a temporary solution but as they are necessary fundamental needs they can't be closed completely. The only way is to limit the number of people present at a time at these places. But it is also hard to keep Police or a guard at every place to limit the number of people and restrict access above it.

Hereby, we'll see a device that can count and limit the number of people entering the place and also automatically checks the temperature of the person as well. This proposal consists of the recent problems arised due to Covid-19, a well-described background, justification, objective and significance of the research, also the materials and methods, working and circuit diagram of the device, research plan and the expected outcome.

## Introduction

### Background

This Covid-19 pandemic has created an immediate demand for essential equipment to limit the spread of the disease, treat patients and facilitate the work of overworked healthcare workers along with advanced information technologies applications. China has recently adapted various advanced technologies and has been able to restrict the spread of disease and many other countries are also adapting more advanced technologies. In China, The initial screening of the patients is done by 5G-enabled thermometers that send instant updates, drones and robots are used to transport medical equipment as well as patient samples, in some of the severely affected areas, where humans were at a risk of catching the virus, drones came to the rescue. Drones were also flying with QR code placards that could be scanned to register health information and also being used to patrol public places, conduct thermal imaging, or to track people violating quarantine rules. Agricultural drones were spraying disinfectants in the countryside and those powered with facial recognition were also being used to broadcast warnings to the citizens to not step out of their homes, and chide them for not wearing face masks.

In the context of technology to break the spread of viruses at public places, China, Hong Kong and many other countries have adapted color codes. It assigns three colors to people – green, yellow and red – on the basis of their travel and medical histories. Only those people who were assigned a green color code could be allowed in public spheres after using the designated QR code at metro stations, offices and other public places.

But in the context of Nepal, buying and using those softwares may not be affordable for every place as it is expensive. So, I've designed a hardware model that can be installed on the entrance and exits of public places at very low cost.

### Justification of Technology Development

- ❖ **Problem statement:** It is already known to all how Covid-19 has affected our lives. We've to be more careful and conscious while stepping out of our home and so in this situation it has been very difficult to open and run public parks, departmental stores, public buses and vehicles, schools or colleges, etc. But we'll suffer from various adverse effects on our livelihood due to restriction on these things. This device can help us to deal with this problem without completely restricting or closing these areas.
- ❖ **The proposed approach:** In order to deal with this problem the better approach suggested from several experts is to limit the number of people and thermal screening before entry in every place. This project deals with ensuring these ways with the help of technology as more effective and accurate.
- ❖ **Project aims:** In the current scenario, this project is necessary to reopen important places

with low risk of the spread of virus. The major benefit of the project is the increase in GDP of the country along with the limited risk of the spread of the virus. Furthermore, it can make people aware about the necessity of the use of masks and other personal safety measures to prevent themselves from coming in contact with the virus.

## Research Objective

The major objectives of this project are:

1. To break the rapid spread of Covid-19.
2. To remind people of the necessity of wearing masks that is done by continuously displaying “Please, wear your mask” on the LCD screen.
3. To resume the economic activities and trade with slower speed that are restricted due the spread of Covid-19.
4. To restart the stores and public transportation by reducing the number of customers.
5. To reduce the risk of spread of virus at public parks or religious places.
6. To restrict the entry of a susceptible person at public places.

## Significance of Technology

The device has the capability to provide better solutions for our daily lives necessities during the crisis. With the installation of this device, we’ll get the following advantages:

1. Departmental stores, grocery stores, can be reopened by ensuring the limited number of customers.
2. Offices and banks can be reopened by pledging half the number of staff.
3. Public vehicles and buses can be reopened with commitment of half the number of passengers.
4. Suspects with high body temperature won’t be allowed to enter the public places and decrease the risk of the spread of virus.
5. Schools/Colleges can be reopened by limiting half the number of students in each class or each block.
6. Reminds people to use masks by displaying “Please, Use your mask.” on the LCD screen.

## Literature Review

As mentioned earlier most of the countries use color codes to limit access to public places. This kind of device is not practically installed yet. Only the basic concept of this kind of device that lights red, yellow or green bulbs to provide instructions to the people is provided as an example on the web.

