

Intelligent Power Saving System using Pir Sensors

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Abstract - The main objective of this paper is to save power in IT work spots, using a PIR sensor capable of detecting only human beings. It deals with the concept of office automation which will be very much helpful to save power in the time of power crisis. A PIR sensor is fixed to each and every computer in the work spot. The PIR sensor fixed in the computer will sense its user for every 15 seconds as pre programmed in the controller which is fixed to the sensor. In the case of absence of user, the monitor is programmed to turn off. All the PIR sensor are centralized by a PIC controller (PIC 18F4520) in the department. This is capable of interfacing multiple electronic devices. It interfaces the PIR sensors with the relays. If a whole row or continuous 4 system is seemed to have no user then PIC controller is programmed in such a way to switch off the respective lights and fans (or AC shutters) by a interface between switchboard of light and fan control and PIR sensor. A DC relay is used for the turn ON and turn OFF purposes of electrical appliances according to the output obtained from the PIC controller circuit. A relay driver circuit is used to drive the relay according to the output pulses from the PIC controller.

Keywords—PIR-passive infrared sensor ; PIC microcontroller

I INTRODUCTION

The technology is going on attaining its various stepping stone and almost it has attained its saturation. So as far as this development is concerned, the power consumption in day to day life has been increased in a rapid rate. One of the main reason for power crisis will be improper planning and usage of electrical energy. Similar example will be usage of electrical appliances in unwanted places. This paper deals with the concept of Office Automation, where unmanned electrical appliances are turned Off in IT work spots.

By changing the sleep interval based on traffic rate during the service to increase the period of life for battery powered mobile devices [1]. The consumption of power by the PIR sensor based lighting device has paved the way for automation in different fields[2]. The home automation, home networking using PIR sensors and also about the efficient power saving in houses [3]. Based on the habit of user domestic energy waste is minimized by a set of sensors [4].The standby mode of lights in absence of user, and also has a feature of a microcontroller unit to control the functions of PIR and standby mode of lights [5] Various type of sensors with actuators to control different home applications such as

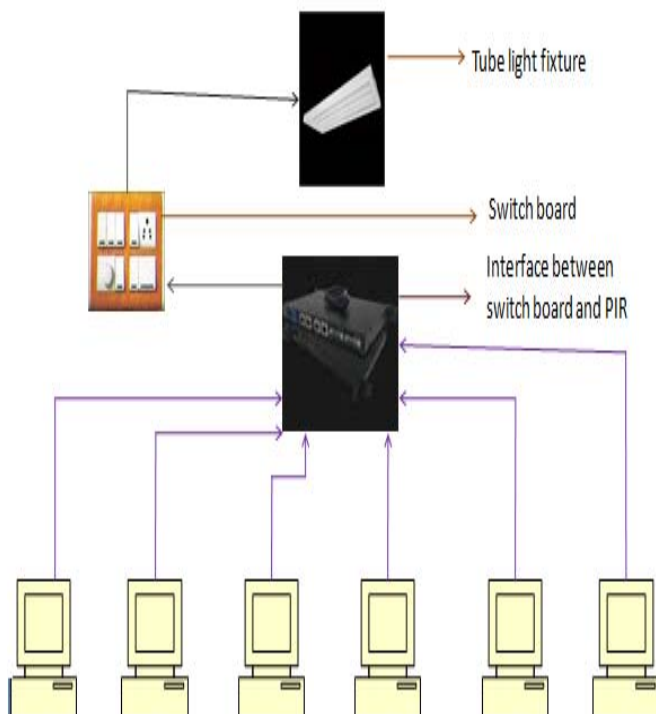
fans, lights as well as air conditions with the aid of a microcontroller [6]. Based on the breaking of infrared light the door is controlled automatically. Apart from this it also concentrates on room light control [7].To save the power consumption in places such as gardens, libraries, staircase, parking, gardens etc and also where security is more important that is generation of alarm is required [8]. Based on the detection of the visitors on the road in the street the light is turned on to normal intensity so that visibility is clear and in their absence its intensity will be reduced [9]. The appliances are operated using sensors and microcontrollers. The sensor network and a central control section connected with IR sensors and relays sense the presence of person and turn on and off the appliance [10].The street light working is made smart by making it sense the presence of vehicle .When the vehicle is sensed it is turned on and in the absence of vehicle the street light is turned off [11]. Minimize the consumption of power by the lamps used in the libraries with the elements like LDR, Relay, micro-controller [12].

