

# Bidirectional Visitor Counter for Smart Power Management

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## ABSTRACT

In today's world, there is a continuous need for automated appliances. With the increase in the living standards, there is an immediate need for developing circuits that would change the complexity of life to simplicity. This Project is designed and presented in order to count the visitors of an auditorium, hall, malls, etc. The system counts both the entering and exiting visitor of the auditorium or hall or other place, where it is placed. Depending upon the sensors interruption, the system identifies the entry and exit of the visitor. On the successful implementation of the system, it displays the number of visitor present in the auditorium or hall.

Depending on the number of people present in the hall we are going to control the lights and fans on considering the environmental aspects like temperature, light etc. If no one in the room the fans and lights are going to switched off automatically, the fan's speed is regulated according to the temperature in the room. When the projector switch get turned ON all the lights will get turned OFF but fans remains in the ON condition.

**Keywords:** Arduino board, LDR, IR Sensors, LCD.

## I. INTRODUCTION

The "BIDIRECTIONAL VISITOR COUNTER FOR SMART POWER MANAGEMENT IN AN AUDITORIUM" is a reliable circuit that takes over the task of controlling the room lights as well as counting number of persons/visitors in the auditorium very accurately and also to regulate the fan according to the temperature inside the auditorium. When somebody enters into the room then the counter is incremented by one and the main circuit gets energized, the light will be only switched OFF until all the persons in the room go out. The total number of persons inside the room is also displayed. The microcontroller does the above job. It receives the signals from the sensors, and this signal is operated under the control of software. Microcontroller continuously monitors the Infrared

Receivers. When any object pass through the IR Receiver's then the IR Rays falling on the receivers are obstructed. This obstruction is sensed by the Microcontroller Atmega328/P.

The electronic device nowadays is rapidly taking its best position to ease the human complexity of living life. As per the concern of the human disabilities in keeping counter of everything happening in and around the world we limit this project to you to increment the functioning of the visitors through the controlling system. The audacity of this project will not only give a count of the person entering the room but will also light up according to the individuals entered and regulate the fan according to the temperature inside the auditorium. We set up the program in such a way so that each individual when under goes this system will leave a mark through the

counter and lighting up the LED and fan will be regulated according to the temperature. This project will negotiate as well as cooperate to its level best if we put in better action and give it a better way of exposure. The real time power consumption, temperature and count data are displayed using the 16x2 LCD. When the projector switch get turned on all the lights will get turned off but the fans will remains in the on condition.

## II. LITERATURE REVIEW

[1] The main aim of this paper is to design and employ of power saving in general public places like auditoriums, shopping malls and theatres etc. Generally an Auditorium consists of so many number of electrical and electronic devices or equipments. To control and monitor all these equipments or appliances we need a person or controlling system.

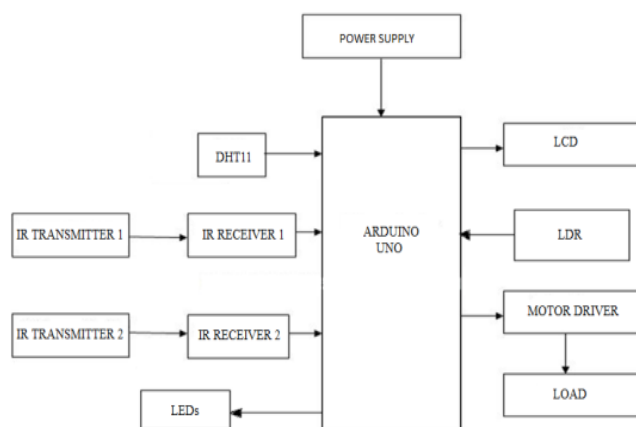
[2] In this paper Automatic controls play an ever-increasing role in a human way of life. Automatic control is vast technological area whose central aim is to develop control strategies that improve performance when they applied to a system. the distinct characteristic of automatic control is that it reduces the human operator. One such gadget is the fan. In this paper, an automatic control solution is suggested to control the fan speed.

[3] The project controls a room light as well as count the number of individuals entering and leaving a room. When an individual enters in to a room then counter is incremented by and accordingly number of lights in a room will be switched ON and when the individuals leaves a room then the counter is decremented by one. Lights will turn OFF when all the individuals go out of a room. The total number of individuals present inside a room is also displayed on the LCD display. IR sensors sense the obstruction and microcontroller receives these Signals produced by the obstruction from the sensors. The received

signal is operated via program stored in ROM of Microcontroller.

[4] Microcontroller at89s52 based visitor counter flow chart, bidirectional visitor counter using fpga, IR sensor based visitor counter circuit diagram, pc based visitor counter in microcontroller, visitor counter using atmega16 microcontroller, concept of bidirectional counter using 89s52, future scope related to bidirectional counter.

