

VISITOR NUMBER BASED ELECTRICITY SAVING USING SENSORS

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Abstract : In today's world, there is a continuous need for automatic appliances with the increase in standard of living; there is a sense of urgency for developing circuits that would ease the complexity of life. This Paper focuses on "Visitor counter based power saving using sensor" using Microcontroller is a reliable circuit that takes over the task of controlling the room lights as well us counting number of persons/ visitors in the room very accurately. When somebody enters into the room then the counter is incremented by one. If there is no one in the room the room lights automatically Turn OFF. Moreover the total number of persons inside the room is also displayed on the LCD. The microcontroller does the above job. It receives the signals from the sensors, and this signal is operated under the control of software which is stored in ROM. Microcontroller 89S52 continuously monitor the Infrared Receivers. When any object pass through the IR Receiver's then the IR Rays falling on the receiver are obstructed, this obstruction is sensed by the Microcontroller. Infra red sensors are a type of light sensors they function in the infra red 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 relay driver circuit.

Keywords— *Infrared Receiver, 89S52 Microcontroller, LCD .*

I. INTRODUCTION

A. WHAT IS AN EMBEDDED SYSTEM?

An Embedded System is a combination of computer hardware and software, and perhaps additional mechanical or other parts, designed to perform a specific function.

An embedded system is a microcontroller-based, software driven, reliable, real-time control system, autonomous, or human or network interactive, operating on diverse physical variables and in diverse environments and sold into a competitive and cost conscious market.

An embedded system is not a computer system that is used primarily for processing, not a software system on PC or UNIX, not a traditional business or scientific application. High-end embedded & lower end embedded systems. High-end embedded system - Generally 32, 64 Bit Controllers used with OS. Examples Personal Digital Assistant and Mobile phones etc .Lower end embedded systems - Generally 8,16 Bit Controllers used with an minimal operating systems and hardware layout designed for the specific purpose.

B. CHARACTERISTICS OF EMBEDDED SYSTEM :

An embedded system is any computer system hidden inside a product other than a computer. They will encounter a number of difficulties when writing embedded system software in addition to those we encounter when we write applications. Throughput – Our system may need to handle a lot of data in a short period of time. Response–Our system may need to react to events quickly. Testability–Setting up equipment to test embedded software can be difficult. Debugability–Without a screen or a keyboard, finding out what the software is doing wrong (other than not working) is a troublesome problem. Reliability – embedded systems must be able to handle any situation without human intervention.

Memory space – Memory is limited on embedded systems, and you must make the software and the data fit into whatever memory exists. Program installation – you will need special tools to get your software into embedded systems. Power consumption – Portable systems must run on battery power, and the software in these systems must conserve power. Processor hogs – computing that requires large amounts of CPU time can complicate the response problem. Cost – Reducing the cost of the hardware is a concern in many embedded system projects; software often operates on hardware that is barely adequate for the job. Embedded systems have a microprocessor/ microcontroller and a memory. Some have a serial port or a network connection. They usually do not have keyboards, screens or disk drives.

II. LITERATURE

This project is an implementation to the idea of automatic visitor counting and load controlling using a microcontroller currently the main work that has been done on this proposed system is using ultrasonic sensors which give longer detection range compared to IR rays. If user wants to switch ON and OFF the electrical appliances, he/she has to go to a specific area and ON/OFF the appliance. But in this design ,we are controlling the electrical area and ON/OFF the appliances. But in this design we are controlling the electrical loads remotely using RF technology. The user has RF transmitter and RF receiver is kept at the appliances side. The user is able to control the electrical appliances within the range of 100 feet. We have also used LCD sensors to sense light condition and depending upon it controls the electrical light loads.

This projects titled “Visitor Number Based Electricity Using Sensors” is designed and presented in order to count the visitors of an auditorium, hall, room, offices , malls ,sports venue etc.

The system counts both the entering and existing visitors of the auditorium or hall or other place , where it is placed .Depending upon the interrupt from the sensors , the system identifies the entry and exist of the visitor.

On the successful implementation of the system , it displays the number of visitor present in the room. This system can be economically implementation in all the places where the visitors have to be counted and controlled.

This system can be used as an automated switch to increase energy efficient. This system can be used at the entrances of a room to control the lights and other appliances.

