Hall Entrance & Power Management

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Abstract— The objective of this project is to make a PIC controller based model to count number of persons visiting particular room and using two PIR sensors we can automatically on/off the light & fan in the room. Also it contains Automatic password operated door lock by using the 4x4 keypad interfacing with PIC16F877a. Here we can use two IR sensor pairs and can know present number of persons in the respective room. PIR sensors used to detect the presence of any obstacle (here humans) to on/off respective load such as light and fan. In nowadays, there is a continuous need for automatic equipments with the increase in standard of culture; there is a importance of flurry for developing circuits that would be spontaneous the complexity of life. Also if at all one wants to know the number of people present in room so as not to have traffic. This circuit proves to be helpful.

Keywords— IR Tranciever, Password Operated Door Lock, PIC16F877a, PIR Sensors, Pyroelectricity.

I. INTRODUCTION

Wastage of electricity is one of the main problems which we are facing now a days. In our home, school, colleges or industry we see that fan or lights are kept on even if there are nobody in the room or area. This happens when we are in hurry and that’s why we often forget to turn off the lights or fans. To avoid all such conditions we have designed this project called “Hall Entrance & Power Management”. This project has three modules, first one is known as “Password operating door lock”, second module is known as “Digital human counter”, and third module is “Automatic room light controller”. Prime idea behind this project is known as “Human counter” which measures the number of persons coming inside room as like seminar hall, conference room, classroom. Another part of project serves the procedure of a door-latch opening using a password entered through keypad. This function is implemented using a couple of Infrared sensors. 16x2 LCD display located outside the room which displays this value of person count. This person count will be rised if somebody enters inside the room and at that time lights are switch on. And in opposite side, person count will be diminished if somebody leaves the room. Passive Infra-Red (PIR) sensor module is used to detect the presence of person near to the sensor. They have a single output that goes active high (or active low, based on details) when the motion is occurred.

In this project, a PIC16F877a microcontroller instantly observes the output from the sensor module and switch a relay on when it becomes active. When number of persons inside the room is zero i.e. none of any person present, lights inside the room are turned off using a relay interface. In this way Relay does the function of “Automatic power saver”. Since this project uses 2 couples of infrared sensors, it can be used as Bidirectional human counter as well.

II. METHODOLOGY

An In this paper we are offering to conserve the power consumption in electrical equipment such as fan and light. It can be also use for providing protection to any system in residences, seminar halls, libraries as well as in ATM gate. This work is in two portions as follows: first is room light control and another is automatic fan coordination with respect to presence of human. For the project, we are developed different modules as following:

- For the first aim of our project, which is password operated door lock we used 4x4 keypad matrix interfaced with PIC16F887a. This keypad is for the purpose of providing protection to the room in which we are keeping the project assembly. So, the door cant open without entering the correct password which is set by us.

- Second part of project is the human counting. For this we are using two IR transmitter receiver pairs. Considering the pairs as pair 1 & pair 2 Count will increment if obstacle cuts beam of first pair before cuts the beam of second pair and vice-versa.

- Third part of project is the human detection with the help of PIR sensors which then turn on/off relay which is normally connected to the loads i.e. light & fan as per the requirement.

In order to accomplish the optimum achievement and precise detection, three different units are designed and implemented.

1. Interfacing 4x4 keypad matrix with PIC.
2. Interfacing LCD with PIC.
3. Interfacing Relay with PIC.
III. FUNCTIONAL BLOCK DIAGRAM

IV. WORKING

PIC16F877a acts a main control unit for the proposed system. Following are the blocks used for the system working:

A. Transformer

An inverter is an electrical device that shifts direct current (DC) to alternating current (AC); the shifted AC can be at any required voltage and frequency with the use of proper transformers, switching, and control circuits. In our project, we are using step down transformer 230-12v to provide electrical supply to whole circuitry.

B. IR TX-RX Pair

IR Transmitter and receiver are used to check any device wirelessly. IR LED emits infrared light, means it emits light in the boundary of Infrared frequency. The wavelength of Infrared (700nm – 1mm) is just across the normal visible light. Anything which generates heat, emits infrared like our human body. Other than emitting unseeable infrared light, IR LED are identical to normal LED and also has functions as a normal LED, means it consumes 20mA current and 3volts power. IR LEDs have light emitting angle of approximate 20-60 degree and range of around few centimeters to some feets. IR receiver receives the modulated Infrared waves and changes its output according to it. Receiver output is goes low, means its output is remains HIGH when there is no IR present, and becomes low when it detects IR.

C. PIR sensor

Certain crystalline materials have the characteristics to create a surface electric charge when exposed to thermal infrared radiation. This phenomenon is known as ‘pyroelectricity’. The Passive Infra-Red (PIR) sensor module works on that particular principle. The human body radiates heat in the form of infrared radiation which is maximum at about 9.4 um. The presence of human body creates a unaware change in the IR profile of the surrounding that is sensed by the pyroelectric sensor.

D. PIC16F887a

PIC16F887a is heart of our project. It is main controller that drives whole circuit as per our commitment. PIC16F877a having features as follows: it is faster. It consumes less power. It has 12bit processing also many devices to select as per requirement.
E. LCD Display

16X2LCD is used to display current status of door lock, human counting also indication of the power on/off. It is connected in 8bit mode with PIC16F877a.

F. Relay

Relay is an electromagnetic device which is used to detach two circuits electrically and connect them magnetically. They are very beneficial devices and permits one circuit to switch another one while they are fully separate. They are frequently used to interface an electronic circuit (working at a low voltage) to an electrical circuit which works at very high voltage. For example, a relay can make a 5V DC battery circuit to switch a 230V AC mains circuit. Thus a small sensor circuit can operate say a fan or an electric bulb. In our project, we used two relays i.e. SC5-S-DC12v.

G. Diodes

Fly back diodes which we used in circuit are used to provide a track for current when relay coil is switch off. Without diode the energy has no place to go and will cause a large and certainly ruin voltage spikes that may harmful to circuit.

H. Voltage Regulator

7805 is voltage regulator used to convert higher voltage to +5V DC for microcontroller to other logic IC’s. 7805 have problem of power dissipation and heating, to avoid this problem IC LM2575 can be used with the parallel connection with one inductor and capacitor. IC LM2575 can operates up to 40v input to serve 5v constant output to the PIC16F877a.

I. Rectifier

W10A is a bridge rectifier used to connect 12AC to DC from the step-down transformer.

V. Future Scope

We can send this data to a furthermost location using mobile or internet. We can execute this project with the help of other related modules like fire sensor, wind sensor, temperature sensor, humidity sensor, position sensor etc. We can add the module of voice alarm system to show that the room is full and persons can’t go into the room.

We can implement these by using RFID reader. Whenever person enters the room, he/she will show the RFID card to RFID sensor. According to that counter will count as one but the infrared entry will not be activated. But when the person is exiting from the room, the infrared exit operation will be activated and the counter will decrement by one and the lights will switched off if nobody present in the room.
The RFID sensor will be arranged outside the room for the entry and the infrared sensors will be located at side of the door for the exit operation. Meaning, if the person enters the room and he/she shows the RFID card to RFID sensor, the RFID will activate but it neglects the infrared entry operation. But leaving the room, the infrared will do the task and the counter will reduced.

VI. CONCLUSION

Implementation of our project helps to save electricity in the particular room or conference hall by doing sections of that room. Also our project is use to maintain security of corresponding room by password based door lock. We have used the IR sensors, so that we can saved status of the persons entering in the room or exiting from the room. PIC16F877a is also advance controller that we used in our project is having very much better functions than microcontroller 8051.

REFERENCES