## III. METHODS AND MATERIAL



**Fig 1:** Block diagram of Bidirectional visitor counter

Infrared sensors are a type of light sensors they function in the infrared part of the frequency spectrum. IR sensors are active sensors they consist of an emitter and a Receiver. When the beam is cut the controller then accordingly comes to know if the person is entering or exiting and then accordingly increments or decrements the count, which is, then displayed on the 16 x 2 Alphanumeric LCD. If there are people in the room, the controller turns on the power in the room. Since the controller cannot provide the necessary power a relay is used. The controller turns ON/OFF the relay using a motor driver circuit.

## MATERIALS REQUIRED

### A. HARDWARE COMPONENT

#### 1. Arduino UNO board:

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

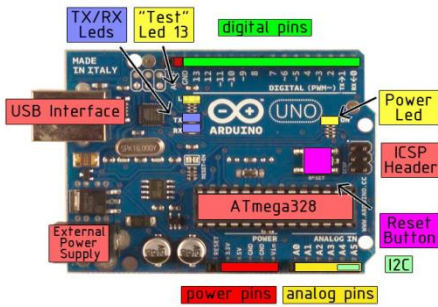


Fig 2: Arduino board

#### 2. IR Sensor:



Fig 3: IR sensor module

The basic concept of an Infrared Sensor, which is used as obstacle 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. An IR sensor consists of an emitter, detector and associated circuitry.

#### 3. LDR:



Fig 4: LDR

A light dependant resistor also know as a LDR, photo resistor, photo conductor or photocell, is a resistor whose resistance increases or decreases depending on the amount of light intensity. LDRs (Light

Dependant Resistors) are a very useful tool in a light/dark circuits.

#### 4. Motor driver L293D:



Fig 5: motor driver

It is a simple 16 pin dual H-bridge IC for DC Motor. It act as current amplifiers since they take a low current control signal and provide a higher current signal.

#### 5.Liquid Crystal Display(LCD):



Fig 6: Liquid crystal display

Liquid Crystal Display screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs.

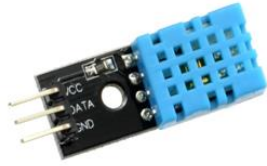
#### 6. LED light:



Fig 7: LED light

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## 7. DHT11:



**Fig 8:** Temperature sensor

DHT11 digital temperature and humidity sensor is a composite sensor contains a calibrated digital signal output of the temperature and humidity.

## 8. DC Motor (PMDC):



**Fig 9:** DC motor

A DC Motor whose poles are made of permanent magnets is known as permanent magnet DC (PMDC) Motor. The construction of PMDC is similar to conventional dc motor whose stator poles are replaced by suitable permanent magnet no need to have field windings.

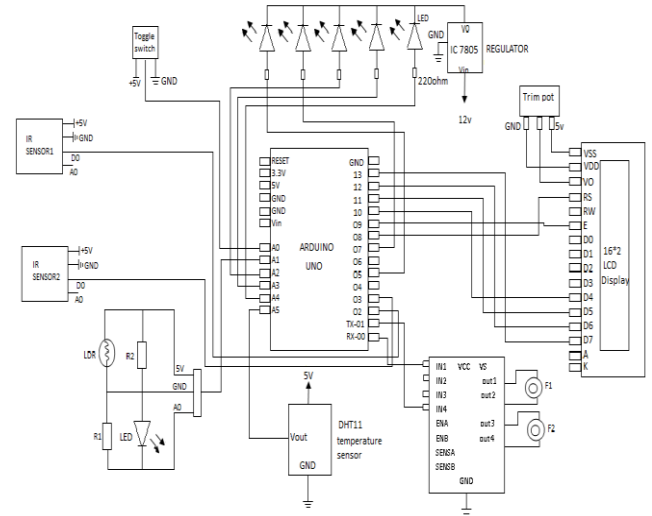
## B. SOFTWARE REQUIREMENT

### Embedded C in Arduino software:

Embedded C is one of the most popular and commonly used programming languages in the development of embedded systems. Embedded system consists of both hardware and software. If we consider a simple embedded system, the main hardware model is the processor. The processor is the heart of embedded system and it can be anything like a Microprocessor, Microcontroller, DSP, CPLD (Complex programmable logic device) and FPGA (Field programmable-gated array).