III. PROPOSED WORK

A. SYSTEM DESCRIPTION

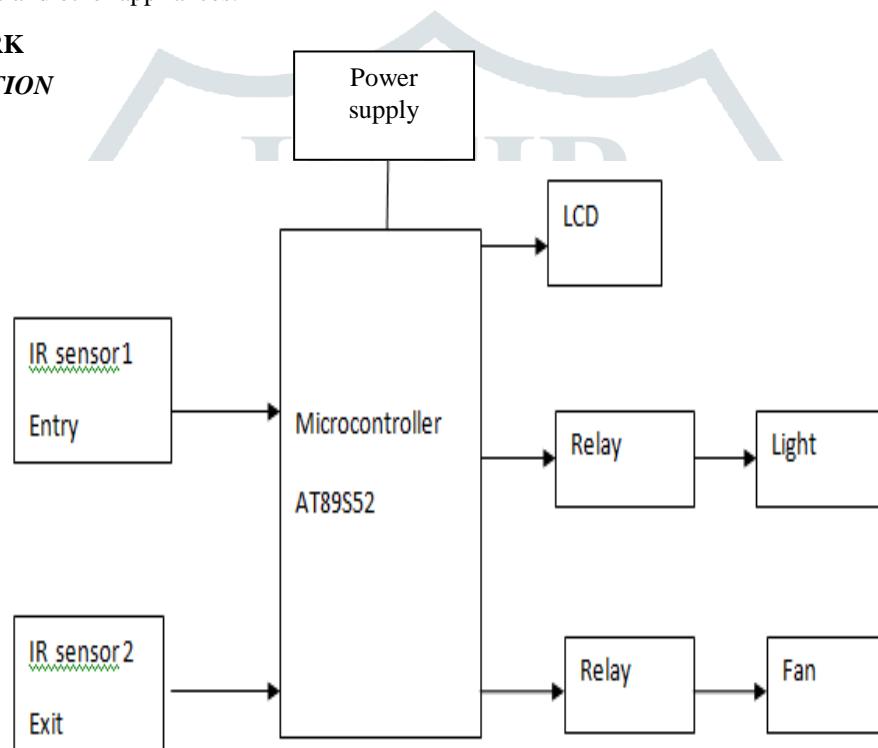
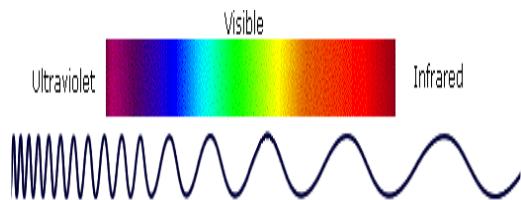


Fig 1. Block Diagram of Proposed Method

INFRARED SENSORS:

Technically known as "infrared radiation", infrared light is part of the electromagnetic spectrum located just below the red portion of normal visible light – the opposite end to ultraviolet. Although invisible, infrared follows the same principles as regular light and can be reflected or pass through transparent objects, such as glass. Infrared remote controls use this invisible light as a form of communications between themselves and home theatre equipment, all of which have infrared receivers positioned on the front. Essentially, each time you press a button on a remote, a small infrared diode at the front of the remote beams out pulses of light at high speed to all of your equipment. When the equipment recognizes the signal as its own, it responds to the command. But much like a flashlight, infrared light can be focused or diffused, weak or strong. The type and number of emitters can affect the possible angles and range your remote control can be used from. Better remotes can be used up to thirty feet away and from almost any angle, while poorer remotes must be aimed carefully at the device being controlled.

The light our eyes see is but a small part of a broad spectrum of electromagnetic radiation. On the immediate high energy side of the visible spectrum lies the ultraviolet, and on the low energy side is the infrared. The portion of the infrared region most useful for analysis of organic compounds is not immediately adjacent to the visible spectrum, but is that having a wavelength range from 2,500 to 16,000 nm, with a corresponding frequency range from 1.9×10^{13} to 1.2×10^{14} Hz



Infrared imaging is used extensively for both military and civilian purposes. Military applications include target acquisition, surveillance, night vision, homing and tracking. Non-military uses include thermal efficiency analysis, remote temperature sensing, short-ranged wireless communication, spectroscopy, and weather forecasting. Infrared astronomy uses sensor-equipped telescopes to penetrate dusty regions of space, such as molecular clouds; detect cool objects such as planets, and to view highly red-shifted objects from the early days of the universe.

