

Object Sensor and Counter Using Arduino Uno

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Abstract- Object sensor and counter is a reliable circuit which overtakes the role of counting number of persons/visitors in the room. When anyone enters the room, the counter is incremented by one and when anyone exits the room the counter is decremented by one and the total number of persons present in the room is displayed on LCD. Microcontroller is used here to make a secure count over a large number of visitors. It gets the signals from the sensors and these signals are stored in ROM. The audacity of this project will not only give count of the person entering the room but will also light up according to the persons entered. This system is basically required in many places where count for the visitors is needed by the administrator of that system. Visitor counting has not any limit to the entry/exit point of a company, but it has a wide range of applications which give information to management on the volume and flow of people in allocation. The basic method for counting the number of visitors includes sharing human auditors to standard manually that tallies the visitors who enter or exit by a location. It is readily available in the market and is easy to build.

Keyword: LCD, ROM, Microcontroller, Audacity.

1. INTRODUCTION

This research project of "Object Counter and Sensor" is based on the interfacing of some components such as sensors, motors etc. with Arduino microcontroller. This counter can count people in both directions. This circuit can be used to count the number of persons entering a hall/mall/home/office in the entrance gate and it can count the number of persons leaving the hall by decrementing the count at same gate or exit gate and it depends upon sensor placement in mall/hall. It can also be used at gates of parking areas and other public places.

The main objective of this work is in our home, school, colleges or industry we see that fan and lighting point are kept on even if there is nobody in the room or area and passage. This happens due to negligence or because we forgot to turn lights off or we are in a hurry. To avoid all such situations this "Object Sensor and Counter" is designed.

2. RELATED WORK

Gaurav Waradkar, Hitesh Ramina, Vinay Maitry, Tejasvi Ansurkar, Asha Rawat, Parth Dasin "Automated Room Light Controller with Visitor Counter" is a reliable circuit that takes over the task of controlling the room lights as well as counting number of persons / visitors in the room very accurately [1]. Ying-Wen Bai, Yi-Te Ku in "Automatic room light intensity detection and control using a microprocessor and light sensors" propose a design using both a microprocessor and light sensors for automatic room light detection and control. Their design, the HLCM (Home Light Control Module) which will be installed in every light fixture of a family [2].

Subhankar Chattoraj, Aditya Chakraborty in "Bidirectional Visitor Counter with Automatic Room Light Controller and Arduino as the master controller" proposed 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 [3]. Sonali K. Pawar, in "Automatic Room Light Controller Using microcontroller ATMEGA16A and bidirectional visitor counter" controls a room light as well as count the number of individuals entering and leaving a room. When the number of individuals in a room is greater than 5 then 2 lights will be switched ON [4]. E. Shilpa in "Implementation of Automatic Room Light Controller with Visitor Counter Design using 8051 Microcontroller" proposed and designed in this paper that is the visitor counter that is bidirectional in feature which can read both the incoming and outgoing traffic and agents at same time securely [5]. Erdem, Hin "Design and implementation of data acquisition for fuzzy logic controller" is that need for a device that can automatically control the lightening system of a room and capability of taking count of number of people in a room on its own has been long overdue [6]. Dr. Abhijit Banubakode in "Energy Efficient Automated Public Utility" proposed that the basic objective after using a PLC is that PLC has a capability of handling several Inputs, Output signals especially discrete. The overall automation of the Utility is controlled using SCADA software [7].

3. OBJECT SENSOR AND COUNTER

The project "Object sensor and counter" is divided in four parts: Arduino Uno, IR sensors, micro controller and counter display. Arduino is a microcontroller-based open source electronic prototyping board which can be programmed with an easy-to-use Arduino IDE. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo. We have used two IR sensor modules which contain IR diodes, potentiometer, Comparator (Op-Amp) and LED's. Potentiometer is used for setting reference voltage at comparator's one terminal and IR sensors sense the object or person and provide a change in voltage at comparator's second terminal.

