

Abstract

Safety counter is a device which allows to manage a large crowd by dividing the large crowd into smaller groups. The term 'safety' is due to the situation facing by the whole world today, where large gathering is not permitted. So, in this situation this device provides safety by allowing small groups of people from large crowd to enter a place and restricting others to enter until the number of people inside a place is lower than a specified number and the term 'counter' is because device uses the key principle of counter.

Safety counter also provides the facility of Sanitization spray when a person enters the place/room.

Introduction

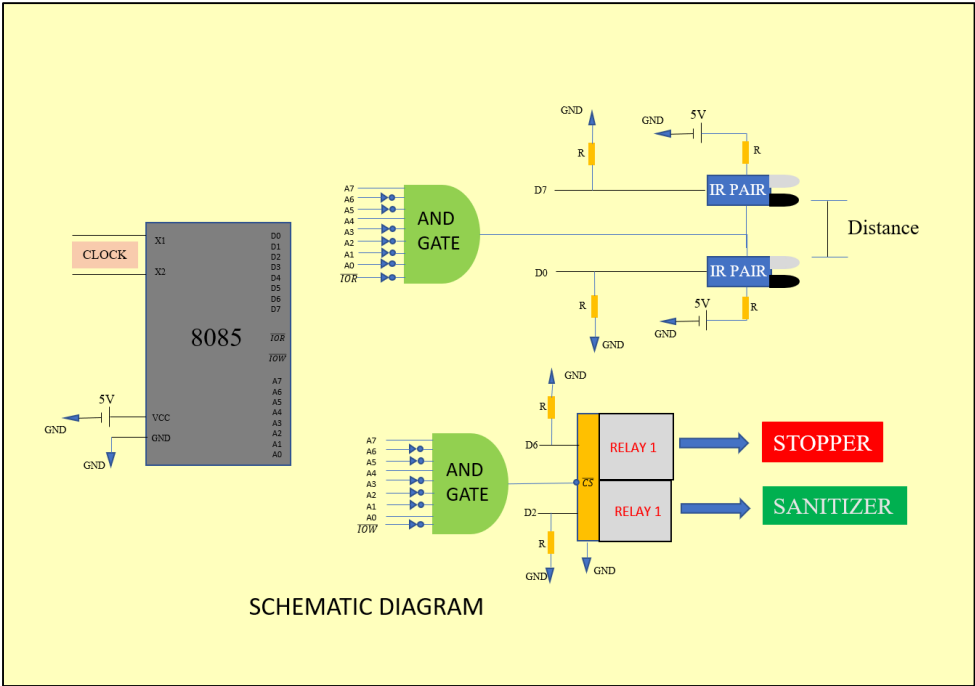
The Safety Counter is a device that is used to allow only a specific number of people to enter a place and restrict others to enter until the crowd inside a place is below the specified count.

It works by managing the number (counts) of people entered and exited from the room. It activates barriers/stoppers when the count of people inside a room/place gets above a specific number and restricts people to enter. It also provides the facility of sanitization which gets activated when a person enters the room.

It senses the entry and exit of people by using the IR pair sensors and takes actions like enabling sanitization pump and activating the barriers/stoppers by the help of the actuator like relays which are connected to the microprocessor 8085.

Total number of people visited are stored to memory location 8400H. Maximum number of people that can be counted by the device is 65,536 (65 K).

Schematic Diagram



Working Procedure

Initialize the accumulator, register C as 8-bit counter and HL register pair as 16-bit counter to zero.

1. There are two IR pair sensors named IR pair 1 and IR pair 2 used to input data and installed at some distance from each other and connected to microprocessor 8085.
2. The program decodes someone entered or exited the room/place by using the following algorithm.
3. When someone crosses IR pair 1 followed by IR pair 2 then the algorithm decodes it as person entered the room.
4. And algorithm decodes person exited the room when the person crosses IR pair 2 and then IR pair 1.
5. So, after identifying someone entered it increments the counter by one and decrements counter by one if person exits from the room.
6. Program compares the number of people entered the room with specified count (10 in our case).
7. So, it allows only 10 persons at a time and stops the others by activating the stopper/barrier (relay connected at loc. 91H to data pin D6) that restricts 11th person to enter the room until someone exits out from the room.
8. Here barriers can be buzzer or light indicator or stopper.
9. When the person enters the room, microprocessor also activates the sanitizer pump (relay connected at loc. 91H to data pin D2).
10. At last it stores the total number of people visited to memory location 8400H.
11. Maximum number of people counted by the device is 65,536 (65k).