Here, this project is designed with basic ideas from that example with major advancements at a very low cost of around NRs6000-7000. There are already many devices developed that can

automatically open doors on arrival of someone and also various types of non-contact thermometer has been made. I've tried to combine these kinds of projects with basic changes needed.

“Customer limiting shop assistant” project made by Harry Anderson on [create.arduino.cc/projecthub/](https://create.arduino.cc/projecthub/) explains how ultrasonic sensors can be used to count the number of people entering and departing from the place.

After the study of the above mentioned report and the datasheets of various sensors and modules, and responses of experts on recent technologies to combat Covid-19 through video conferencing and press releases, the parameters of this device were fixed.

## Materials and Methods

### Budget Plan

This project is designed with basic ideas from that example with major advancements at a very low cost of around NRs6000-7000.

1.	Instruments/Hardwares	S.N.		Estimated Cost(In NRs)
		a.	Arduino UNO R3	900
		b.	HC-SR04 × 2	250 × 2 = 500
		c.	MLX90614	2500
		d.	LEDs × 3	10
		e.	Motors	1500
		f.	L298N Motor Driver	450
		g.	LCD	500
		h.	Battery	100
		i.	Switch	20
		j.	Resistors × 10	10
		k.	Potentiometer(POT)	20
2.	Software			
		a.	Arduino IDE	0
3.	Machinery			

