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Automatic Room and Temperature Monitoring with Visitor Counter Using Arduino and IOT

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Abstract: The objective of our project is to reduce human effort to control the mass gathering and excess consumption of electricity. As in today's scenario advancement of technology is way above in today's digital world. Everyone prefers smart devices over humans to work accurately. This device will provide a solution to reduce the consumption of electricity and as well as it also monitoring the real time count of the person. This device will be very helpful where large gatherings are restricted. In today's situation the government restricts the maximum allowed person in any gathering, this device allows real time counting for easy management. It uses infrared sensors to detect any object/ person entering the room then it will automatically activate the electricity of that room and the second sensor continuously detects when someone leaves that room then it will automatically turn off the electricity of that room.

Keywords: Digital visitor counter, IR Receiver, Microcontroller, Liquid crystal display (LCD), and Arduino uno, Resistors LED.

I. INTRODUCTION

In today's generation everyone wants to depend on an automatically advanced device which helps to reduce human effort drastically and give better output. This project is basically based to track the how many persons are entering and leaving in the room ,it displays the real time numbers on the display if no exceeds to the maximum no then it will automatically buzzer .This device also ensure the minimum consumption of electricity because sensor detects automatically the person and activate and deactivate the bulbs and appliances of that part of area. It uses arduino uno as a cpu to work smartly .when someone passes through the entrance then it will detect through IR sensor and increase the count and when someone leaves the exit it will automatically decrease the count at the same time it also monitors the control of lights in the room.

II. HARDWARE REQUIREMENTS

The main hardware component that mainly required for my projects are bellow.

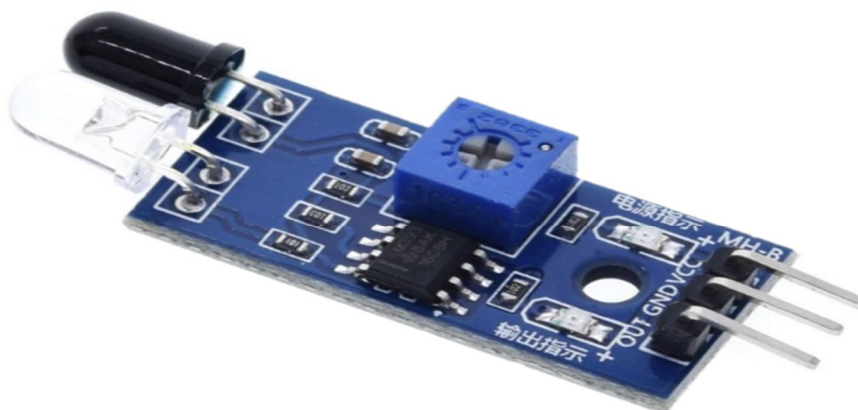
A. Arduino UNO

- 1) The Arduino Uno is an open source microcontroller based on the Microchip _AT_mega328P microcontroller.
- 2) The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards and other circuits.
- 3) The board has 14 digital Input/Output pins in which six are capable of PWM output and 6 analog I/O pins, and is programmable with the Arduino UNO (Integrated Development Environment), via a type B USB Cable .
- 4) The word "UNO" means "one" in Italian and was chosen to mark the initial release of Arduino Software.
- 5) The Uno board is one of the first series of USB-b



B. IR Sensor Module

- 1) An infrared sensor emits and/or detects infrared radiation to sense its surroundings to sense any objects and other things.
- 2) The basic concept of an Infrared Sensor (IRS) which is used as an Obstacle (Objects) detector is to transmit an infrared signal, this infrared signal bounces from the surface of an object and the signal is received at the infrared receiver.



