

# An Automatic way of limiting the crowd in public places to prevent the spread of COVID-19

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**Abstract--** The primary focal point of the venture is to execute a practical and robotized method of restricting the swarm out in the open spots to forestall COVID – 19 utilizing sensors. The World Health Organization (WHO) has encouraged individuals to avoid swarmed spots to shield themselves from the spread of Corona Virus illness. Despite the fact that individuals practice social separating, it may not be compelling when they are available in jam-packed spots. Consequently, there must be a computerized framework to screen the group in broad daylight places. The execution of this framework is finished by utilizing PIC MICROCONTROLLER and interfacing it with IR sensor and LCD. The interfacing programming utilized here is MPLAB IDE .

**Index Terms:** COVID-19, Microcontroller, IR sensor, LCD display, MPLAB IDE

## 1. INTRODUCTION

Coronavirus an irresistible illness brought about by the as of late found Corona Virus began from bats and pangolins. The primary transmission to people was in Wuhan, China. WHO declared it as a pandemic on March 12, 2020 when it was spreading quickly [1]. This flare-up purchased the world to end for a while which took numerous lives all throughout the planet. One method of restricting the spread of an irresistible infection, for example, Covid-19, is to rehearse social separating and restricting the group in broad daylight places. This is certifiably not another idea, as most social orders have been mindful of the benefit of avoiding individuals who are experiencing a contamination for some ages [5].

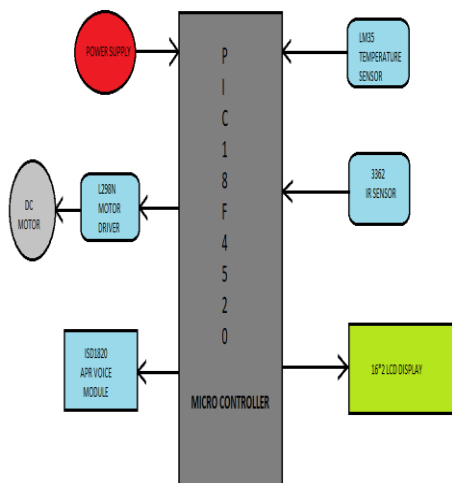
The goal is to decrease transmission, deferring the scourge top, diminishing the size of the epidemic pinnacle, and spreading cases throughout a more extended opportunity to mitigate tension on the medical care framework.

The disease that causes COVID-19 is currently spreading rapidly from person to person. When a solid individual comes into contact with respiratory beads from hacks or sniffles of a contaminated individual, they are can get the disease.

The World Health Organization (WHO) expresses that "Corona virus is communicated by means of beads and fomites during close unprotected contact between an infector and infected [3]. A fomite is an article or material which is probably going to convey disease, like garments, utensils, and furniture. Subsequently, transmission of the disease can be tried not to by avoid others just as from contacting contaminated fomites [2]. By limiting interaction between potentially infected persons and healthy individuals, or between population bunches with high rates of transmission and population bunches with no or low rates of transmission, social separation aims to reduce or interfere with COVID-[7].19 transmission in a population. By every one of these information we can infer that by keeping up friendly separating and by swarm restricting in public places that can stop or hinder the spread of an exceptionally infectious illness [1].

The triumph of old-type general well being apparatuses over SARS gives driving force to proceed with such severe measures for the novel Covid [4] . Given the direction of this flare-up, it is presently a matter of whether we can increase such endeavors to stay up with the quick increment of cases and topographical spread starting case casualty rate was accounted for to be 15%, however the underlying cases were one-sided towards the serious finish of the illness[2], with quickly rising cases, it is currently thought to associate with 2–3%. Until we comprehend the full clinical range of the illness [6].

