Automated Switch System for Auditorium

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Abstract: **Many times in many places like auditorium, office, laboratory, classrooms etc. electric power is getting waste if switch stayed in on state even if there is no one to use, so we have to switch ON and OFF an instrument (Light, Fan, AC etc.). In this case we have to stop the work we are doing presently i.e. doing mechanical work by our self instead of this we are using some sort of sensor to do all those work. These types of sensor precise and save are time and also its cheap.**

Keywords: **PIC Microcontroller, LDR.**

1. Introduction

The main aim of our project is to make precise and cheap sensor which switch ON and OFF electrical instrument in presence of how many people are present at that place. (Advantage of this project is that light switch ON and OFF accordingly to the number of people entering or exiting). For making this sensor we had some sort of transducer or detector like phototransistor, photodiode and LDR, which are depending on intensity of light and changes voltage, current and resistance respectively. As well as we can use the IR sensor to detect the same. These characteristics can be used as input to the microcontroller. First of all the problem we encountered which of this transducers should be used as detector. After going through, we decided to do this by using IR sensor Using this type of sensor we have detect when people are entering the room and leaving the room. For this we have to use the two sensors.

2. Materials and methods

Hardware: The components used are as follows.

PIC Microcontroller: A PIC18F4520 microcontroller is a compact integrated circuit designed to govern a specific operation in an embedded system. A typical microcontroller includes a processor, memory and input/output (I/O) peripherals on a single chip.

PIC 18F4520: This block is used to interface between input and output and the program code is present in this microcontroller. A PIC microcontroller is a dedicated computer system-on-a-chip. It contains a processing core, memory, and programmable input/output peripherals. PIC microcontrollers include an integrated CPU, memory (a small amount of RAM, program memory, or both) and peripherals capable of input and output. PIC microcontrollers are operated at high speed compared to the microprocessors and microcontrollers, (at clock speeds of as 12 MHz). They consume relatively little

power (Milliwatt or even microwatts), and will generally have the ability to retain functionality while waiting for an event such as disturbance. Power consumption while sleeping may be just nanowatts, making them ideal for low power and long lasting battery applications.

PIC microcontrollers are used in automatically controlled products and devices, such as automobile engine control systems, remote controls, office machines, appliances, power tools and toys. By reducing the size, cost and power consumption compared to a design using a separate microprocessor, memory and input/output devices, PIC microcontrollers make it economically control many more process (usually one specific process).
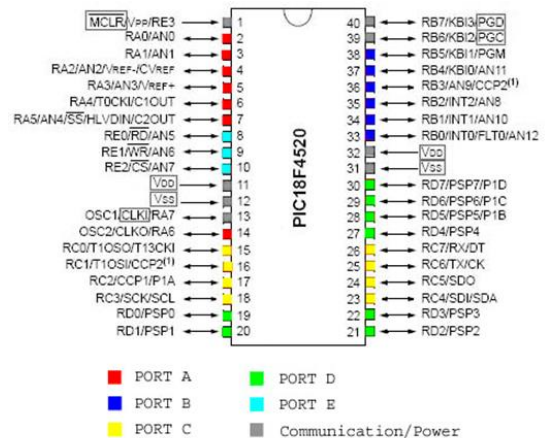

Fig. 1. PIC microcontroller

A. IR sensor

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.

There are five basic elements used in a typical infrared detection system: an infrared source, a transmission medium, optical component, infrared detectors or receivers and signal processing. Infrared lasers and Infrared LED's of specific wavelength can be used as infrared sources. The three main types of media used for infrared transmission are vacuum, atmosphere and optical fibers. Optical components are used to focus the infrared radiation or to limit the spectral response. Optical lenses made of Quartz, Germanium and Silicon are used to focus the infrared radiation. Infrared receivers can be

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photodiodes, phototransistors etc.

Some important specifications of infrared receivers are photosensitivity, detectivity and noise equivalent power. Signal processing is done by amplifiers as the output of infrared detector is very small.
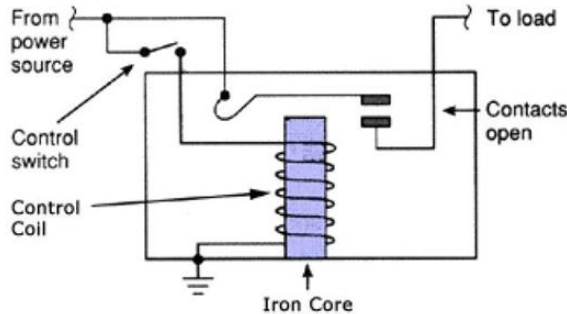
B. Relays

Fig. 2. Actual design of relay

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations. A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contactor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device to perform switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called "protective relays".

Software: The software part is done as follows.

The program is written in Assmbly [Muhammad Ali Mazidi 2013]. The program written is converted into hex file using MPlab. This hex file is written into IC by the process called burning through development software called USB programmer.

3. Results and discussion

A. Working

1) Circuit Description and Working

Input: In input we use IR sensor to detects the obstacle it's the simple circuit in which there are IR transmitter and Receiver LED as discussed above IR transmitter transmit the IR light and when there will be obstacle its will receive the signal on IR receiver and the output shows the deflection in voltage and that

voltage can be further get amplify for that we can use the op-amp or transistor in amplification mode or we can use the cheap module of IR sensor which gives same output. In these first circuit there are two IR sensor which detects the obstacle not only that using those two detectors we can detect the way like people are entering or exiting and these output of first circuit will feed to the CPU, we can use input circuit as per the number of door having to auditorium.

B. CPU

CPU consist PIC microcontroller. We use PIC Microcontroller to develop output as behaviour of input. In this section those two output of detectors are connected to port C. The output of detector A is connected to pin C.0 (port C pin 0) and the output of detector B is connected to pin C.1 (port C pin 1). According to input the software in PIC microcontroller develop the output and gives the output at port D and these output are afterwards are used in output section for ON and OFF of switch. WE developed two types of software:

a) Increment and Decrement of resistor
b) Rotating Left and Right resistor with carry

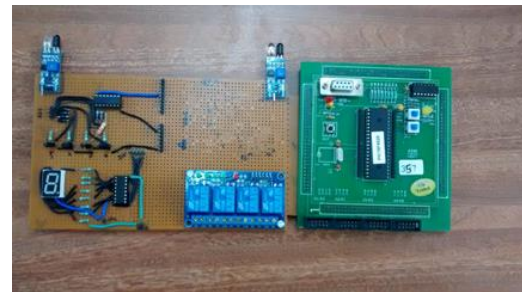According those types of program software PIC gives the output at port D.

Fig. 3. Hardware setup

C. Output

In output there can be two types of hardware implementation. Here we are developing hardware of

a) Increment and Decrement
b) Rotate left and Right

According to these the output switches the light.

In both cases we use OPAMP for amplification of output voltage and this output voltage of OPAMP is given to relay to ON and OFF the switches. In type A we can switch ON and OFF only four switch. And in type B we can extend it to 8 or 16 as we need. The port D have 8 bit and those bits are going to get amplified and go to the relay as shown in above diagram. And this hardware manages the operation of switches.

4. Conclusion

We have successfully made a sensor by using IR, which was our aim in the project. This device can be used in auditorium, meeting room, Laboratory and at many places. But there is some drawback of this project, if a person comes out first from inside than all light will glow but this can be neglected. Hence

we can conclude that this project is the future in this field of electronics, where in market which wants cheaper things and efficiency of working object. It also in way which reduces the use of power or energy. And directly it saves the energy.

Acknowledgement

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