



Energy Control and Student Tracking System using RFID and Arm-7

Sneha Rajendra Jagtap, Sonali Mohan Kulkar, Sneha Satish Jadhav , Aniket Amod Kokare

Prof. Sunny G. Gholapsunny,
Department Of Electrical Engineering,
SVPM College Of Engineering,
Baramati-413115, Maharashtra, India.

Abstract: *This Project “Student tracking system with Automatic Room Light Controller using ARM7” is a reliable circuit that takes over the task of controlling the room lights as well as tracking the students in the class room very accurately & send SMS to their parents. The attendance of students is monitored daily using the RFID technology & SMS send to their parents using GSM system . And also the room light is controlled automatically using LDR. When somebody enters into the room then the counter is incremented by one and the light in the room will be switched ON and when any one leaves the room then the counter is decremented by one. The light will be only switched OFF until all the persons in the room go out. The total number of persons inside the room is also displayed on the seven segment displays. 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 ARM LPC2138 continuously monitor the Infrared Receivers, When any object pass through the IR Receiver's then the IR Rays falling on the receivers are obstructed this obstruction is sensed by the Microcontroller.*

Keywords: ARM7, RFID, GSM

1.Introduction

The objective of this project is to make a micro-controller based model to count the number of persons visiting a particular room and accordingly light up the room. Here we use sensor to detect the number of persons coming inside the room or leaving the room. In today's world, there is a continuous need for automatic appliances. The world is running fastly and so the device or appliances should be. With the increase in standard of living , there is a sense of urgency for developing circuits that would ease the complexity of life. Also if at all one wants to know the number of people present in room so as not to know the percentage of congestion, or this application proves to be helpful.

Like microprocessor, a micro controller is a general-purpose device, but one that is meant to read data, performs limited calculations on that data and control its environment based in these calculations. The prime use of micro controller s is to control the operation by a micro controller using a fixed program that is stored in ROM and does not change over the lifetime of the system. . GSM World references China as 'the largest single GSM market, with more than 370 million users, followed by Russia with 145 million, India with 83 million and the USA with 78 million users. The prime use of micro controller s is to control the operation by a micro controller using a fixed program that is stored in ROM and does not change over the lifetime of the system.



Block Diagram

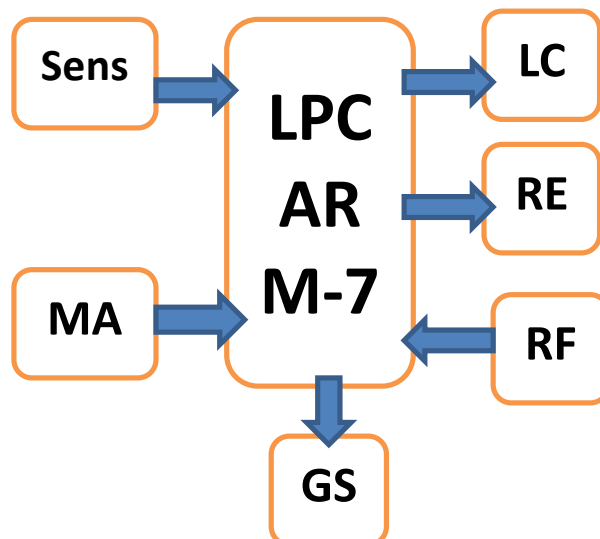


Fig-i

The above figure shows the block diagram for this micro-controller application. They mainly comprise of the Micro-controller, IR sensors, Relays, Seven segment display etc. They can be further elaborated as :-

1.1 Power Supply:-

Here we use +5 and +3.3V dc power supply. The main function of this block is to provide the required amount of voltage to essential circuits. 3.3V is required for the arm7 as it is a low power consumption device(LPC). Here we have IC 7805, which provides the +5V dc regulated power supply. Also a transformer is used to step down a high voltage AC to a low voltage AC. The rectifier is used to convert a AC into a DC.

1.2. Microcontroller-LPC 2138

Micro controller is a true computer on a single chip the design incorporate the entire feature found in a microprocessor, CPU, ALU, PC, SP and all registers. It also had added the other features to make a computer ROM, Ram, parallel input output, serial input, output counters and clock circuit.

