PEOPLE COUNTER

Project statement:
To Build a circuit design to count the number of people traversing an entrance**.**

Project Description:
In this project, we are going to design a circuit, which will count the number of people passing through an entrance. We will assume that only one person can go through the entrance at a time. Also to make it more practical we will assume the entrance to be a door of a room. One person will enter or leave the room through the door at a time. We will also keep a log of the net number of persons in the room by counting the total number of people entering and leaving the room.

To achieve our goal we will be using Arduino UNO and PIR sensors to count the number of people entering and leaving, and an LCD screen to display the results. We will be using a temperature sensor and buzzer for better results.

Components Used:-
1. PIR sensor
2. LCD screen
3. Resistors
4. Circuit board/ Breadboard
5. Arduino UNO
6. Temperature sensor (TMP36)
7. Buzzer
8. Wires

Technologies Used:-
All objects with a temperature above absolute zero emit heat energy in the form of electromagnetic radiation. Usually, this radiation isn't visible to the human eye because it radiates at infrared wavelengths, but it can be detected by electronic devices like **PIR sensors**.
And that is the most important working principle.

A liquid-crystal display (LCD)
It is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers.
Liquid crystals do not emit light directly, instead use a backlight or reflector to produce images in colour or monochrome.

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing

something online etc.

The basic principle of working of the **temperature sensors** is the voltage across the diode terminals. If the voltage increases, the temperature also rises, followed by a voltage drop between the transistor terminals of the base and emitter in a diode.
Tmp36 sensor give values from 20 to 358 and these values correspond to temperature range -40 to 120-degree Celsius and 180 is corresponding to approx. 36 degree
(for further information one may refer to:
https://www.encardio.com/blog/temperature-sensor-probe-types-how-it-works-applications/)

Piezo buzzers are constructed by placing electrical contacts on the two faces of a disk of piezoelectric material and then supporting the disk at the edges in an enclosure. When a voltage is applied across the two electrodes, the piezoelectric material mechanically deforms due to the applied voltage.
(for further information one may refer to:
https://www.cuidevices.com/blog/buzzer-basics-technologies-tones-and-driving-circuits)

Workflow
The work started up from a meeting and we were expected to learn Arduino. We began with a small task to lighten up the LEDs. After its submission, we did the actual task of counting the people through the PIR sensor in the best possible way. With its completion, we searched for ways to display the count on an LCD display instead of the serial monitor. This marked a new phase of learning. It was advised to upgrade it with buzzers and temperature sensors as well. So we made a people counter device capable of checking the body temperature and buzzing if someone's body temperature is not within the desired limits.

Applications:
1.In marketing
(a)With help of people counter, no. of customers in malls or any other place can be analysed to get the information like at what time of the day we have maximum no. of the customers and when we have a minimum count. Thus, can decide no. of servents required at different times of the day and can reduce labour cost.

(b)We can place people counter at different stores within the malls so that we can know about the demands of the customer.

2.In colleges and schools, it helps us in knowing the number of students attending the class.

2.In temples or Public gatherings:
Sometimes the crowd in the temples becomes too high which causes inconvenience to the people inside. So we can use a people counter to avoid so, like when the no. of people in temple reaches to a decided threshold then further entry of people can be denied.

Problems tackled through this project:

- Devices like people counters are extremely useful when it comes to keeping track of the number of people entering or exiting a particular entrance.
- It saves time and ensures accuracy.
- It may be useful when space is available only for a certain number of people and thus will automatically deny further entry of people.
- With the advancement of technology, we can even deploy parts like TMP36(Temperature sensors) and Buzzers to understand the need of the hour.
- This will check the temperature of people and if it's above the set limit, it will automatically buzz indicating the person as a coronavirus suspect.
- It may be a single door system or a double door system both of which have their own merits and demerits.
- With a single door, it may save costs with some extra coding but it may fail at times when a person passes the first sensor but doesn't pass through the second sensor and at the same time the person inside passes along the inside sensor. This will increase the count falsely.
- The double door system is free of all these errors but it's too costly.

Scope of Improvement or (Future Prospects) -

- It can be implemented in security solutions where we can equip it with a variety of sensors to make it more efficient and reliable.
- It can be upgraded with TMP36 and piezo buzzers as mentioned above to serve as a dual-purpose device.
- With LCD displays, it can become more efficient as everyone can see the count.
- We can also implement fingerprint sensors in our project. If implemented properly it may serve as an effective tool to keep track of the people in a particular area or space.
- With a PIR sensor, it is not possible to count the correct number if more than one person is entering at a time, this will simply increase the count by one, so we require improvement by the use of other sensors and technology.

- We can also add the face recognition system so that it can keep a record of a known person along with the count of the total number of people in the room. It will buzz when some unknown person will enter.

Conclusion:
People counter is one of the best and amazing implementations using a microcontroller. It has various applications along with some limitations. These limitations can be overcome with the help of technology. It can also be coupled with technology like a face recognition system to make it more advanced and useful. In our project, we implemented the simple version of it which will keep the count of no. of people, display the count on the screen, and also buzz when a corona suspect enters the room.

Report by:
Lakshya Mittal
Aditya
Sanjay Pratap Singh
DEVID KUMAR DEKA

Mentored by:
Pavan Kumar
G Bala Ratna Swamy