Automatic Room Light Controller with Bidirectional Visitor Counter

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Abstract: *Wastage of electricity is one of the main problems which we are facing nowadays. In our home, school colleges or industry we see that fan/lights are kept on even if there is nobody in the room or area/passage. This happens due to negligence or because we forgot to turn lights off or when we are in a hurry. To avoid all such situations we have designed this project called "Automatic room light controller with visitor counter". This project has two modules, the first one is known as "Digital Visitor counter" and the second module is known as "Automatic room light controller". The main concept behind this project is known as "Visitor counter" which measures the number of persons entering any room like seminar hall, conference room, classroom. This function is implemented using a pair of Infrared sensors. LCD display placed outside the room displays this value of person count. This person count will be incremented if somebody enters the room and at that time lights are turned on. And in a reverse way, person count will be decremented if somebody leaves the room. When the number of persons inside the room is zero, lights inside the room are turned off using a relay interface. In this way Relay does the operation of "Automatic room light controller". Since this project uses 2 infrared sensors, it can be used as a Bidirectional person counter as we.*

Keywords: Microcontroller, IC, Sensor, Transformer, Reset, Disc capacitor, Reset button switch, Rectifier diode, Transistor, Segment Display

I. INTRODUCTION

The project of "Digital visitor counter" is based on the interfacing of some components such as sensors, motors etc. with microcontroller 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. This project is divided in four parts: sensors, controller, counter display and gate. The sensor would observe an interruption and provide an input to the controller which would run the counter increment or decrement depending on entering or exiting of the person. And counting is displayed on a 16x2 LCD through the controller. When any one enters in the room, IR sensor will get interrupted by the object then other sensor will not work because we have added a delay for a while. When any one enters in the room, IR sensor will get interrupted by the object then other sensor will not work because we have added a delay for a while.

II. HARDWARE PLATFORM

The hardware consists primarily of a digital cpu, an Arduino Uno circuit, an Infrared Sensor module, 16x2 LCD screens, all of which are addressed in detail along with their basic functions

2.1 Arduino UNO

Historically, an Arduino board consists of an Atmel 8-, 16-, or 32-bit AVR[14] microcontroller with complementary components that allow for programming and integration into other circuits. The Arduino's standard connectors are an essential feature since they enable users to link the CPU board to a number of interchangeable add-on modules known as shields. Few shields interact directly with the Arduino board via different pins, but several shields are individually

addressable via an I2C serial bus, allowing many shields to be stacked and used in parallel. It provides 14 digital I/O pins, six of which can produce pulse width modulated signals, and six analogue inputs, which can also be used as six digital I/O pins. This board has a 5 volt linear regulator and a 16 MHz crystal oscillator[21].

2.2 Infrared Sensor Module

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. The radiations are invisible to our eyes, which can be detected by an infrared sensor. The emitter is simply an IR LED[12] (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED.

2.3 Liquid Crystal Display (LCD)

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. The reasons being: LCDs[11] are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix.

III. METHODOLOGY

In this paper our main aim is to propose model for visitor counter. Proposed system architecture is shown in Figure.


A block diagram representing the circuit developed The system is built on the interference of an infrared wave. The source of light is an infrared beam. There are two parts in the Bidirectional Visitor Counter with Automatic Room Light Controller and Arduino as the master controller. An IR diode[13] is used as the transmitter. It must be powered by a 5 volt DC supply and installed on one side of the door frame. On the front end of the receiver is an RX.

3.1 Controlling Actuators

Finally, the activation is handled by the Arduino gateway. When continuously tracking sensors in real time. The Arduino reacts in real time to monitor the on/off of the lead and the buzzer. This machine is divided into two sections: the transmitter section, which provides power and the light output, and the receiver section[16], which provides the power and the light output. The other is the receiver part, which takes light input and implements it on the enters sensor circuit and exit sensor circuit.