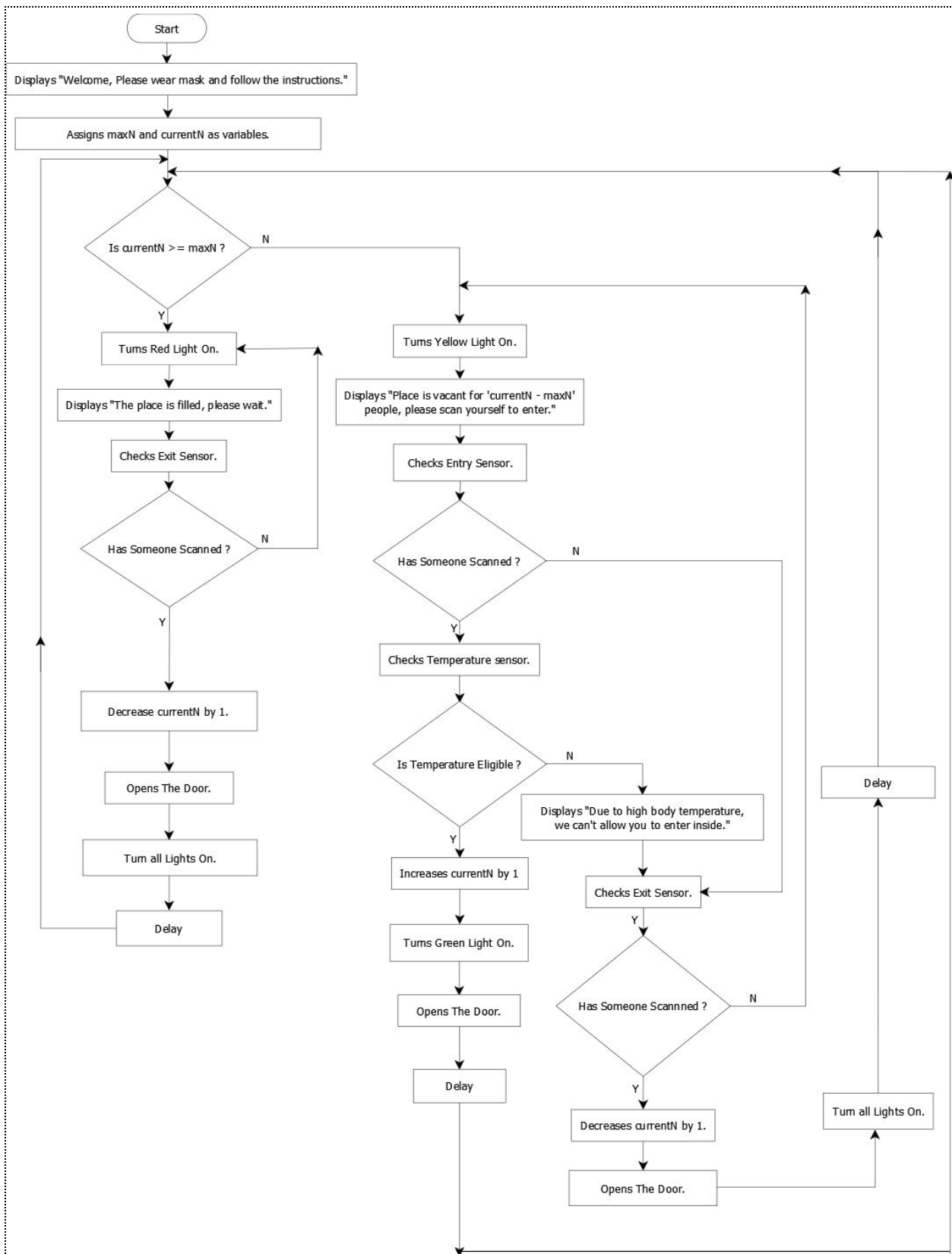
		a.	Soldering Iron	220
	Total			6730

## Working

With its start, the LCD will display “Welcome, please follow the instructions and wear your mask.” that’ll remind people to wear masks. Thereafter, the device is assigned with the maximum number of people the place can hold. Now it checks if the number already inside the place is less than the maximum number of people allocated or not.

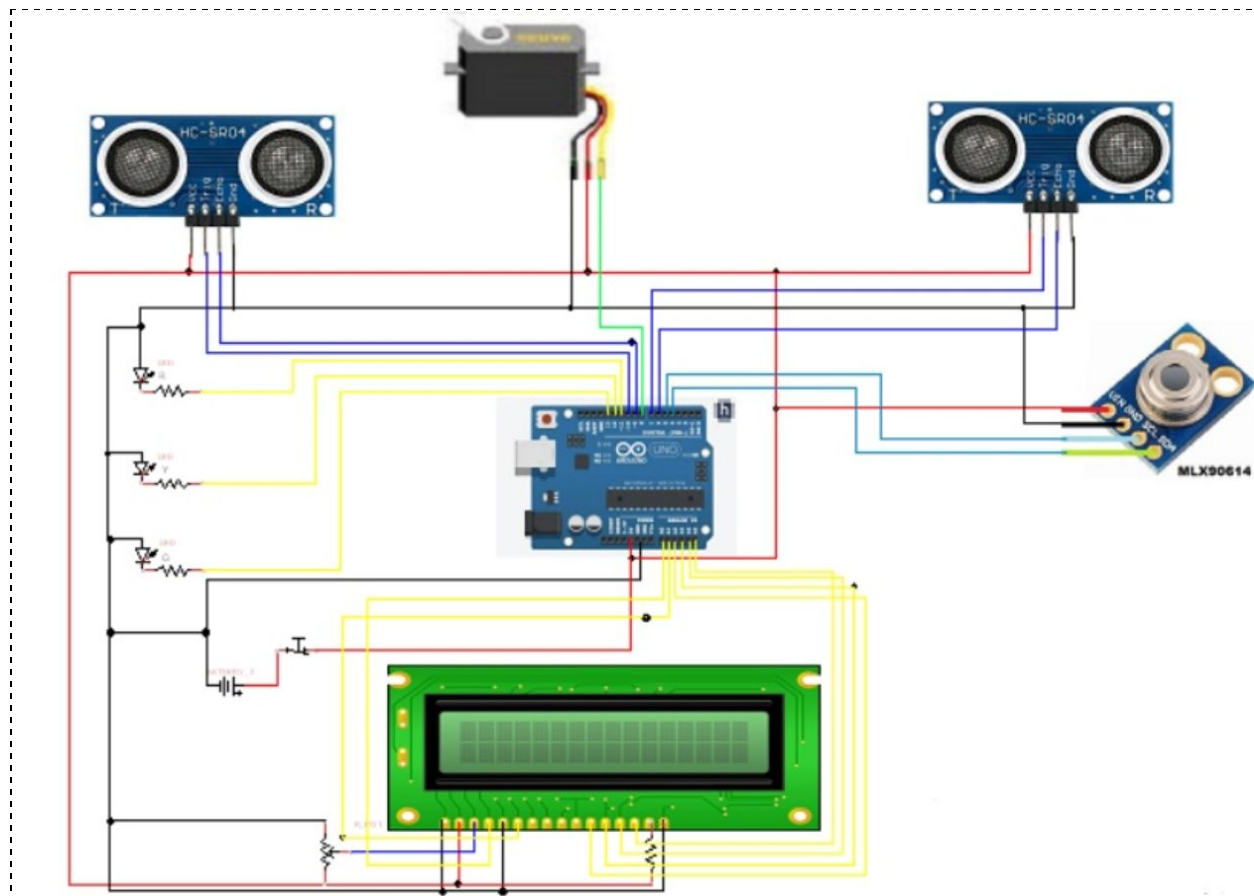
If not, it’ll turn the Red light on and display “The place is filled, please wait.” then it checks the exit sensor whether someone has scanned or not. If not it displays the red light on and repeats the process but if yes, it decreases the current number of people by 1, starts the servo motor to open the door and turn all the lights on, applies a delay and again returns to check if current number of people is less than the maximum number of people allocated and repeats the loop.