Like microprocessor, a micro controller is a general-purpose device, but one that is meant to read data, performs limited calculations on that data and control its environment based in these calculations. The prime use of micro controller s is to control the operation by a micro controller using a fixed program that is stored in ROM and does not change over the lifetime of the system.

Features-

- 32-bit microcontroller.
- 512 KB of on-chip flash memory.
- 40kB of on-chip static RAM .
- It has inbuilt watch dog timer.



-
- It has inbuilt I2C bus.
 - It has inbuilt 2ADC.
 - Single full chip erase in 400 ms & programming of 256B in 1ms.
 - Single 10-bit DAC provides variable analog o/p.

1.3. Sensors:-

Here we use three different sensors namely:

- i] IR sensor ii] LDR sensor iii] Temperature sensor

In this system we use IR sensors to detect the number of people going inside or coming outside. It is placed on the doors of a room or a hall. There are two parts of the sensor- Transmitter and the Receiver. When the person goes through the sensor there is objection and the receiver sends the signal to the Timer. We have implemented the person counter module using 2 transmitters and 2 receivers.

- i] Infra-red detector:

used to determine the presence of occupants inside the room.

- ii] Light intensity controlled lamp:

Input should be taken from a LDR sensor for turning a lamp on or off according to a preset value. If it is found that the room is empty the system will turn the fan and light off after a preset delay.

- iii] Temperature controlled fan:

Input should be taken from a temperature sensor & compared with a user defined threshold value to determine rotational speed.

1.4. GSM module

GSM (Global System for Mobile communication) is a digital mobile telephony system that is widely used in Europe and other parts of the world. GSM uses a variation of Time Division Multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot it operates at either the 900 MHz or 1800 MHz frequency band. Mobile services based on GSM technology were first launched in Finland in 1991. Today, more than 690 mobile networks provide GSM services across 213 countries and GSM represents 82.4% of all global mobile connections. According to GSM World, there are now more than 2 billion GSM mobile phone users worldwide. GSM World references China as "the largest single GSM market, with more than 370 million users, followed by Russia with 145 million, India with 83 million and the USA with 78 million users."

1.5. RFID

Radio frequency identification (RFID) is a generic term that is used to describe a system that transmits the identity (in the form of a unique serial number) of an object or person wirelessly, using radio waves. It's grouped under the broad category of automatic identification technologies.



RFID stands for **Radio-Frequency Identification Device**. The acronym refers to small electronic devices that consist of a small chip and an antenna. The chip typically is capable of carrying 2,000 bytes of data or less.

The RFID device serves the same purpose as a bar code or a magnetic strip on the back of a credit card or ATM card; it provides a unique identifier for that object. And, just as a bar code or magnetic strip must be scanned to get the information, the RFID device must be scanned to retrieve the identifying information.

1.6. Relay Driver Circuit:-

This block has the potential to drive the various controlled devices. In this block mainly we are using the transistor and the relays. One relay driver circuit we are using to control the light.

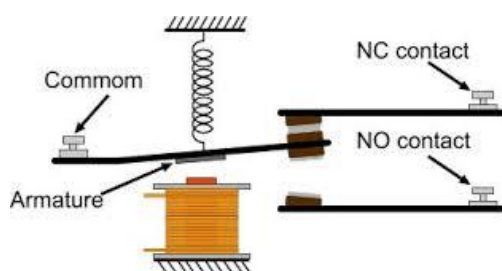
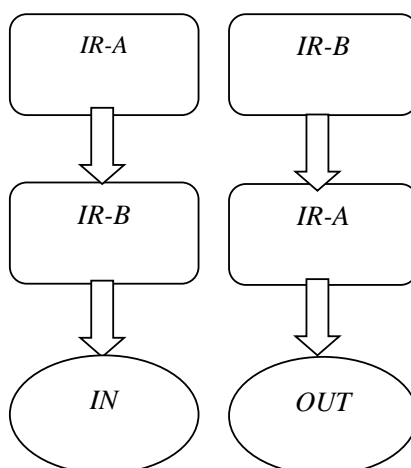