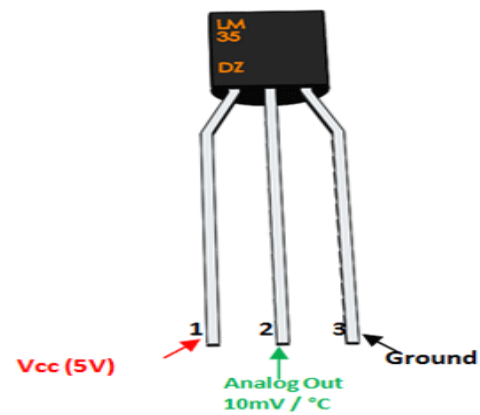
## 2. BLOCK DIAGRAM



**Fig.1.: Block Diagram**

The above figure shows the block diagram of crowd limiting system for preventing COVID-19. Here, we are using a LM35 temperature sensor, which senses the body temperature of a person who is entering a room or a building. We are using an IR sensor for sensing the person who are entering and leaving a room or a building. Here, we used two IR sensor, one is placed at the entrance door and one is placed at the exit door. We are using 16x2 LCD display for displaying purpose. It displays the body temperature of the person who is entering the room, and maximum number of people that can enter into the room and remaining vacancy of the room. It is also used for displaying some alert messages. We are using a 12V DC motor for automatic opening and closing of door. We are interfacing this motor along with L298N motor driver for providing constant current supply to the motor and for operating the motor in both forward & reverse direction. We are using an ISD1820 APR voice module for alerting purpose. It is a 2 channel voice module, first channel is used for alerting the abnormalities in the person's body temperature and second channel is used for alerting when no one enter the building or room. This all above discussed components are interfaced with a microcontroller. The microcontroller used here is a PIC18F4520 series.

#### • LM35 Temperature sensor

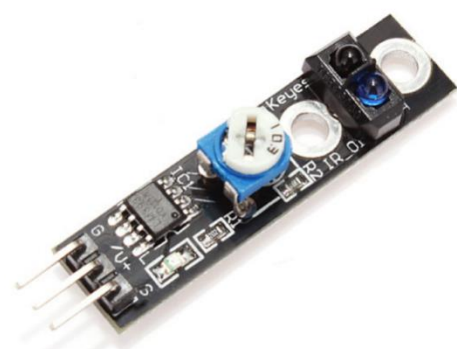


**Fig.2. LM35 Temperature sensor( Temperature sensor)**

LM35 is a precision Integrated circuit Temperature sensor, whose yield voltage differs, in light of the temperature around it. It is a little and modest IC which can be utilized to quantify temperature anywhere between - 55°C to 150°C.

- Lm35 Regulator Features:
- Least and Greatest Input Voltage is 35V and -2V separately. Regularly 5V.
- Can measure temperature extending from -55°C to 150°C
- Output voltage is specifically proportional (Linear) to temperature (i.e.) there will be a rise of 10mV (0.01V) for each 1°C rise in temperature.
- ±0.5°C Accuracy
- Id is less than 60uA
- Cost of temperature sensor is low
- Little and thus appropriate for farther applications
- Accessible in TO-92, TO-220, TO-CAN and SOIC bundle

#### • IR Tracking Sensor



### 3. HARDWARE DESCRIPTION

**Fig.3. IR sensor**

The IR sensor module comprises for the most part of the IR Transmitter and Collector, Opamp, Variable Resistor (Trimmer pot), surrender Driven in a word. IR Driven produces light, within the scope of Infrared repeat. IR light is subtle to us as its recurrence (700nm – 1mm) may be a part higher than the clear light reach. IR LEDs have light discharging point of approx. 20-60 degree and scope of approx. scarcely any centimeters to many feets, it depends on the kind of IR transmitter and the producer. Many transmitters have the reach in kilometer. IR LEDs can be white or plain in colour, and they may emit a large amount of light. When light falls on a photo-diode, it behaves in an IR-beneficial manner. A photo-diode is a semiconductor with a P-N junction that operates in reverse bias, which means that when light falls on it, it starts leading the current in an invert bearing, and the current stream's size is proportional to the size of the light. It is useful for IR discovery because of this feature. Photodiode has a black shade layer on its exterior side, similar to that of an LED. The most significant amount of light is absorbed by the black tone. The IR sensor employments an LM358 Operational Amplifier (Op-Amp) as a voltage comparator. The comparator will look at the preset (pin2) restrain voltage as well as the photodiode's arrangement resistor voltage (pin3). The voltage drop caused by the photodiode's format resistor the surrender of the edge voltage Opamp is tall. The voltage drop caused by the photodiode's format resistor When the Opamp abdicate is moo, the Driven at the Opamp abdicate terminal turns on. When the Opamp surrender is tall, the Driven at the Opamp surrender terminal turns on (Showing the area of Question). It's a preset variable resistor that's being utilized here. It's utilized to alter the remove at which an protest ought to be distinguished.

