A

Seminar report

On

AUTOMATIC STREET LIGHT

Submitted in partial fulfillment of the requirement for the award of degree
Of ECE

SUBMITTED TO: SUBMITTED BY:

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Acknowledgement

I would like to thank respected Mr…….. and Mr. ……..for giving me such a wonderful opportunity to expand my knowledge for my own branch and giving me guidelines to present a seminar report. It helped me a lot to realize of what we study for.

Secondly, I would like to thank my parents who patiently helped me as i went through my work and helped to modify and eliminate some of the irrelevant or un-necessary stuffs.

Thirdly, I would like to thank my friends who helped me to make my work more organized and well-stacked till the end.

Next, I would thank Microsoft for developing such a wonderful tool like MS Word. It helped my work a lot to remain error-free.

Last but clearly not the least, I would thank The Almighty for giving me strength to complete my report on time.

Preface

I have made this report file on the topic **AUTOMATIC STREET LIGHT** ; I have tried my best to elucidate all the relevant detail to the topic to be included in the report. While in the beginning I have tried to give a general view about this topic.

My efforts and wholehearted co-corporation of each and everyone has ended on a successful note. I express my sincere gratitude to …………..who assisting me throughout the preparation of this topic. I thank him for providing me the reinforcement, confidence and most importantly the track for the topic whenever I needed it.

CHAPTER-1

LITERATURE REVIEW

1.1 INTRODUCTION

We need to save or conserve energy because most of the energy sources we depend on, like coal and natural gas can't be replaced. Once we use them up, they're gone forever. Saving power is very important, instead of using the power in unnecessary times it should be switched off. In any city "STREET LIGHT" is one of the major power consuming factors. Most of the time we see street lights are ON even after sunrise thus wasting lot of energy. Over here we are avoiding the problem by having an automatic system which turns ON & OFF the street lights at given time or when the ambient light falls below a specific intensity. Each controller has an LDR which is used to detect the ambient light. If the ambient light is below a specific value the lights are turned ON.

 A light dependent sensors is interfaced to the pic18f452 microcontroller it is used to track the sun light and when the sensors goes dark the led will be made on and when the sensor founds light the led will be made OFF.

It clearly demonstrates the working of transistor in saturation region and cut-off region. The working of relay is also known Microcontroller and the code is written in c language in MikroC ide, the resulted value can be seen with the help of UART or LCD display .Automatic Street Light Control System is a simple yet powerful concept, which uses transistor as a switch. By using this system manual works are 100% removed. It automatically switches ON lights when the sunlight goes below the visible region of our eyes. This is done by a sensor called Light Dependent Resistor (LDR) which senses the light actually like our eyes. It automatically switches OFF lights whenever the sunlight comes, visible to our eyes.

Aim of this project is to control the street light using LDR. When the light falling occur means resistance value will be change. There is no light then the resistance value is

change. From this resistance change the voltage variation can be obtained this value is given to ADC of PIC. PIC is stand for peripheral interface controller.

1.1.1 SCOPE OF THE PROJECT:

The main scope of the project is to learn the pic microcontroller, using 10BIT ADC serial communication, interfacing the 16x2 LCD module, and effective use of the MIKROC IDE.

1.1.2 OVERVIEW:

- Gives brief introduction on the project.
- Discuss different modules of the project.
- Discuss about PIC microcontroller.
- Discuss about the Hardware.

1.2 LIGHT DEPENDENT RESISTOR

LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high, sometimes as high as 1000000 ohms, but when they are illuminated with light resistance drops dramatically. Electronic onto sensors are the devices that alter their electrical characteristics, in the presences of visible or invisible light. The best-known devices of this type are the light dependent resistor (LDR), the photo diode and the phototransistors.

Light dependent resistor as the name suggests depends on light for the variation of resistance.

- LDR are made by depositing a film of cadmium sulphide or cadmium selenide on a substrate of ceramic containing no or very few free electrons when not illuminated.The longer the strip the more the value of resistance.

- When light falls on the strip, the resistance decreases. In the absence of light the resistance can be in the order of 10K ohm to 15K ohm and is called the dark resistance.

