

Automatic Load Control with Visitor Counter Using Arduino

P.Shanmukha Rao¹, P.Srinivasa Rao², K. Valmeeki³, K. Muragan⁴

^{1,2,3,4} B.Tech Students, Department of Electrical Engineering, Aitam College, Tekkli

Abstract- The aim of the project we have designed a circuit that switches load automatically whenever a person enters and leave the room respectively. The benefit of this circuit is that after entering the room person will not have to search for the light switch the light will automatically be turned on and need not to switch it OFF as the person leave the room, the room load will be turned off automatically.

INTRODUCTION

Nowadays without electricity we cannot imagine our daily life because electricity has become a necessity for all. Therefore, utilization of these resources for power supply is the best possible way of producing, conserving and renewing energy, which is advantageous as it is pollution free, affordable, and free from environmental impacts.

Many environmental effects and day-by-day depleting energy resources warn us to save energy by using automatic room controller and energy-efficient lighting systems. Nowadays the wastage of electricity has become a routine thing for us.

However, there is a solution to control energy efficient lights at home by using automatic load controller. This article provides information about such a solution of energy efficient lighting to conserve energy by optimizing home appliances such as lights, fans, etc

IR TX and IR RX:

This infrared transmitter and receiver is called as IR TX-RX pair. Color of IR transmitter and receiver is different. However you may come across pairs which appear exactly same or even has opposite colors and it is not possible to distinguish between TX and RX visually. In case you will have to take help of multimeter to distinguish between them. Pair of Infrared LED and Photo diode tuned to same IR wavelength. This sensor can be used to detect

reflecting silver/white strip, obstacle detection, flame detection, etc.



Light Dependant Resistor:

A Light Dependent Resistor (LDR) or a photo resistor is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light sensitive devices. They are also called as photo conductors, photo conductive cells or simply photocells.

They are made up of semiconductor materials having high resistance.

LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits. As the amount of light falling on this LDR increases, its resistance decreases. Light Dependent Resistor is suitable for use in projects which require a device or circuit to be automatically switched on or off in darkness or light.



Arduino Microcontroller :

Arduino is an open source electronics prototyping platform based on flexible, easy-to-use hardware and software. It's intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments. It's an open-source physical computing platform based on a microcontroller board, and a development environment for writing software for the board.

In simple words, Arduino is a small microcontroller board with a USB plug to connect to your computer and a number of connection sockets that can be wired up to external electronics, such as motors, relays, light sensors, laser diodes, loudspeakers,

microphones, etc., They can either be powered through the USB connection from the computer or from a 9V battery. They can be controlled from the computer or programmed by the computer and then disconnected and allowed to work independently.



ATmega328 features

- Microcontroller: ATmega328
- Operating Voltage: 5V
- Input Voltage (recommended): 7-12V
- Input Voltage (limits): 6-20V
- Digital I/O Pins: 14 (of which 6 provide PWM output)
- Analog Input Pins: 6
- DC Current per I/O Pin: 40 mA
- DC Current for 3.3V Pin: 50 mA
- Flash Memory: 32 KB
- SRAM: 2 KB (ATmega328)
- EEPROM: 1 KB (ATmega328)
- Clock Speed: 16 MHz

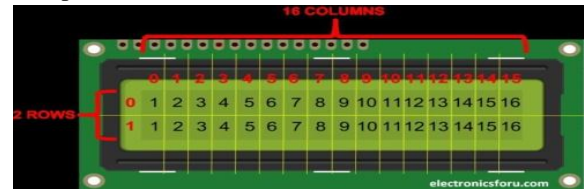
LM 358:

The LM358 IC is a dual channel op-amp IC. It consists of two internally frequency compensated, high gain, and independent op-amp. The LM358 IC is available in a chip sized package and applications of this op amp include conventional op-amp circuits, DC gain blocks and transducer amplifiers. LM358 IC is a good, standard operational amplifier and it is suitable for your needs. It can handle 3-32V DC supply & source up to 20mA per channel. This op-amp is apt, if you want to operate two separate op-amps for a single power supply. It's available in an 8-pin DIP package



LIQUID CRYSTAL DISPLAY:

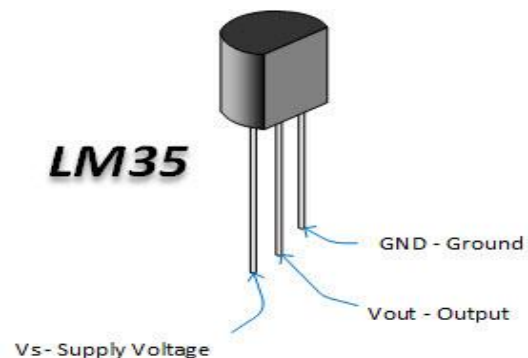
We come across LCD displays everywhere around us. Computers, calculators, television sets, mobile phones, digital watches use some kind of display to display the time. An LCD is an electronic display module which uses liquid crystal to produce a visible image. The 16x2 LCD display is a very basic module commonly used in DIYs and circuits. The 16x2 translates a display 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5x7 pixel matrix.