The main objective of the paper is to save power in the range of 20-25% in IT work spots which will greatly reduce the cost of power consumption annually. Power saving levels can be fixed according to our needs. In this paper power is saved in 45 seconds level expecting a higher efficiency in work spots. A LCD monitor consumes ≤ 21 watts per hour during normal operation. Installing this will save 5 watts per hour in a single computer. When accounted for fans, air conditioners and lighting systems, the power saving will be drastic in a way that it will reduce the part of the amount to be paid to the electricity board.

II PROPOSED SYSTEM

The block diagram in figure 2.1 shows the schematic representation of the office automation. The system is implemented in the similar way for the purpose of energy saving. The monitors are interfaced to the PIC controller. The PIC controller is interfaced with the PIR sensors. The sensors sense the presence of humans. Based on the presence or absence the relay acts.

Fig.2Block Diagram of Intelligent Power Saving Systems
Using PIR



III WORKING STRUCTURE OF PIR SYSTEM

The block diagram in Fig.3 shows how the monitors, fans and lights are interfaced to the PIC controller. The PIC controller is interfaced with the PIR sensors. 4 PIR sensors are connected in parallel. The output of the PIR sensor is fed to a non inverting amplifier. The output from the PIR sensor is inverted to 0 as the PIC controller is programmed in such a way to accept 0 as input pulse. The PIR sensors are placed in each and every cabinet. These PIR sensors detect the human being and will send the impulses to the inverting amplifier which will send the impulse to the controller. The controller will activate the corresponding relay. The output from the PIR sensor is a constant one and not a variable output. The PIC controller is not a self functional unit. It has to be supported with several other components in a circuit board for its normal functioning. A 20000 MHz oscillator supplies clock pulse for its functioning. A 5V regulator and a 12V regulator are provided to supply 12V to the input and 5V to appropriate pins. The input is taken from a centre tapped transformer. The capacitors are provided to reduce the harmonics from bridge rectifiers. This paper has implemented the energy saving scheme for computer monitors.

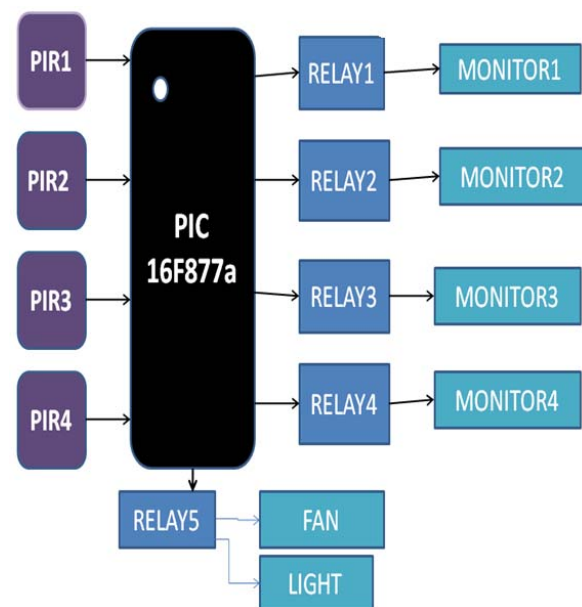


Figure 3. Working Structure of Intelligent Power Saving Systems Using PIR Sensors

IV IMPLEMENTATION IN SOFTWARE

The algorithm for the implementation of the power saving system is shown below

Algorithm

- Step1: Start the program
- Step2: Search For human beings in individual systems
- Step3: Detect the presence of human beings in cabins
- Step4: Process the output from individual sensors to detect if the system has a user or not.
 1. If yes, turn on the respective relay.
 2. If no, go to the previous step.
- Step5: Check for the number of users in the room
 1. If it is >0 maintain the 5th relay or port in ON condition.
 2. If it is =0, i.e. no user in a room, then the 5th relay is turned off.
- Step6: Stop the process.