Depending on the exposure of light the resistance can fall down to value of 500 ohms. The power ratings are usually smaller and are in the range 50mw to .5w. Though very sensitive to light, the switching time is very high and hence cannot be used for high frequency applications. They are used in chopper amplifiers. Light dependent resistors are available as discs 0.5cm to 2.5cm. The resistance rises to several Mega ohms under dark conditions.

The below figure shoes that when the torch is turned on, the resistance of the LDR falls, allowing current to pass through it is shown in figure.
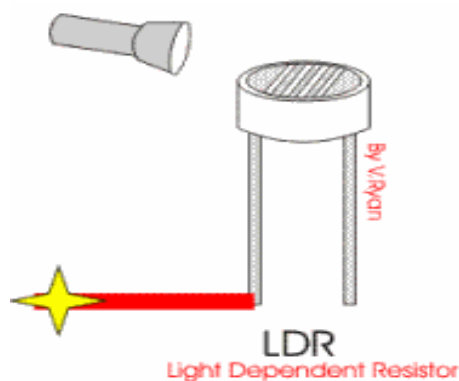
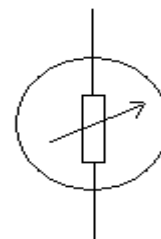

Fig. 1.1: LDR.   **Fig.** 1.1.1: Symbol for LDR.

The basic construction and symbol for LDR are shown in above figures respectively. The device consists of a pair of metal film contacts separated by a snakelike track of cadmium sulphide film, designed to provide the maximum possible contact area with the two metal films. The structure is housed in a clear plastic or resin case, to provide free access to external light. Practical LDRs are available in variety of sizes and packages styles, the most popular size having a face diameter of roughly 10mm. practical LDR is shown in below figure.
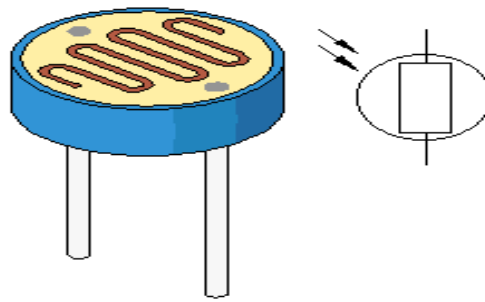
Fig. 1.2: Practical LDR.

1.2.1 Recovery rate:

When an LDR is brought from a certain illuminating level into total darkness, the resistance does not increase immediately to the dark value. The recovery rate is specified in k ohm/second and for current LDR types it is more than 200k ohm/second. The recovery rate is much greater in the reverse direction, e.g. going from darkness to illumination level of 300 lux, it takes less than 10ms to reach a resistance which corresponds with a light level of 400 lux. A LDR may be connected either way round and no special precautions are required when soldering.

- Darkness: Maximum resistance, about 1Mohm.
- Very bright light: Minimum resistance, about 100 ohm.

The LDR is a variable resistor whose resistance decreases with the increase in light intensity. Two cadmium sulphide (cds) photoconductive cells with spectral response similar to that of the human eye. The cell resistance falls with increasing light intensity. some of its features:

- High reliability.
- Light weight.
- Wide spectral response.
- Wide ambient temperature range.

CHAPTER-2

HARDWARE IMPLEMENTATION

In this project the list of hardware components used are given below:

- 18F452 Microcontroller.

- Push Button For Reset.

- RS232 IC.

- 10 MHZ Crystal.

- A Relay.

- Light Dependent Resistor.

- 16X2 Pic LCD Module.

- Power Supply 5v dc With LED.

2.1 MICRO CONTROLLER

This section provides an introduction to most common word in the embedded system "microcontroller". It is written to familiarize you with microcontroller terminology and basic microcontroller architecture.

A microcontroller is a single chip, self-contained computer which incorporates all the basic components of a personal computer on a much smaller scale. Microcontrollers are often referred to as single chip devices or single chip computers. The main consequence of the microcontroller's small size is that its resources are far more limited than those of a desktop personal computer. In functional terms, a microcontroller is a programmable single chip which controls a process or system. Microcontrollers are typically used as embedded controllers where they control part of a very larger system such as an appliance, automobile, scientific instrument or a computer peripheral.

Microcontrollers are designed to be low cost solutions; therefore using them can drastically reduce part and design costs for a project. Physically, a microcontroller is an

integrated circuit with pins along each side. The pins presented by a microcontroller are used for power, ground, oscillator, I/O ports, interrupt request signals, reset and control. In contrast, the pins exposed by a microprocessor are most often memory bus signals (rather than I/O ports).