Fig-ii

We have used 12 volt relay. As the microcontroller can not turn on relay directly, we need to use a Relay Driver circuit. This circuit consists of a transistor. This transistor is used to turn on relay through microcontroller. We have used a SPDT relay which stands for Single Pole Double Throw relay. In this project we have provided 2 pin connector as a output of Relay. One of these 2 pins is connected to the normally open terminal of the relay which is also known as NO contact. Output signal from AT89S52 is given to the base of the transistor, which further energizes the particular relay. It then controls the flow of charge to the the load that is tube-lights and fans etc. Because of this, appropriate device is selected and it does all its allotted function.

Flow Chart-





If IN = OUT \Rightarrow Lights Off

If IN \neq OUT \Rightarrow Lights On

Fig-iii

The above flow chart describes the working of this Application of Micro-Controlller. The 2 sensors are to be put at the entrance. When the Ath IR sensor is interrupted the Micro-controller will look for the Bth IR sensor. That is if Ath sensor is interrupted 1st and then the Bth sensor then it is said that the person is going inside. And vice-a-versa. Now the counter will send the pulse to the micro-controller. Further the micro-controller will send the signal to the relay.

The 2 sensors A and B are used for the purpose of getting the direction. If the sequence IR-A – IR-B will give the number of persons going inside. And the sequence IR-B – IR-A will give the the number of persons coming outside. The number of interrupts in the IR sensor will give the number of persons passing through.The receiver of the IR sensor will give the pulse to the counter. And then the micro-controller will give the signals to the relay.

Survey in our College Building

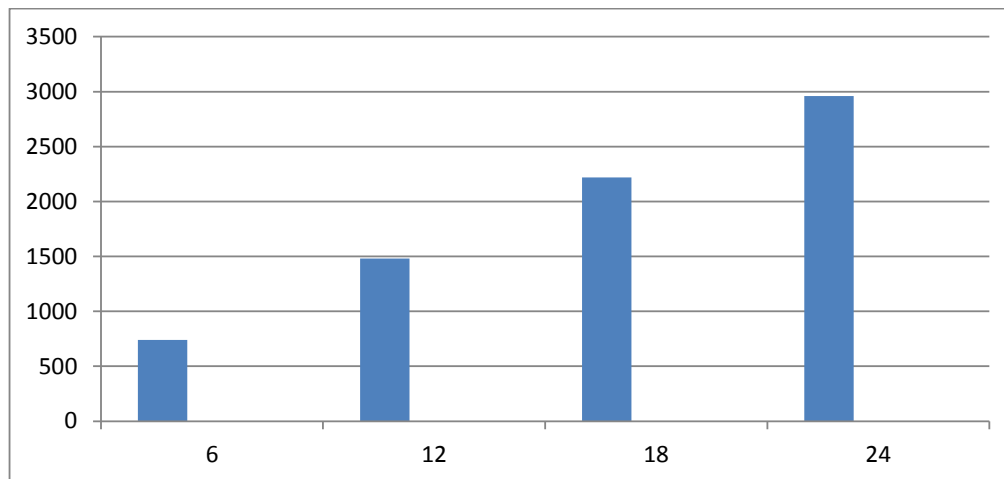
We did one survey in one of our buildings of our college. We checked the total number of tubelights and fans that were still on during the two breaks:- 1-Short break(15 minutes) & 2-Long break(45 minutes) i.e. total of 1 hour. And we got the above result. By implementing this project we can save about Rs 636 every month for a single building. And when we will implement this in the whole campus, the saving will be considerably large, both in financial and also there will be appreciable Conservation of Energy. We carried out the estimation for average number of fans and tubelights on. We drew the following conclusions from our observations.