- **PIC18F4520 Microcontroller**



**Fig.4. Microcontroller**

An PIC18F4520 may be a direct, moo-control, rapid 8-digit, completely static Microcontroller with 40 pins, 36 of which may be utilized as I/O pins. It contains Control-on-Reset (POR) functionality, as well as Amplified Watchdog Timer (WDT) equipment that can be altered from 4ms to 131s. Control Administration Highlights are useful for moo-control applications. It highlights three diverse constrain-on-the-board settings.

1. Able to run MODE
2. Relaxation mode
3. Disabled mode

In addition, device PIC18F4520 has three programmable outer hinders and four Interrupts-On-Change (IOC) pins, which are interesting applications for hinders-related applications. A 13-channel 10-cycle ADC converter module is also included in the framework. Because of its large working voltage range of 2V to 5.5V, it is commonly used in 3.3V or 5.0V rationale level operations.

- **16x2 LCD Display Module**

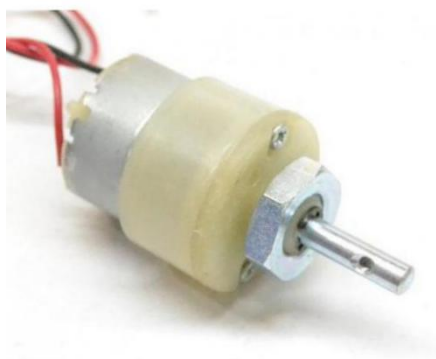


**Fig.5. LCD display**

A LCD is an electronic showcase module that utilizes fluid valuable stone to convey a recognizable picture. The 16×2 LCD appear is an amazingly essential module ordinarily utilized in DIYs and circuits. The 16×2 deciphers o a showcase 16 characters for each line in 2 such lines. In this LCD each character is appeared in a 5×7 pixel matrix A 16X2 LCD has two registers, in particular, arrange and information. The enroll select is utilized to alter from one enroll to other. RS=0 for arrange enroll, in spite of the fact that RS=1 for information

enlist. The arrange enroll stores the arrange headings given to the LCD. An arrange could be a direction given to LCD to do a predefined assignment. Models like: instating it clearing its screen setting the cursor position controlling presentation and so forward Taking care of for orders happens within the arrange enlist. Information Enlist: The information enlist stores the information to be appeared on the LCD. The information is the ASCII worth of the character to be appeared on the LCD. At the point when we send information to LCD it goes to the information enlist and is arranged there. At the point when RS=1, information enroll is chosen. . It's not harder to frame bespoke characters on an LCD show. It requires information of the LCD chip regulator and initially planned subjective get to memory (CG-Slam). The Hitachi HD4478 regulator is found within the larger part of LCDs. The most component in making bespoke characters is CG-Smash. Once articulated within the code, it spares the custom characters. The CG-Smash is 64 bytes in capacity, allowing you to make eight characters at once. The measure of each character is comprised of seven bytes. In hexadecimal, the CG-Smash address is 0x40, or 64 in decimal. At these spaces, able to create bespoke characters. We may print our characters effortlessly by sending commands to the LCD when we make them at these places. Underneath are the character area and printing orders.