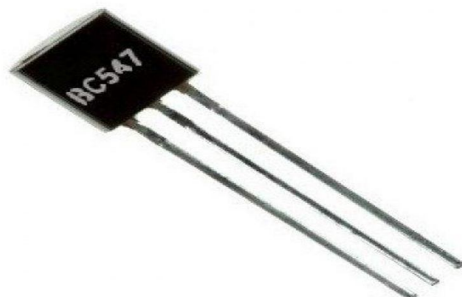
C. 16x2 LCD Display

- 1) The term LCD stands for liquid crystal display. It is one kind of electronic display module that is used in an extensive range of applications like various circuits & devices like mobile phones, calculators, computers, TV sets, etc.
- 2) These displays are mainly preferred for multi-segment light-emitting diodes and seven segments. The main benefits of using this electronic display module are inexpensive (low cost); easily programmable, animations, and there are no limitations for displaying custom characters, special and even animations, etc.
- 3) In this 16x2 LCD Pin 1 - Ground/Source Pin, Pin 2 - VCC/Source Pin, Pin 3 - V0/VEE/Control Pin, Pin 4 - Register Select/Control Pin mode, and 1 = command mode, Pin 5 - Read/Write/Control Pin, Pin 6 - Enable/Control Pin, Pins 7-14 Data Pins.
- 4) In this 16x2 LCD Pin 15 (+ve pin of the LED): This pin is connected to +5V Pin 16 (-ve pin of the LED): This pin is connected to GND.



D. BC547 Transistor

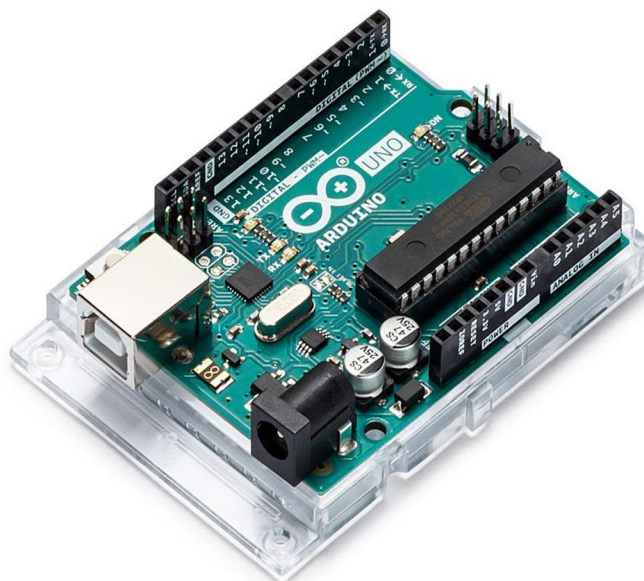
- 1) BC547 is a NPN transistor, hence the collector and emitter will be left open (Reverse biased) when the base pin is held at ground and will be closed (Forward biased) when a signal is provided to the base pin.
- 2) BC547 has a gain value of 110 - 800, this value determines the amplification capacity of the transistor.
- 3) The maximum amount of current that could flow through the Collector pin is 100mA, hence we cannot connect loads that consume more than 100mA using this transistor.



