Automatic Switch using PIR Sensor

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***Abstract*—Automatic Switch is a device that detects the presence of a human in a predefined area and can turn on the lights or any electrical appliances that we want. The device will automatically turn off the lights or electrical appliance if nobody is presence in the area. PIR sensor is used to detect the presence of a human. Brain of the system is Arduino PRO mini which will drive the PIR sensor and electrical appliances.**

***IndexTerms* — Arduino, PIR, Sensor, Relay**

I. INTRODUCTION

Human beings are wasting too much of electrical energy by not turning off the lights, fans and many other electrical appliances when they are not using it. To overcome this problem we have developed a device that can be fitted anywhere in offices or homes. As the device will detect the presence of Human and automatically turn on and off the device.

To detect the presence of human we are using PIR Sensor. PIR consist of IR sensors and IR sensors are used to the heat of the human body and it will turn on the electrical appliances. Arduino mini pro is used to control the PIR sensor and electrical appliances. Relay modules are used to control the electrical appliances.

II. DESIGN

The Arduino PRO mini board contains ATmega328 microcontroller, It is a 8 bit microcontroller, which is used to control the system. Figure 1 shows the block diagram of the system. PIR sensor detect the presence of a human in the area and send signal to Arduino PRO Mini, arduino will turn on the lights, fans or electrical appliances, after every 40 seconds arduino check the output of the sensor and if output is high then it will not switch off the electrical appliances and if output is low then it will turn off the electrical appliances. The device repeats this pattern continuously.Range of the PIR sensor is nearly 6 meters.

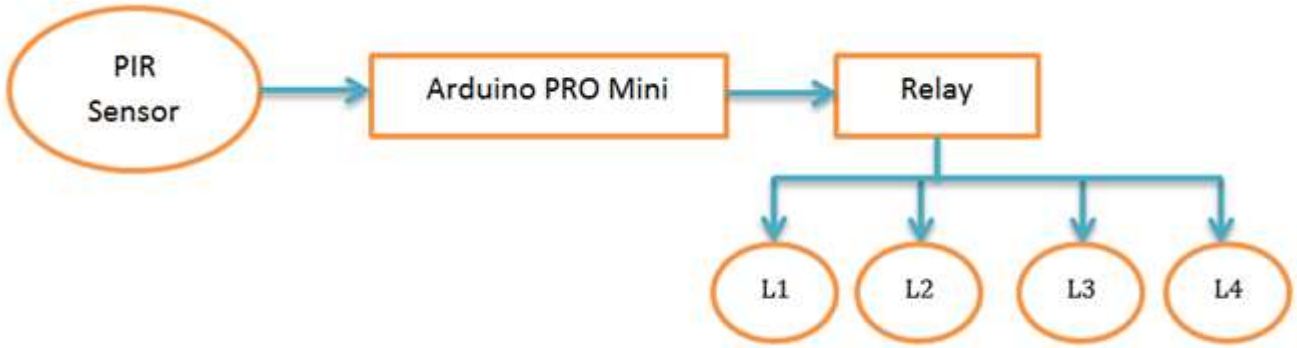

Fig 1: Block Diagram of the System

III. COMPONENTS USED

I. ARDUINO PRO Mini

Figure 2 is the board of the ARDUINO PRO Mini. It contains Atmega 328 microcontroller. Atmega 328 has 32KB of flash memory for storing code and it has 2KB of SRAM and 1KB of EEPROM. Other specifications of the board are shown in the table1. Board comes with two frequency versions we have used 16 Mhz version of the microcontroller. There is a separate loader is required to load the code in to the microcontroller.

Table 1 ATmega328 board specifications

Microcontroller	ATmega328
Board power supply	5V
Digital I/O pins	14
PWM pins	6
UART	1
SPI	1
I2C	1
Analog Input pins	6
External Interrupts	2
DC current per I/O pins	40mA
Flash memory	32KB
Clock Speed	16MHz

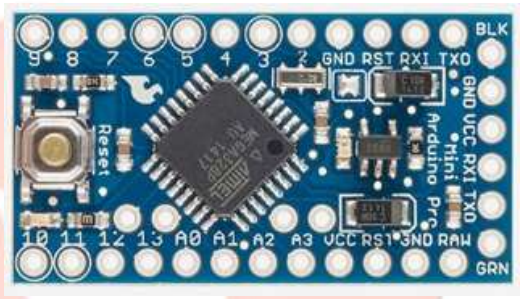

Fig 2: ARDUINO PRO MINI Board

Fig 3: Loader

II. PIR Sensor

This Passive Infrared Sensor (PIR) module is used for motion detection. It requires 10-60 seconds of settling time before starting its operation. It consists of pyroelectric sensor that detects motion by measuring change in the infrared levels emitted by the objects [1]. It can detect motion up to 6 meters. Figure 4 shows the module used in our system.

Fig. 4 PIR Sensor Module

III. Relay Module

Figure 5 shows the relay module used in our system. This relay module is 5V active low module. It is capable to control the various electrical appliances with large current also.

Fig 5: Relay Module

IV. SOFTWARE

Atmel studio 7 is used for the programming of the ATmega328 microcontroller. To load the program on to chip we have used AVRDude. PIR Sensor require 30 to 40 second warm up time so , code is written in a way that when we start the system it will wait for 40 seconds and then system starts functioning.

V. FUTURE SCOPE

In our system we are taking decision based on Human presence but we can also interface LDR (Light Dependent Resistor) Sensor and Temperature sensor for better working of the system. This system can be also interfaced with the Bluetooth module so we can control the whole system from the mobile itself. Applications of our device are listed below

1. It can be used in college and schools (Turn of lights and fans when no one is there)
2. It can be used for home security purpose also we can fit at the main door of the house.

VI. CONCLUSION

It is not an easy task to design this system as PIR sensor is generally used for the motion detection. We have done coding in such a way that little movement of the human is detected by the sensor. We have put some time delay and adjusted the sampling period for the sensor output for the precise detection.

VII. REFERENCES

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