The flow chart representation for the program module employed in the power saving scheme is shown in fig 5. First it senses the presence of human in the cabin, if yes turn on the respective relay, if no go to the previous step and check for the number of users in the room accordingly turn on and turn off the relay.

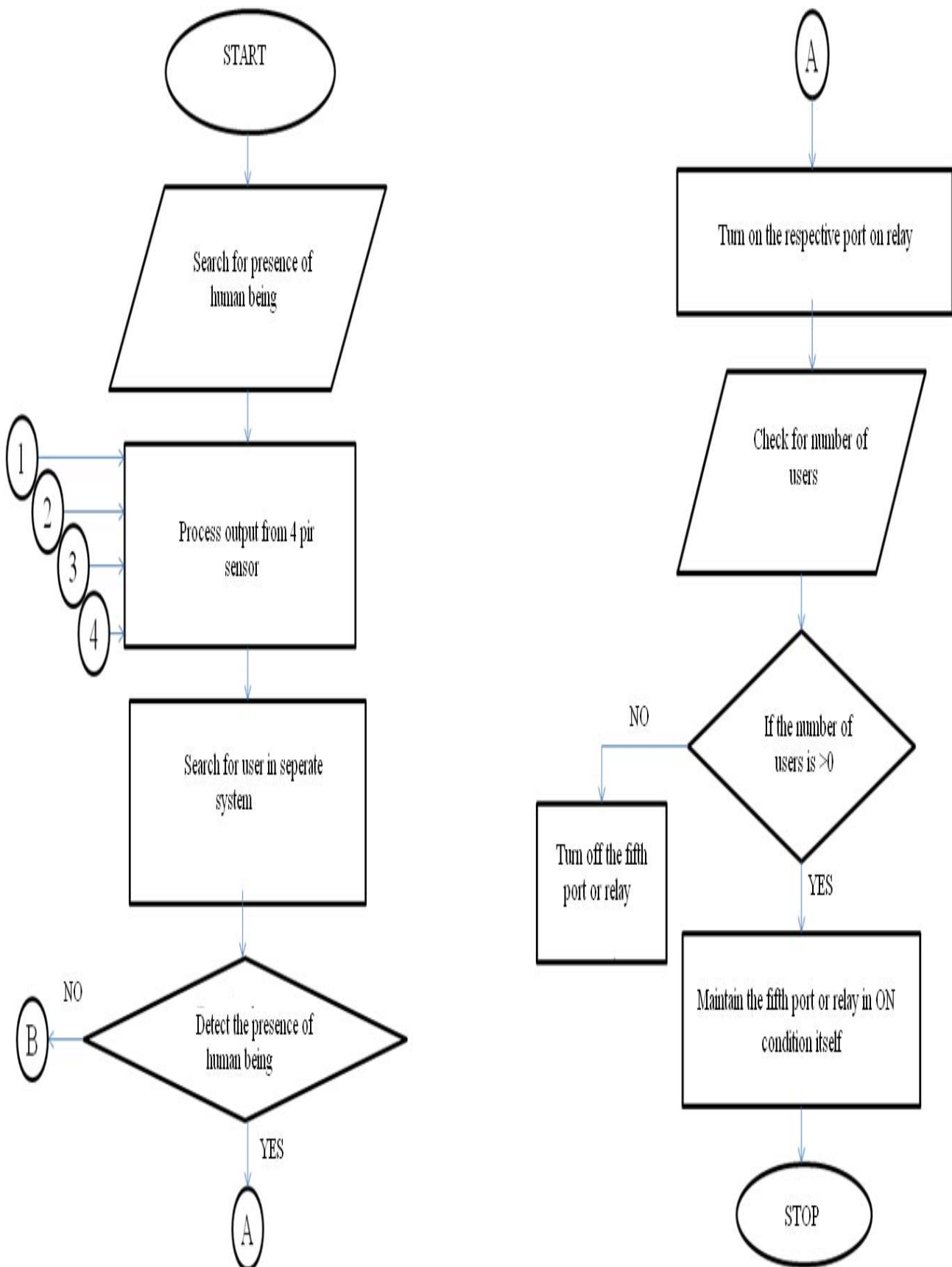


Fig.5 Flow Chart For Implementation Scheme

VI HARDWARE IMPLEMENTATION

The Fig 6.1 explains about the implementation structure of the paper. The relay and relay driver circuits are interfaced to the PIR sensor with the help of PIC Controller.