A microcontroller is the most prominent black rectangular chip with 28 pins. Think of it as the brains of your Arduino. The microcontroller used on the UNO board is Atmega328P by Atmel (a major microcontroller manufacturer). 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. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

4. IMPLEMENTATION

This project has two modules, first one is known as “Object counter” and second module is known as “Automatic room light controller”. Main concept behind this project is known as “Object counter” which measures the number of persons entering in any room like seminar hall, conference room, hotel rooms. Here Arduino receives the signals from the sensors, and this signal is operated under the control of software which is stored in the ROM. LCD display placed outside the room displays this value of person count. This person count will be incremented if somebody enters inside the room and at that time lights are turned on. And in reverse way, person count will be decremented if somebody leaves the room. When number of persons inside the room is zero, lights inside the room are turned off. Here we used +12V and +5V dc power supply, this is to provide the required amount of voltage to essential circuits. +12V voltage is given. +12V is given to relay driver. To get the +5V dc power supply we have used here IC 7805, which provides the +5V dc regulated power supply. For sensing the person and light we are using the light dependent register (LDR). By using this sensor and its related circuit diagram we can count the persons. The high-performance Microchip Pico Power 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with read-while-write capabilities, 1024B EEPROM, 2KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2 wire serial interface, SPI serial port, a 6-channel 10-bit A/D converter, programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. We are using the transistor and the relays. One relay driver circuit we are using to control the light. Output signal from AT89S52 is given to the base of the transistor, which we are further energizing the particular relay. Because of this appropriate device is selected and it does its allotted function. When the relay gets the output it supplies voltage to the bulbs and if someone enters the room bulb switch ON with increase in counter and if someone exits bulb switch OFF with decrease in counter.

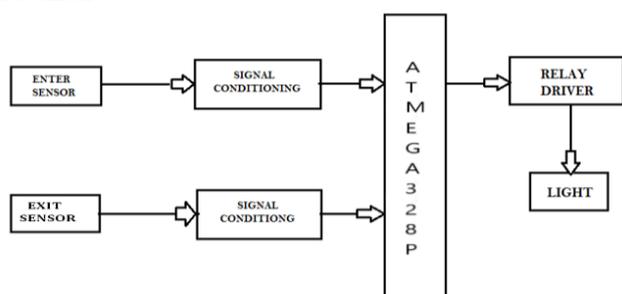


Fig1: block diagram

Advantages:-

1. Low cost
2. Easy to use
3. Implement in single door

4. Main advantage of this project is that it helps in energy conservation. Because when there is nobody inside the room then lights are automatically turned off.
5. Human effort to count the number of persons is eliminated. Since this project does the automatic person counting with the help of two sensors installed on the door frame.

Application:-

1. For counting purposes
2. For automatic room light control

5. FUTURE SCOPE

This project gives us an opportunity to do a big project in the future. The applications stated above are some demo applications that are absolutely possible with its future development. Initially, due to the limitation of time and required funds, we were able to develop just a home appliance control system. The system will also work using IR sensors.

1. It will be more efficient than Laser light and Photodiode. So, we have a big work scope in this sector. We hope that, we will be able to complete all the features needed for its ultimate applications.
2. We can send this data to a remote location using mobile or internet.
3. Voice alarm system can be added to indicate that the room is full and persons cannot enter inside.

6. CONCLUSION

“Automated Room Light Controller with Visitor Counter” is a system to control Room (Classroom, Auditorium, Hall) Lights (LEDs) as well to count the number of persons entering the room. According to our motto of the project “automation, Saving electricity, Increasing appliance life span and yet providing a desired output smartly”. A set of IR sensors will tabulate entry /exit and accordingly manipulate the visitor counter. As the individual enters a row in the auditorium, accordingly the individual IR sensors present in each row will tabulate the count limit of that row. When the user walks out the main door the visitor counter decrements.

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