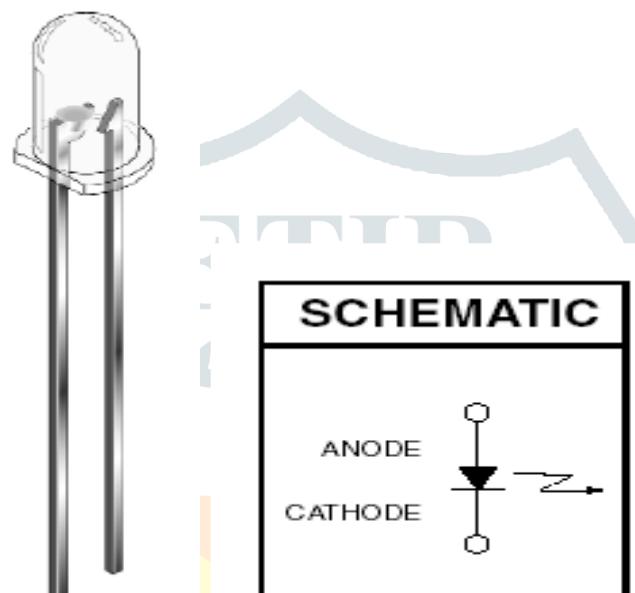


Figure 2:IR LCD QED234

FEATURES

- Wave length is 940 nm
- Chip material =GaAs with AlGaAs window
- Package type: T-1 3/4 (5mm lens diameter)
- Matched Photo sensor: QSD122/123/124
- Medium Emission Angle, 40°.
- High Output Power
- Package material and color: Clear, untainted, plastic
- Ideal for remote control applications

RELAY:

A relay is an electrical switch that opens and closes under the control of another electrical circuit. In the original form, the switch is operated by an electromagnet to open or close one or many sets of contacts. A relay is able to control an output circuit of higher power than the input circuit, it can be considered to be, in a broad sense, a form of an electrical amplifier.

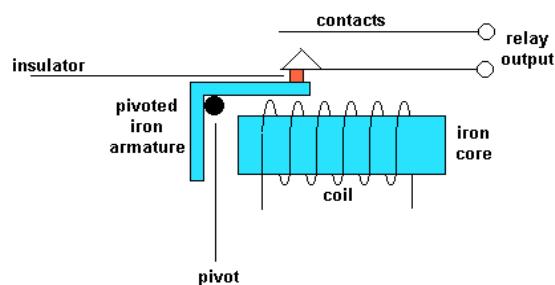


Fig 3: Construction of Relay

Relays are usually SPDT (single pole double through switch) or DPDT (double pole double through switch) but they can have many more sets of switch contacts, for example relays with 4 sets of changeover contacts are readily available.

Basic operation of relays

An electric current through a conductor will produce a magnetic field at right angles to the direction of electron flow. If that conductor is wrapped into a coil shape, the magnetic field produced will be oriented along the length of the coil. The greater the current, the greater the strength of the magnetic field, all other factors being equal.