III. SOFTWARE COMPONENT

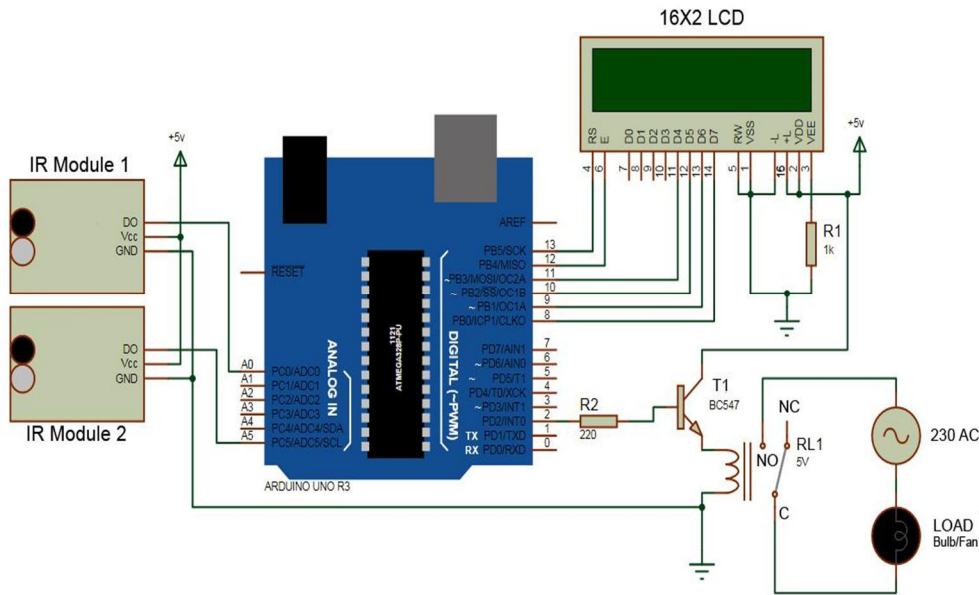
A. Arduino

- 1) Arduino is an open_source platform basically used for building many electronics projects.
- 2) Arduino consists of both a physical programmable circuit board and a piece of software, or IDE (Integrated Development Environment) that runs on your computer.
- 3) The Arduino platform has become quite popular these days with people just starting out with electronics, for good reason and many more reasons. Unlike most previous programmable circuit boards that are too heavy and were complex to use.
- 4) The Arduino doesn't need a separate piece of hardware in order to load new code onto the board; you can simply use a USB cable.
- 5) The Arduino IDE mainly uses a simplified version of C++, that makes it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro_controller into a more accessible package.



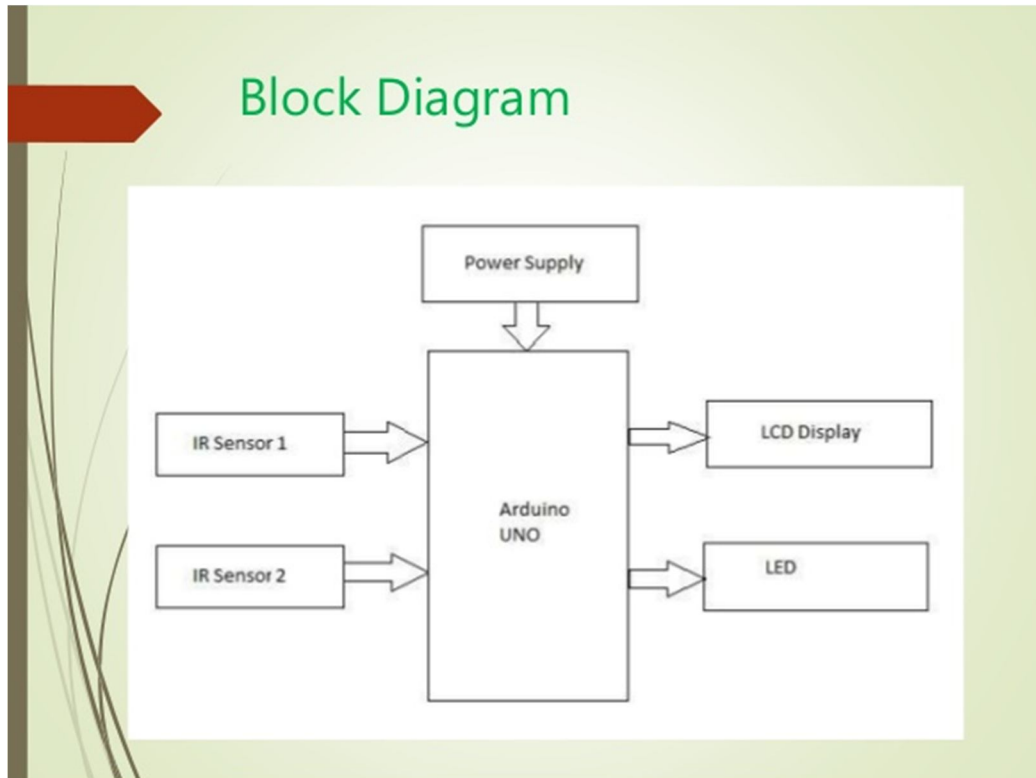
IV. CIRCUIT DIAGRAM

The circuit diagram of the proposed model is shown in figure. The coloured lines specify the wires connecting the circuit elements. To connect various elements in a single port, a breadboard is used.



V. METHODOLOGY

The flow of execution of the proposed model is shown below in the figure. Micro controller refers to the Arduino UNO.