#### • 12V DC Motor



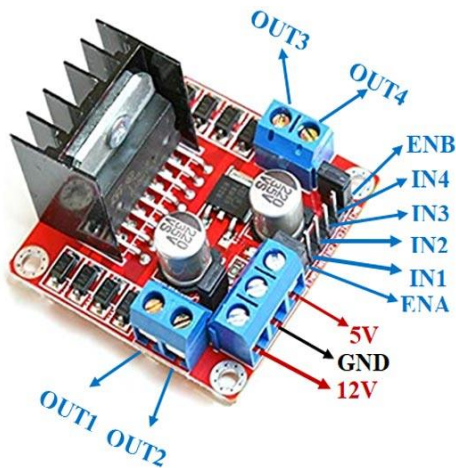
*Fig. 6. DC Motor*

DC motors are electric motors that are fueled by coordinate stream DC, for case, from a battery or DC control supply. Their emolument can be brushed or brushless. The speed of a brushed

DC motor can be obliged by changing the voltage alone. Paradoxically, an AC motor is fueled by exchanging current (AC) which is characterized by both a voltage and a repeat. In this way, motors that are controlled by AC require an alteration of repeat to alter speed, counting more intellect boggling and over the top speed control. This makes DC motors more qualified for adapt going from 12V DC frameworks in autos to transport motors, both which require fine speed control for a scope of speeds over and underneath the assessed speeds. When choosing DC motors, mechanical buyers ought to recognize the key presentation subtle elements, choose arrange and measure necessities, and think approximately the ecological prerequisites of their application. This assurance oversee is aiming to help with this interaction. Determination are the rpm is 150, working volt is 12v and the adapt box is connected to shaft torque is 2Kgcm no load current is 60mA and stack current is 300mA. DC Motor - 200RPM - 12Volts outfitted motors are for the foremost portion a basic DC motor with a equip box associated to it. This may be utilized on off-road robots and grouping of mechanical applications. These motors have a 3mm hung bore opening within the shaft consequently simplifying it to interface it to the wheels or a few other mechanical gathering. 200RPM 12V DC planning motors by and large utilize for progressed mechanics applications. Greatly basic to utilize and open in standard measure. The foremost celebrated L298N H-interface module with introduced voltage controller motor driver can be utilized with this motor that encompasses a voltage of some place in run of 5 and 35V DC or can be most correct motor jumper module from the wide reach available in Motor jumpers classification concurring to particular prerequisites. Nut and strings on the shaft to effortlessly relate and interior hung shaft for successfully interfacing it to the wheel. DC Geared motors with healthy metal gearbox for considerable applications, open within the wide RPM run and evidently suitable for mechanical innovation and advanced applications. Exceptionally straightforward to utilize and open in standard estimate.

#### • L298N Motor Driver





**Fig.7. Motor Driver module**

This L298N Motor Driver Module could be a higher driving driver for DC and Stepper Motors. A L298 motor driver IC and a 78M05 5V controller make this module. Up to 4 DC motors or dc Control motors with directional and speed control can be overseen by the L298N Module. A L298 Motor Driver IC, a 78M05 Voltage Regulator, resistors, capacitor, Control Driven, and a 5V jumper are indeed included within the L298N Motor Driver module. When the jumper is set, the 78M05 Voltage Controller is empowered. When the drive supply isn't absolutely or comparable to 12V, the voltage controller and the 5V stick control the inward equipment. When the vitality source is more than 12V, the jumper must be evacuated and a partitioned 5V ought to be provided through the 5V connector to control the interior equipment. The ENA and ENB pins control the speed of Motor An and Motor B, individually, while the IN1& IN2 and IN3& IN4 pins control the course of Motor An and Motor B.