Temperature sensor:

LM35:

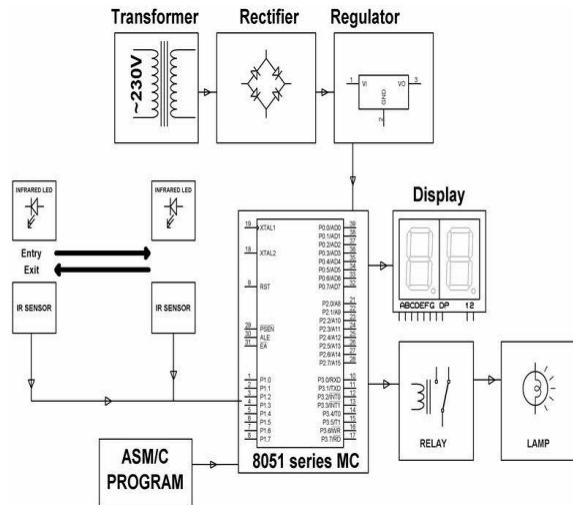
The LM35 is one kind of commonly used temperature sensor that can be used to measure temperature with an electrical o/p comparative to the temperature (in °C). It can measure temperature more correctly compare with a thermistor. This sensor generates a high output voltage than thermocouples and may not need that the output voltage is amplified. The LM35 has an output voltage that is proportional to the Celsius temperature. The scale factor is .01V/°C.



LM35 has three pinouts which are:

- PIN 1: Vcc, it used as input at this pin we apply +5 V input voltage.
- PIN 2: At this pin, we get output voltage.
- PIN 3: This pin is used for ground.

BLOCK DIAGRAM:



TRANSFORMER:

A bridge rectifier coupled with a step down transformer is used for our design. The voltage rating of transformer used is 0-12V and the current rating is 500mA. When AC voltage of 230V is applied across the primary winding an output AC voltage of 12V is obtained. One alteration of input causes the top of transformer to be positive and the bottom negative. The next alteration will temporarily cause the reverse. But in this project we use solar panel in place of transformer output of solar panel is connected to 12V, 3A battery it stores the energy and supplies the energy to the circuit.

RECTIFIER:

In the power supply unit, rectification is normally achieved using a solid state diode. Diode has the property that will let the electron flow easily at one direction at proper biasing condition. Bridge rectifiers of 4 diodes are used to achieve Bridge wave rectification. Two diodes will conduct during the negative cycle and the other two will conduct during the positive half cycle.

FILTERING UNIT:

Filter circuit which is usually a capacitor acts as a surge arrester always follows the rectifier unit. This capacitor is also called as a decoupling capacitor or a bypass capacitor, is used not only to short the ripple with frequency to ground but also leave the frequency of the DC to appear at the output.

VOLTAGE REGULATOR:

The voltage regulators play an important role in any power supply unit. The primary purpose of a regulator is to aid the rectifier and filter circuit in providing a constant DC voltage to the device. Power supplies without regulators have an inherent problem of changing DC voltage values due to variations in the load or due to fluctuations in the AC line voltage. With a regulator connected to DC output, the voltage can be maintained within a close tolerant region of the desired output. IC 7805 regulator is used in this project for providing a DC voltage of +5V and +12V respectively.

WORKING:

When an object moves into a room it will be detected by the IR sensor '1' this makes the microcontroller to switch ON the light using relay switch by understanding that something has moved in to the room and based on intensity of light by using LDR sensor. If the last object moves out of the room it has passes through IR sensor '2' and microcontroller will switch OFF the light using relay. Fan also controlled by same conditions detected by the temperature sensor. If it read specified temperature this makes the microcontroller to switch ON the fan using relay. Low cost, Easy to use.

CONCLUSION

In future days it will helps to the reduce electrical energy consumption that gets wasted in loads when absence of visitors. Conventional sources are depleting very fast, then it's time to think of alternatives.

REFERENCE

- [1] Bai Y. and Ku Y. (2008). Automatic Room Light Intensity Detection and Control using a Microprocessor and Light Sensors, IEEE International Symposium on Consumer Electronics 54: 1173-1176.
- [2] LiD. Bai Y., Wang and Li H.(2011). Design of intelligent lighting control system, IEEE International Conference on Robotics & Control System, 134-137, Xi'an.
- [3] Joon Heo et al, "Design and Implementation of Control Mechanism for Standby Power Reduction," IEEE Trans. on Consumer Electronics, vol.53, no.1, pp.179-185, Feb. 2008.

- [4] Yu-Ping Tsou, Jun-Wei Hsieh, Cheng-Ting Lin, and Chun-Yu Chen, "Building a Remote Supervisory Control Network System for Smart Home Applications," IEEE International Conference on Systems, Man and Cybernetics, 2006, ICSMC '06, vol. 3, pp. 1826-1830, Oct. 2006.
- [5] Environment Monitoring. 2008 International Workshop on Education Technology and Training & 2008 International Workshop on Geoscience and Remote Sensing, 496-499.
- [6] A. Z. Alkar, and U. Buhur, "An Internet Based Wireless Home Automation System for Multifunctional Devices," IEEE Transactions on Consumer Electronics, vol. 51, no. 4, pp. 1169-1174, Nov. 2005.