But if the number already inside the place is less than the maximum number of people allocated, the device turns the yellow light on and displays “Place is vacant for ‘maximum number of people allocated - current number of people entered’ of people, please scan yourself to enter.” and then checks the entry sensor whether someone has scanned or not. If not, it’ll check the exit sensor if someone has scanned and turned yellow light on and repeat the process if none has scanned the exit sensor too. But if someone has scanned the exit sensor it decreases the current number of people inside the place by 1, starts the servo motor to open the door and turns all the LEDs on, adds a delay and repeats the loop from the start. But if someone has scanned an entry sensor it checks the temperature sensor and displays “Please enter.” and turns green light on, increases the current number of people by 1, starts the servo motor to open the door, adds a delay and repeats the whole loop again if the temperature is eligible. But if the temperature isn’t eligible to enter, it’ll display “Due to your high body temperature, we can’t allow you to enter inside.” checks the exit sensor and repeats the process.





## Circuit Diagram



## Research Plan

The plan of the work will be somehow in the following format:

S.N.	Works to be done	Expected Time Required
1.	Coding and Hardware Buying	2-3 days
2.	Assembling of Hardwares and Program Uploading	1 day
3.	Testing	1 day
4.	Debugging	2-3 days
5.	Final Installation	1 day
	Total	1 week

There may be some changes in this interval under certain unfavorable conditions like if the hardware delivery needs more time, or if any of the modules or sensors didn't function properly and needs to be replaced or if some problem arises in the process of installation. This is just an expected time duration that may increase or decrease with the necessity and conditions.

### Expected Outcome

- I. **Reduced Covid-19 Cases**  
With the implementation of this kind of device the chain of spread of Covid-19 will break and it'll put a comma to the rapid spread of Covid-19.
- II. **Automated with zero Human Contact**  
The soul objective of making this device is to avoid touch. The main reason for the spread of the virus is touch. Here at public places the same knob of the door is touched by many people to open or close it. So, this project is designed such that there is no need to touch and open the door manually, this will automatically be done by the motors if all the conditions are eligible to enter and for departure as well.
- III. **Restriction of Entry of Susceptible People**  
Installation of this kind of device will not allow the people with high temperature who are more susceptible to the risk of virus enter inside the public places.
- IV. **Increment in GDP**  
With the use of this device the small trade and market can be reopened by reducing the risk of the spread of virus. This can help to increase the GDP of the country that has reduced to a very low level due to this lockdown.
- V. **Restart of the Academic Year**  
As already mentioned this device can help to restart schools/colleges by reducing and limiting the number of students in each class/block on an even-odd basis.
- VI. **Make People Aware about the Necessity of Personal Safety**  
As the device continuously keeps displaying "Please, use your mask." This will make people realize the importance of masks to fight the virus. Furthermore, with certain changes it can also display other personal safety measures like washing ; your hands multiple times a day or don't touch your face with your hands without washing according to the necessity.