## IV. RESULTS AND DISCUSSION

### A. CIRCUIT DIAGRAM

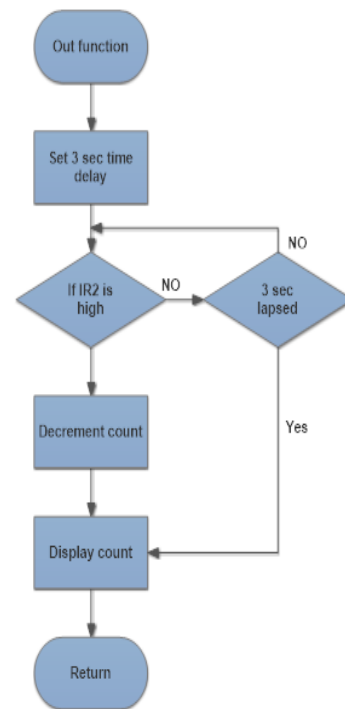
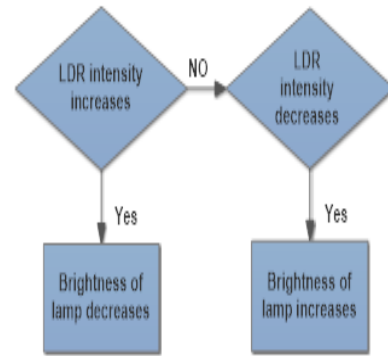
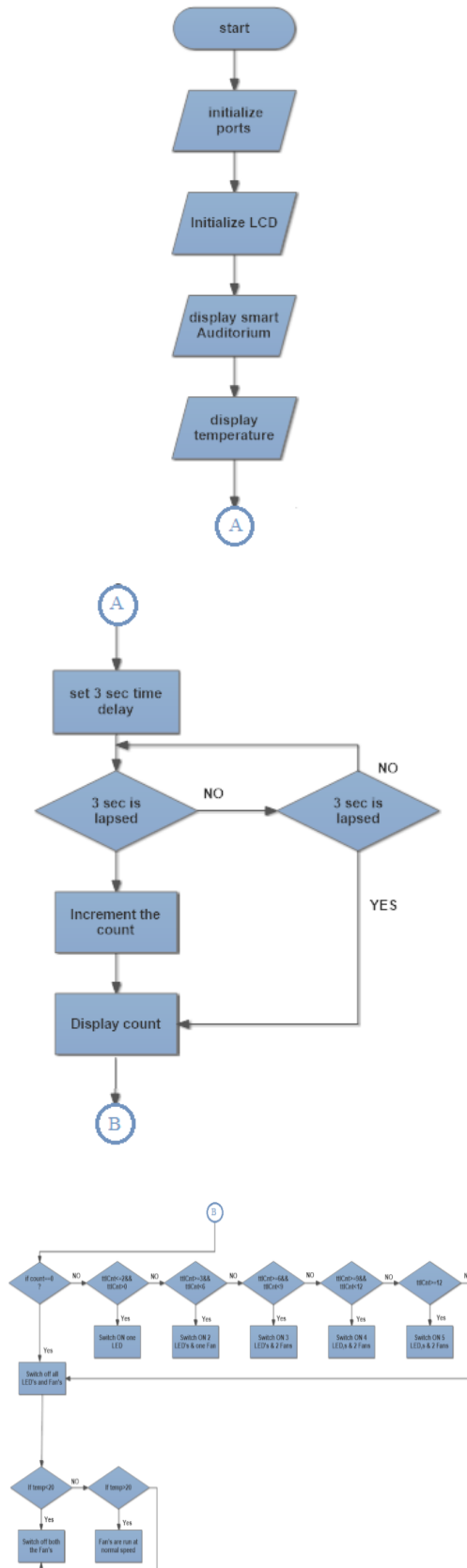


**Fig 10:** Circuit diagram

### Circuit operation:

The two IR sensors are directly connected to the microcontroller pin the outputs of two sensors are applied as a high pulse and low pulse. These high and low pulses are considered as set-1 and reset-0. These conditions are checked by microcontroller as per the written code in it, if the interruption occurs in sensor 1 followed by sensor 2 results in an increment in the count value and if the interruption occur in sensor 2 followed by sensor 1 results in decrement in the count. If the count is less than one, the LED and fan circuit get turned off. There are two IR sensor namely IR sensor IN and IR sensor out for detecting the person's entry and exit movements through the door, when the person enters the room the count get incremented and the led will glow depending on the output from the LDR. The temperature sensor (DHT11) used in the project determines the temperature of the room and the microcontroller takes the input from sensor depending on the temperature value transistor drive circuit operates the dc fan. The temperature and number of counts are displayed in LCD (16\*2).

## B. FLOW CHART



## V. CONCLUSION

This project deals with the usage of the energy in this competitive world of electricity. This project saves more electric power than it seems and also collaborates the knowledge of electric and digital study. The functioning also teaches us how we can preserve electricity even in the electricity-based project. This system is an effective way for the power management, automatic device control and together count, temperature and power consumption. Controlling circuit used in this project controls the devices like fans, lights etc. This system can be used to operate other devices for the effective power usage.

## VI. FUTURE SCOPE

1. Multiple devices can be turned ON/OFF instead of just lights and fans.
2. By modifying this circuit we can achieve the task of opening and closing the door.
3. A long with this metal detector can be added for security reasons.

## VII. ACKNOWLEDGMENT

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