3.2 System Protection

Sometimes, irrational variations in power supply damage the system's components. As the BD139 transistor[18] is supplied with input power and supplies outputs to the modules, it not only provides a liner power supply but also guards against power surges
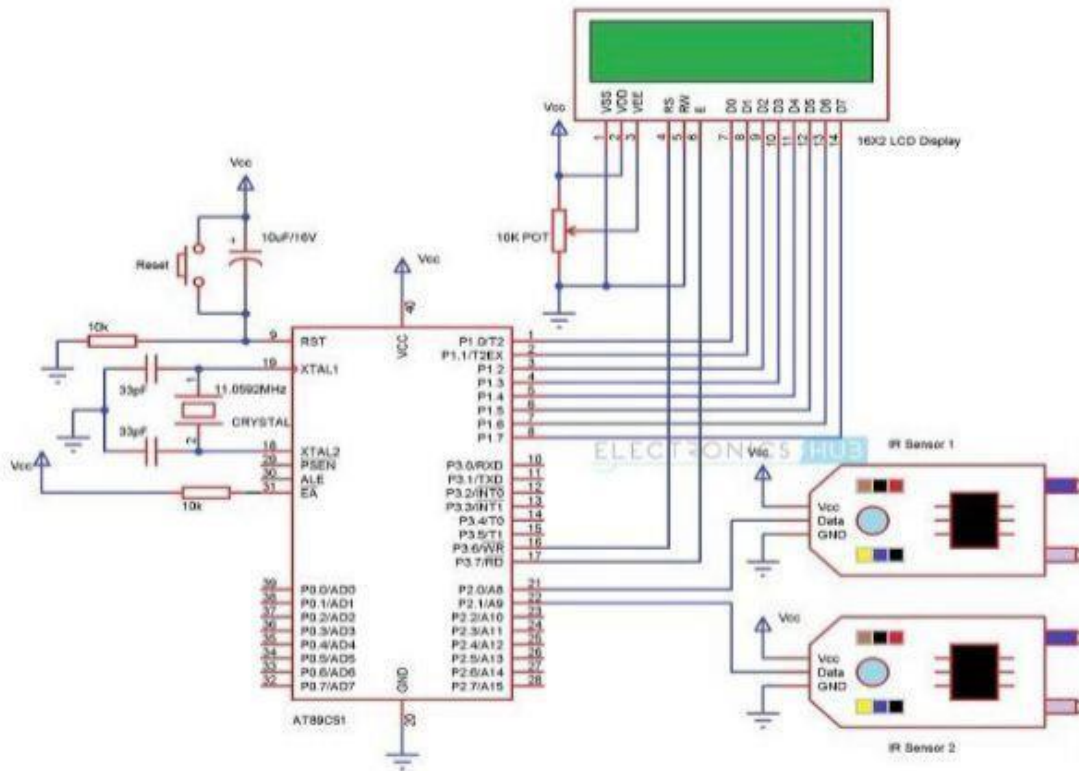
Figure: Circuit Diagram

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IV. RESULT

We built a prototype that represents the system in order to incorporate and explain the technically formed system. As a result, the whole structure that is being implemented as seen below.

Figure: Implementation of Project

We can see different sections of the formed circuit board in this figure, which is connected with the Arduino's [17]digital and analogue pins where appropriate. The picture above shows the visitor counter panel modelled by Arduino(IDE), which includes all of the above-mentioned components.

V. CONCLUSION

This paper proposes and implements a novel architecture for an economic bidirectional Visitor Counter and space lighter controller. It explains how to use Arduino to power a bidirectional [19]guest counter and a room light counter. The cost of this equipment is very low. This project makes use of low-cost, off-the-shelf materials. As a result, the net deployment cost is very low and affordable to the average consumer. This low-cost scheme is intended to increase the quality of living and the difficulty of guest counting. It contains reliable data and strives to eliminate errors whenever possible. Any recommendations for future work can be made, such as the installation of cameras from which not only the count but also the image can be precisely processed. Through managing the Wi-Fi modules[20], wireless networking can be applied to the device. The whole device can be designed as a low-cost commercial hardware kit.

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