A microcontroller has seven main components:

     i.   Central processing unit (CPU).

    ii.   ROM.

   iii.   RAM.

   iv.   Input and Output.

    v.   Timer.

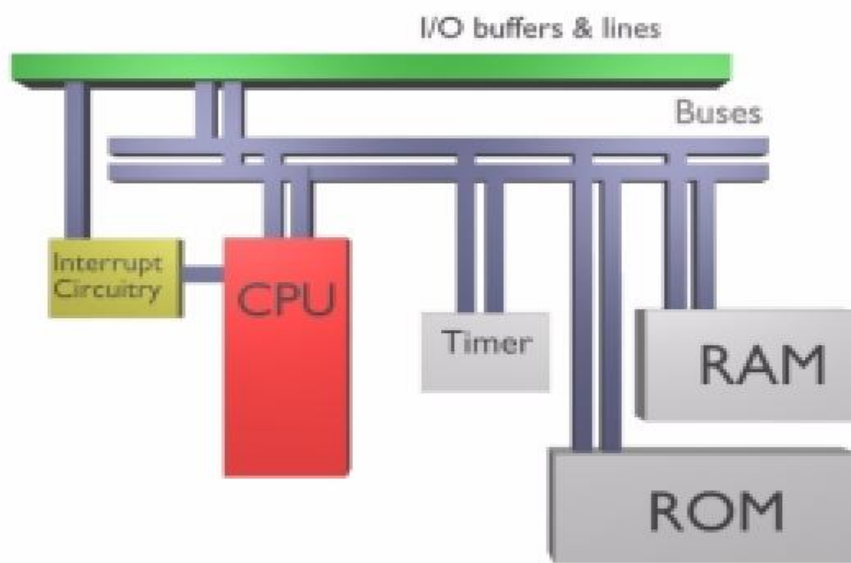   vi.   Interrupt circuitry.

  vii.   Buses.

Fig. 2.1: The Microcontroller.

Microcontrollers do not function in isolation. As their name suggests they are designed to control other devices.

2.2 PIC18f452 MICROCONTROLLER

Microchip manufacture a series of microcontrollers called PIC. (Peripheral interface controller). There are many different flavours available, some basic low memory types, going right up through to ones that have Analogue - To - Digital converters and even PWM built in. A PIC microcontroller is a processor with built in

memory and RAM and you can use it to control your projects (or build projects around it). So it saves you building a circuit that has separate external RAM, ROM and peripheralchips.

Microchip is providing the 8-bit, 16-bit and the 32 bit microcontrollers based on the desired application requirement the design engineer can choose from those. Microchip is also providing the software for the microcontrollers where the application programs are written MIKROC IDE, it is also providing the in circuit debugger called MPLAB ICD3.

In this project PIC18F452 microcontroller is used and the pin diagram of the PIC18F452 is shown below.
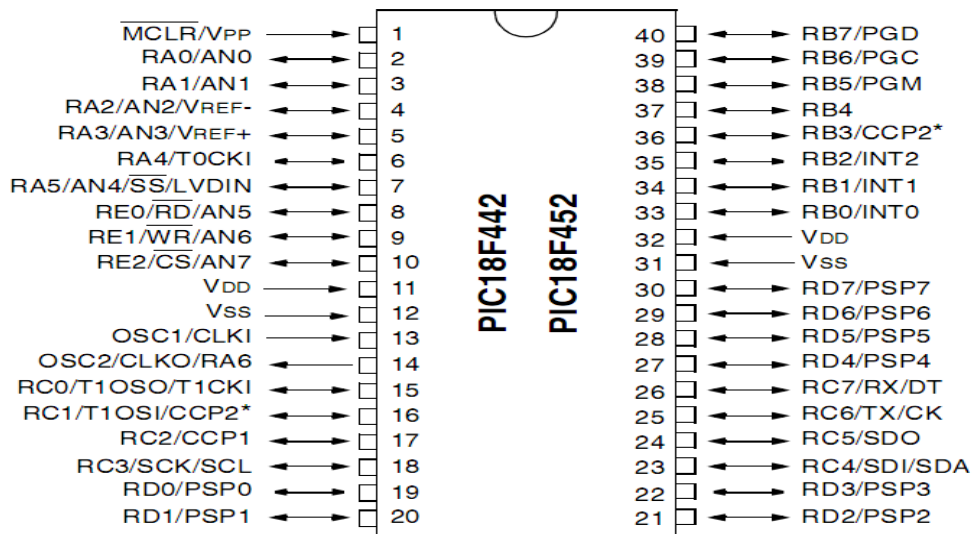

Fig. 2.2: Pin diagram of pic 18f452 microcontroller.