- **ISD1820 APR Voice Module**



**Fig.8. Voice recorder module**

Voice Record Module is base on ISD1820, which a numerous-message record/playback gadget. It can offers veritable single-chip voice recording, no-unstable capacity, and playback capacity for 8 to 20 seconds. The case is 3.2k and the all out 20s for the Recorder. This module utilize is basic which you may facilitate control by press button prepared or by Microcontroller, for case, Arduino, STM32, Chip Unit, you'll basic control record , playback and rehash, etc.3.3V control supply (VCC) GND stands for "control ground." REC - The REC input may be a Tall record flag that's dynamic. When REC is Tall, the module starts recording. For the length of the recording, this stick must remain Tall. REC takes need over any playback flag (PLAYL or PLAYE). PLAYE - Edge started playback: When a Tall going move is recognized, playback continues until an Conclusion of Message (EOM) marker is found or the memory space is depleted. PLAYL - Playback, Level Actuated; a playback cycle is begun when the level of this input stick changes from Moo to Tall. Speaker Outputs — The SP+ and SP pins drive loudspeakers with impedances as moo as 8 ohms specifically. The amplifier input sends its signals to the on-chip preamplifier through the MIC flag. FT (Bolster Through): This mode permits the amplifier to specifically drive the speaker. P.E. - Keep playing the recordings uncertainly. Record Work Informational Once you press the REC button, the RECLED will light up, and you ought to keep squeezing it until the recording is wrapped up. Press and hold the REC button. Select a playback mode: PLAYE, fair ought to press the button once, and the record will be played back in its aggregate or the control will be turned off; You must continuously press this button until you would like to stop or

wrap up the playback record; When employing a brief PE jumper, the record will replay for a certain sum of time until the jumper is turned off or the FT mode is turned off.

#### 4. SOFTWARE DESCRIPTION

The MPLAB® X Integrated Advancement Environment (IDE) may be a exceedingly adaptable programming environment that combines profitable devices to assist you look, sort out, create, troubleshoot, and qualify inserted plans for most Microchip microcontrollers and computerized flag regulators. MPLAB X IDE is congruous with the MPLAB improvement organic framework of programming and gadgets, which incorporates a tremendous assortment of freebies. MPLAB X IDE comes with a slew of highlights to assist you debug issues and cut down on improvement time. Here are many more later highlights,

- Information Visualizer ,There's no compelling reason to purchase advance recognitions disobedient since Information Visualizer can show live gushing information.
- I/O See For fast gear validation, I/O See can affirm and control stick states.
- Assets for Supportive Plan: Spare time with helpful joins to programming libraries, datasheets, and client enlightening that are given as required.
- Basic to Utilize: Enrolling and characterizing spots are presently fair a tap absent.
- For creation level programming, it incorporates the MPLAB Integrated Programming Environment (IPE).

#### 5. DESIGN AND IMPLEMENTATION

Design flow for the proposed system.