Floor	Fan (60 W)		Tubelight (40W)		Energy Lost (kW-Hr)
	ON	OFF	ON	OFF	
Ground	7	9	7	15	0.700
First	5	12	8	13	0.620
Second	8	35	8	32	0.800

Table-i



Graph I - Energy wasted/ No of classrooms



X axis-No of Class rooms

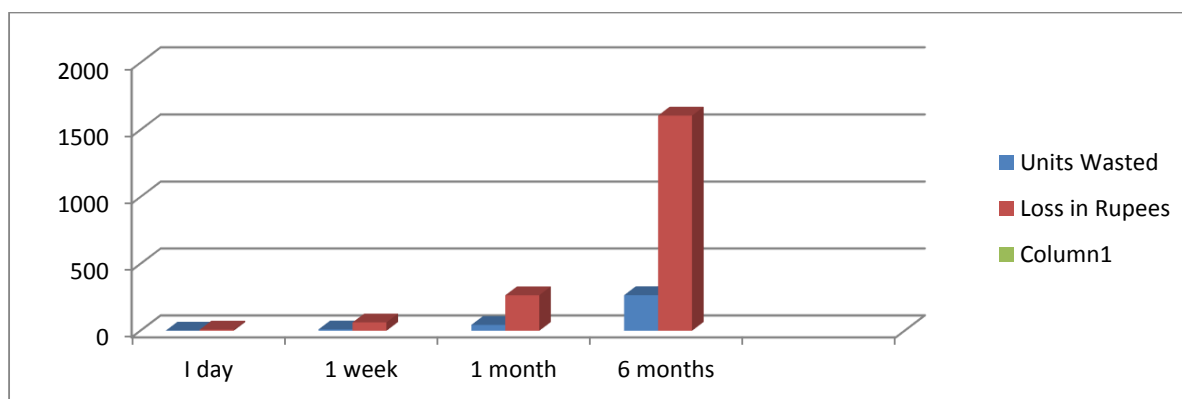
Y axis- Energy wasted in Watts

Graph-i

According to the commercial rates of electricity we drew the following conclusions-

- The energy wasted in terms of rupees is quiet low for a single day.
- But when we take number of days and months into consideration the amount is really huge.
- There is both wastage in electrical energy as well as rupees.

Graph II – Units wasted & Loss in Rs. / No of days



X axis- No of days

Y axis- Energy wasted in Watts Loss in Rupees

Graph-ii



Applications:-

1. This project can be used in various rooms like seminar hall, conference hall where the capacity of room is limited and should not be exceeded. Project will display actual number of persons inside the room.
2. Automatic Room light Controller with Visitor Counter can be used in class rooms, study rooms and library in colleges.
3. This project can also be used in our home because as many times it happens that we come out of our bedroom or hall or kitchen and we forgot to turn off the lights.
4. This project can be used in Cinema halls, multiplex, malls as well as in temples to count the number of person entering inside. So that these places should not get over crowded to avoid congestion. We can fix the limit of people going inside. And once the count is shown we will stop people from entering to avoid any troubles or even mishaps.

Conclusion and Future work-

This method of Energy Conservation will work more efficiently. It not only saves energy but it also proves to be beneficial financially. Thus with the help of the Micro-controller we can save large amount of energy. It also makes the room or hall more automated. We can also use for many other purposes like for attendance or detect the percentage of congestion in any particular room or the hall.

We can add further modifications of sound system for indicating whether the hall is full or congested. We can make the records of the students present in the class during the periods. We can also make daily databases daily for the attendance record of daily or weekly or monthly.

References:- Papers

1. International Journal of Emerging Technology and Advanced Engineering Website: www.ijetae.com (ISSN 2250-2459, Volume 2, Issue 2, February 2012)
2. Journal of Convergence Information Technology Volume 5, Number 1, February 2010
3. International Journal of Embedded Systems and Applications (IJESA) Vol.3, No.1, March 2013
4. Y.-W. Bai and Y.-T. Ku: Automatic Room Light Intensity Detection and Control Using a Microprocessor and Light Sensors
5. Energy Saving by Automatic Control of Power in Simple Home Appliances
6. Implementing Prototype Model for School Security System (SSS) Using RFID

Staff

- Prof Mangate S.
H.O.D, Electrical Department, SVPM College of Engineering, Baramati.
- Prof Gholap S.
Senior Staff, Electrical Department, SVPM College of Engineering, Baramati.