VI. PROPOSED MODEL WORKING

The IR sensors are placed at the entrance of the door; it is placed such that one is present behind the other that is both the sensors can detect the person consecutively. The logic behind the working of the counting process is simple, when the person crosses the sensor near the door and then to the sensor away, it recognizes as an increment in count. If the person crosses the sensor placed away from the door and then sensor near the door, then it will be decremented. Increment in the sense, person enters the room whereas decrement denotes the person leaving the room. It is to be noted that both sensors should not be simultaneously detected, so the sensors should be placed apart from each other constricted to the entrance region. The LCD board gets refreshed at every instance as the time delay kept is very small in a few milliseconds so that the count display should not be lagged at any instance. Potentiometer is connected to the LCD so as to adjust the contrast of the LCD display board. Lights and fans can be connected to the relay such that they get started working at once the relay switch gets closed. The opening and closing of the relay is controlled by the Arduino UNO board. If the count in the room is equal to zero then the relay switch is in open mode. The relay gets closed at once the count is raised greater than 1. To avoid discrepancies in counting, set a condition in the algorithm such that the count should not precede the limit zero. If count goes less than zero, then set the counting variable to zero again. Mahmud Hossain Jewel, Jahid Hasan, Nazmul Islam [6] used the smoke sensors additionally to detect the gas leakage. The digital pins of the Arduino UNO are connected to the LCD display board. IR sensors are connected to analogue ports of the Arduino UNO. Video of the working model is given as a sample in this reference which will be useful for further conclusions about the physical structure and the working nature.

A. Benefits Of Digital Visitor Counter

- 1) *Easy To Count Humans*– When somebody enters the room then this counts how many people have entered the room? For example:-In this pandemic, only 50 people are allowed to go to the marriage hall. If there are more people than that, then they will start making noise.
- 2) *Save Electricity* – It will help to save electricity. When no one is there in the room the fans and lights will be off.
- 3) *Work Automatic* – When somebody enters in the room then this counts automatically through sensor and no need of any person for count. It can be used for automatic room light and fan control. Reduces the human work – Whole system will work automatically so it reduces the human work.
- 4) *Check The Temperature* – If the temperature is good for humans then it will allow them to enter the room. If the temperature is not good then it will exit automatically. Time savings – Because this works automatically, that's why saves the time of humans and no human needs.
- 5) *Security* – It checks the temperature of humans, that's why it helps in the security. Provides security as the door is password based and the password is confidential so intruders cannot enter the room. For example- in this pandemic, when some people enter the mall then before it will check the temperature of humans. After that humans will enter the mall so that other people will be safe.
- 6) *Low Cost*

B. Application Of Digital Visitor Counter Digital Visitor Counter

It can be used to count and display the number of people entering inside any seminar hall or conference hall. If a person enters the room then it increases by one and if a person leaves the room then it decreases by one. We define applications of digital visitor counter in many fields like that:-

- 1) *Official Meetings*: Digital visitor counter can be used at official meetings. There will be a limit of people to come to the meeting that's why only important employees can come to the meeting. Suppose that, if only 20 employees are allowed in the meeting, 20 employees will enter the meeting. If there are more than 20 employees then it will exit after counting.
- 2) *Marriage Hall*: It can be used at marriage halls. Where the capacity of the marriage hall is limited and should not be exceeded. The project will display the actual number of persons inside the marriage hall. Where the number of people attending a marriage party can be calculated easily. For example:-in this pandemic, where the government allows only 50 people to come to the marriage hall. Where it shows the limitation of people that's why, we can easily calculate the number of persons.
- 3) *Homes And Other Places*: It can be used at home and other places to keep a check on the number of persons entering a secured place and calculate the number of guests getting inside. And also used in our home because many times we come out of our rooms without turning off the lights or without locking the room.

- 4) *Automatic Room Light Controller:* We need automatic equipment in today's world. It works , when some people enter the room, the lights automatically turn on and then some people leave the room, the lights turn off automatically with the help of a sensor For example:- It can be used in school, college , office, home etc.
- 5) *Electricity Conservation:* It can also be used to save electricity. Suppose that ,when no one is in the room then lights and fans will automatically turn off. Due to which we can save electricity.
- 6) *Check Temperature:* If the temperature is good for humans then it will allow them to enter the room. If the temperature is not good then it will exit automatically.
- 7) *Limitations Of Digital Visitor Counter:* More than one candidate should not enter or exit the room, if it happens it will count it as a single person. When anybody is inside the room we need to switch off the power then we've to do it manually. That's why we fail to control the light automatically. Digital visitor counter is not a high range circuit and we can not use it in large areas. With frequently changing in the count value , after a certain amount of time the output can look confusing. In a seven segment display board we can count up to a certain number of people entering into the room. If the body entering the room is greater than the maximum limit of the display board then we fail to count it.

VII. CONCLUSION

The project entitled Digital Visitor Counter helps to count the entering and exiting person in a particular passage. It is very helpful to use on any limited counted place . It can be used for automatic room light control ,when no one is present in the hall appliance will be off thus it will help to save electricity. In this project there is no need for human intervention.

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