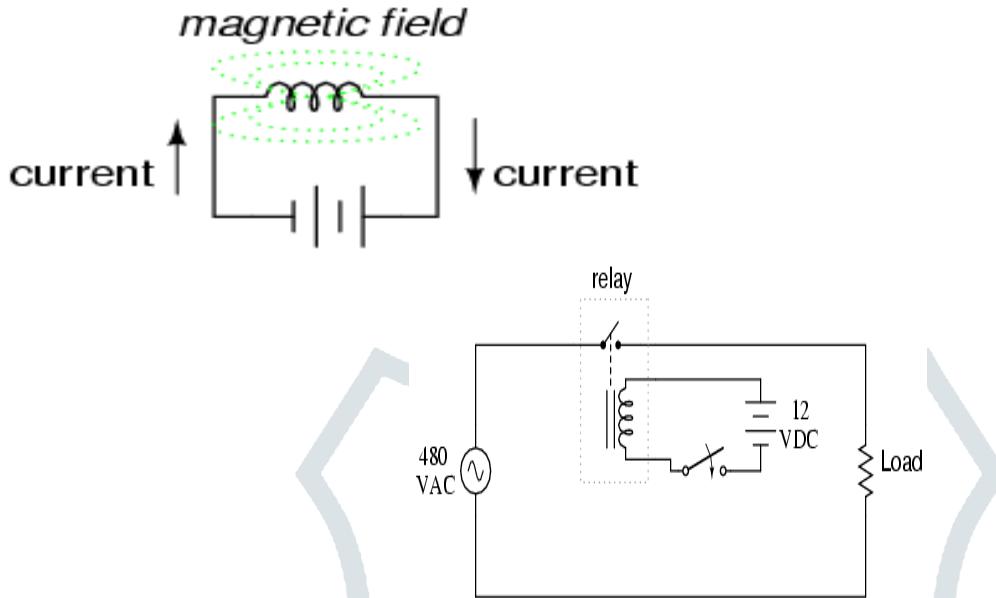


Fig 4: Operation of Relay

Inductors react against changes in current because of the energy stored in this magnetic field. When we construct a transformer from two inductor coils around a common iron core, we use this field to transfer energy from one coil to the other. However, there are simpler and more direct uses for electromagnetic fields than the applications we've seen with inductors and transformers. The magnetic field produced by a coil of current-carrying wire can be used to exert a mechanical force on any magnetic object, just as we can use a permanent magnet to attract magnetic objects, except that this magnet (formed by the coil) can be turned on or off by switching the current on or off through the coil.

If we place a magnetic object near such a coil for the purpose of making that object move when we energize the coil with electric current, we have what is called a solenoid. The movable magnetic object is called an armature, and most armatures can be moved with either direct current (DC) or alternating current (AC) energizing the coil. The polarity of the magnetic field is irrelevant for the purpose of attracting an iron armature. Solenoids can be used to electrically open door latches, open or shut valves, move robotic limbs, and even actuate electric switch mechanisms and is used to actuate a set of switch contacts.

IV. RESULTS

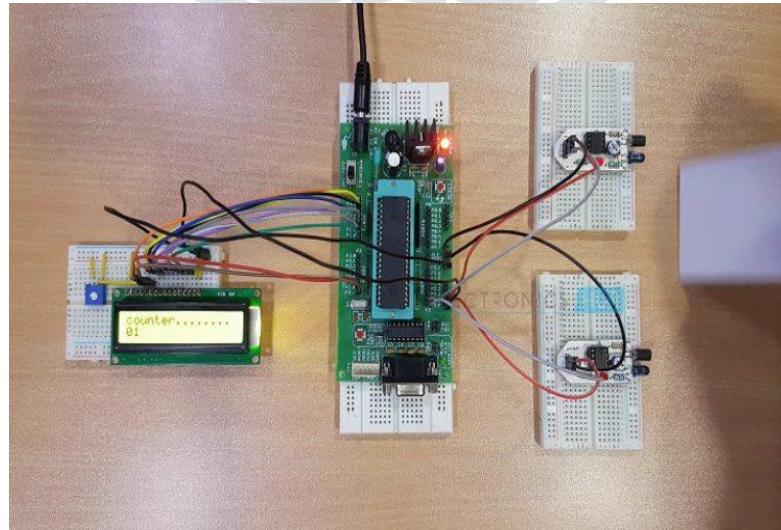


Fig 4: Final Project model

- This project using Microcontroller is a reliable circuit that takes over the task of controlling the room lights as well us counting number of persons/ visitors in the room very accurately.

- When somebody enters into the room then the counter is incremented by one.
- If there is no one in the room the room lights automatically Turn OFF.
- Moreover the total number of persons inside the room is also displayed on the LCD.

V. CONCLUSION

This project designed and implemented a lighting module. It can detect the approach of the visitor and then let the relay circuit actuate the lighting to work in the maximum intensity mode to let the lighting be bright enough. It can also turn to energy-saving mode automatically after the visitors leave in few minutes. The current consumption measurements show that over 300 mA is consumed in maximum intensity mode and only around 150 mA is measured in energy-saving mode. The results show that the implemented module is functional work and the proposed module is useful for the energy saving purpose in the lighting space. In the future, few units of the designed lighting modules will be realized and connected together to form a lighting network. The collection of the visitation data and the security assistance of large scale. Using this project we can save lot of power in large scale industries. In large scale industries there will be more lights use for lighting in that time by using this project we can save the power. For example by using this project we can save power nearly 100MW per a day.

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