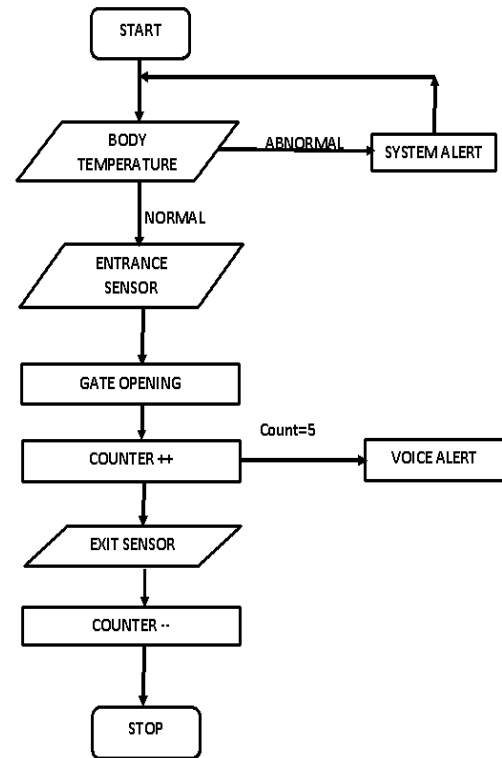


Fig.9.Flow chart for the proposed system

#### 6. RESULTS AND DESCUSSIONS

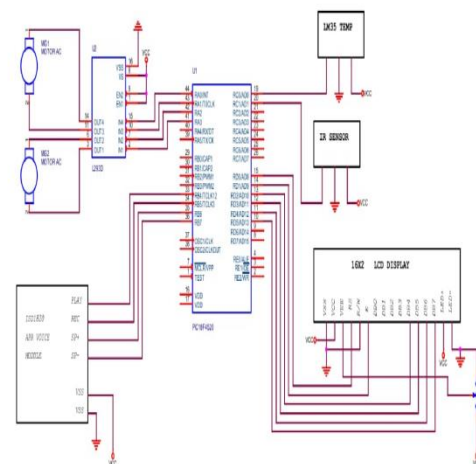
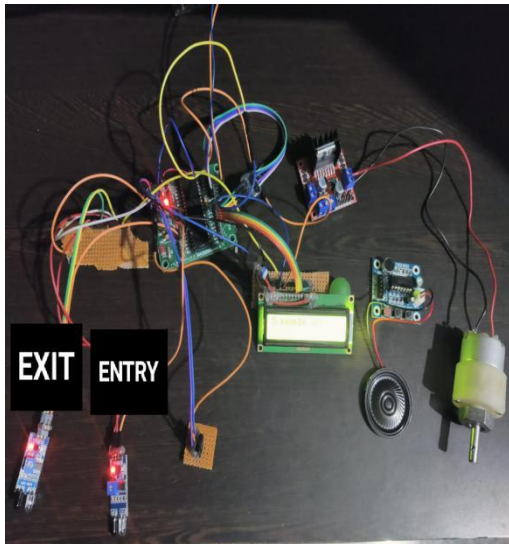


Fig.10.Schematic Diagram for Proposed System

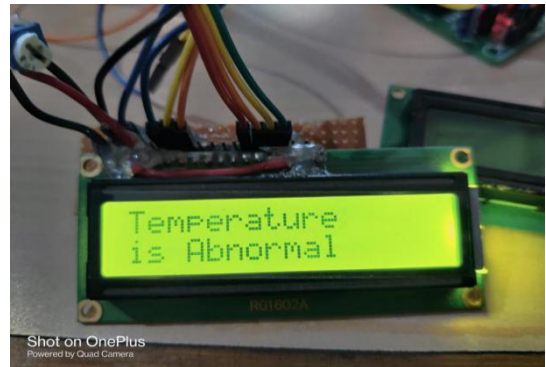


**Fig.11.** Hardware Interfacing of the Proposed System



**Fig.12.** Body temperature of the person

If the person's body temperature is abnormal, an alert message will be displayed in the LCD showing that "Temperature is abnormal" and "Please consult a Doctor". The same alert message will be alerted using ISD1820 APR voice module kit. Hence the entry will be restricted to that person. If only the body temperature of the person is normal, he/she can enter the room.



**Fig.13.** Displaying alert message "Temperature is Abnormal"



**Fig. 14.** Displaying alert message "Please Consult Doctor"

Initially we have to set a limit for maximum number of people that can be allowed inside a room. Here, we have set that limit has '5' and this limit will be displayed in the LCD display.



**Figure 15:** Displaying the max. People that can be allowed

We have placed an IR sensor at entrance door as well as at exit door. Whenever a person needs to enter the room, this IR sensor



senses by his/her movement and an active low signal will be sent to the microcontroller. Hence the microcontroller actuates the DC motor to open the door automatically. After some time delay the door gets automatically get closed. Simultaneously, the count value will be reduced by '1' whenever a person enter the room.



*Fig.16. LCD displaying remaining persons that can allowed into room*

Whenever there are max. People that are already inside the room, this LCD display will display an alert message showing that "No Entry Allowed". The same alert message will be

alerted using ISD1820 APR voice module kit. Unless or until a person leaves the room this alert message will be displaying in the LCD and the entry will restricted. Once a person leaves the room a count value will be increased by '1'.



*FIG. 17. Displaying alert message "NO ENTRY ALLOWED"*

From this we are able to limit the crowd in public places automatically and it can bring a drastic change in spreading rate of COVID-19 virus.

## 7. CONCLUSION

- The infection that causes COVID-19 is currently spreading rapidly from person to person. When a solid individual comes into contact with respiratory beads from hacks or sniffles of a contaminated individual, they are can get the disease.
- In dealing with the overall Covid-19 pandemic situation, straightening the curve for Covid instances will be difficult if people do not take action to stop the illness from spreading.
- we can really make changes in the spreading of Corona Virus by limiting the crowd in public places and also maintaining social distancing.
- When unsafe distances between people are identified, cautions or alarms might be issued to keep the distance safe.



## 8. REFERENCE

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