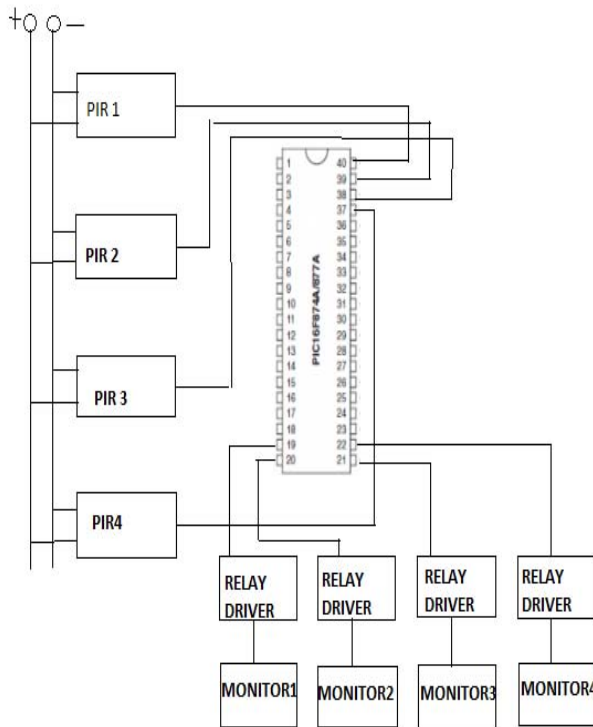


Fig.6.1 Working Circuit

The figure 6.2 shows the circuit board consisting of microcontroller, relay and relay driver circuit implemented for this scheme.

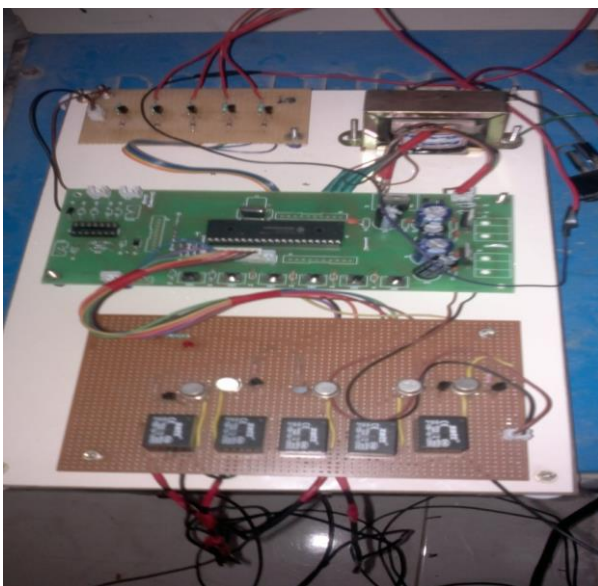


Fig.6.2 Hardware Circuit

PIR sensors implemented monitors which detects the presence of the user are shown in figure 6.3.



Fig.6.3 PIR Sensor Implemented Monitors

PIR sensors implemented monitors which detects the absence of 2 users, turns of the monitor using a relay and since two more users presence is sensed the monitor is not turned off is shown in figure 6.4.



Fig.6.4 PIR Sensor Turns of two Monitors

PIR sensors implemented monitors which detects the absence of 4 users, turns of the monitor using a relay is shown in figure 6.5.



Fig.6.5 PIR Sensor Turns of Four Monitors

V CONCLUSIONS

The intelligent power saving system using PIR sensor can be used for power savings in IT fields. Now as far as we are in the technical and modernized world, power saving is also one to be concerned and it occupies the IT area in this paper to save the power by low cost of means. With the implementation of this we can achieve the main objective to save power in IT fields. In future it can be enhanced by implementing RF technology. It is an endless process and considerably this will have an innovative enhancement. As with any work of research, there is always more that can be done. Aside from further using PIR we can use (RF)

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