Program Code

| Memory address | Label | Machine code/Opcode | Mnemonics with Operands | Comments |
|----------------|---------|---------------------|-------------------------|--|
| 4200 | | 3E 00 | MVI A,00H | Initialize reg. A |
| 4202 | | 0E 00 | MVI C,00H | Initialize reg. C for counter |
| 4204 | | 21 00 00 | LXI H,0000H | Initialize HL pair as counter |
| 4207 | ENTRY: | DB 90 | IN 90H | IR pairs connected at 90H |
| 4209 | | E6 01 | ANI 01H | Checking IR pair1 ON/OFF |
| 420B | | CA 23 42 | JZ EXIT | Jump if IR pair1 OFF to location EXIT |
| 420E | CHECK: | DB 90 | IN 90H | IR pairs connected at 90H |
| 4210 | | E6 80 | ANI 80H | Checking IR pair2 ON/OFF |
| 4212 | | CA 0E 042 | JZ CHECK | Jump if IR pair2 OFF to location CHECK |
| 4215 | | 23 | INX H | Increment HL pair |
| 4216 | | 22 00 084 | SHLD 8400H | Store HL pair value to memory location 8400H |
| 4219 | | CD 35 42 | CALL RELAY | Switch ON Sanitizer by calling RELAY |
| 421C | | 0C | INR C | Increment counter |
| 421D | | 3E 0A | MVI A,10 | Move value 10 to reg. A |
| 421F | | B9 | CMP C | Compare reg. C value with A |
| 4220 | | CC 40 42 | CZ STOP | Call STOP if Z=1 |
| 4223 | EXIT: | DB 90 | IN 90H | IR pairs connected at 90H |
| 4225 | | E6 80 | ANI 80H | Checking IR pair2 ON/OFF |
| 4227 | | CA 07 042 | JZ ENTRY | Jump if IR pair1 OFF to location ENTRY |
| 422A | CHECK1: | DB 90 | IN 90H | IR pairs connected at 90H |
| 422C | | E6 01 | ANI 01H | Checking IR pair1 ON/OFF |

| | | | | |
|------|---------|-----------|------------|---|
| 422E | | CA 2A 42 | JZ CHECK1 | Jump if IR pair1 OFF to location CHECK1 |
| 4231 | | 0D | DCR C | Decrement counter |
| 4232 | | C3 07 042 | JMP ENTRY | Jump back to location ENTRY |
| 4235 | RELAY: | 06 50 | MVI B,50H | Initialize reg. B with value 50H |
| 4237 | COUNT: | 3E 20 | MVI A,04H | Initialize reg. A with value 04H |
| 4239 | | D3 91 | OUT 91H | Switch ON Sanitizer |
| 423B | | 5 | DCR B | Decrement reg. B |
| 423C | | C2 37 42 | JNZ COUNT | Jump if Z not Zero to location COUNT |
| 423F | | C9 | RET | Return back |
| 4240 | STOP: | 3E 04 | MVI A, 40H | Initialize reg. A with value 40H |
| 4242 | | D3 91 | OUT 91H | Activate Stopper |
| 4244 | | DB 90 | IN 90H | IR pairs connected at 90H |
| 4246 | | E6 80 | ANI 80H | Checking IR pair2 ON/OFF |
| 4248 | | CA 40 42 | JZ STOP | Jump if IR pair2 OFF to location STOP |
| 424B | CHECK2: | DB 90 | IN 90H | IR pairs connected at 90H |
| 424D | | E6 01 | ANI 01H | Checking IR pair1 ON/OFF |
| 424F | | CA 4B 42 | JZ CHECK2 | Jump if IR pair1 OFF to location CHECK2 |
| 4252 | | 0D | DCR C | Decrement Count |
| 4253 | | C9 | RET | Return back |
| 4254 | | 76 | HLT | Terminate |

Output/Result

The device counts the number of people and restricts more than 10 persons to enter into a room by comparing the number of people entered with specified count (10 in our case). When number of people gets equal to the specified count microprocessor activates the barriers and stops people to enter the place until number of people inside room gets lower than the specified count. The device also sprays sanitizer on the person when he enters. After the completion of count the counted value get stored to memory (8400H).

| INPUT | OUTPUT |
|--|---|
| IR pair1 sensor (connected at 90H pin D0) | Final 16-bit Count stored at memory location 8400H |
| IR pair1 sensor (connected at 90H pin D7) | Stopper/barrier (relay connected at 91H pin D6) |
| | Sanitization Pump (relay connected at 91H pin D2) |

Future Goals

As the whole world is going through the pandemics of COVID-19 where people are advised not to gather in large number. So, in this pandemic, Safety counter can be very helpful as it can prevent us from large crowd as this device allows a small proportion of crowd to enter a place and it also provides the facility of sanitization spray.

This device is very helpful at the places where large crowd gathers like at shops, hospitals, etc.

This device can also be used to auto switch ON/OFF the Lights. For auto switching, the device need some modification. Modifications like some more actuators (like relays) connected to microprocessor that auto switches the lights. Auto switch works when first person enters the room then it switches ON the light and switches OFF the light when last person exits out. It takes decision by calculating the number of people entered and exited.