Features	PIC18F242	PIC18F252	PIC18F442	PIC18F452
Operating Frequency	DC - 40 MHz	DC - 40 MHz	DC - 40 MHz	DC - 40 MHz
Program Memory (Bytes)	16K	32K	16K	32K
Program Memory (Instructions)	8192	16384	8192	16384
Data Memory (Bytes)	768	1536	768	1536
Data EEPROM Memory (Bytes)	256	256	256	256
Interrupt Sources	17	17	18	18
I/O Ports	Ports A, B, C	Ports A, B, C	Ports A, B, C, D, E	Ports A, B, C, D, E
Timers	4	4	4	4
Capture/Compare/PWM Modules	2	2	2	2
Serial Communications	MSSP, Addressable USART	MSSP, Addressable USART	MSSP, Addressable USART	MSSP, Addressable USART
Parallel Communications	—	—	PSP	PSP
10-bit Analog-to-Digital Module	5 input channels	5 input channels	8 input channels	8 input channels
RESETS (and Delays)	POR, BOR, RESET Instruction, Stack Full, Stack Underflow (PWRT, OST)	POR, BOR, RESET Instruction, Stack Full, Stack Underflow (PWRT, OST)	POR, BOR, RESET Instruction, Stack Full, Stack Underflow (PWRT, OST)	POR, BOR, RESET Instruction, Stack Full, Stack Underflow (PWRT, OST)
Programmable Low Voltage Detect	Yes	Yes	Yes	Yes
Programmable Brown-out Reset	Yes	Yes	Yes	Yes
Instruction Set	75 Instructions	75 Instructions	75 Instructions	75 Instructions
Packages	28-pin DIP 28-pin SOIC	28-pin DIP 28-pin SOIC	40-pin DIP 44-pin PLCC 44-pin TQFP	40-pin DIP 44-pin PLCC 44-pin TQFP

Table. 2.1: Device features.

PIC18F452 MEMORY RANGES

The program memory and the data memory for the pic18f452 microcontroller are given in the below table.

Device	On-Chip Program Memory		On-Chip RAM (bytes)	Data EEPROM (bytes)
	FLASH (bytes)	# Single Word Instructions		
PIC18F242	16K	8192	768	256
PIC18F252	32K	16384	1536	256
PIC18F442	16K	8192	768	256
PIC18F452	32K	16384	1536	256

Table. 2.2: Program memory and data memory for the pic18f452 microcontroller.

When the power is given to the hardware module, the pic micontroller initially configures all the devices on the board. Then the microcontroller will continuously read the sensor value and it is converted to the digital value. The current humidity is shown on the 16x2 LCD as well as on the hyper terminal.

2.3 POWER SUPPLY

The 5v adapter is connected to the power jack to give the power supply to the pic 18f452 microcontroller and the peripheral items. In the pic 18f452 the VCC pins are the 11th &32 and the ground pins are 12th and 31pins. A led is also interface to show the status of the power.

2.4 PUSH BUTTON

A push button has two legs in which one leg is connected to the MCLR i.e. the first pin of the microcontroller and the other end is connected to the VCC pin. This is used to reset the microcontroller.

2.5 RS 232

The rs232 is used for serial communication with the computer. In the coding part the 9600 baud rate is used for the serial communication. The pin connection of the Rs232 is given below

- 1st and 3rd pin of the rs232 is connected to a capacitor of 0.1mf.
- 2nd pin is connected to a capacitor of 0.47mf positive end and the other end is connected to the ground.
- 4th pin is connected to the positive end of the capacitor (0.47mf) and 5th pin is connected to the negative end of capacitor.
- 6th pin is connected to the negative end of the capacitor and the other end is connected to the ground.
- 7, 8,9,10 pins are left unconnected.
- The 11th pin of the RS232 is connected to the 25th pin of the microcontroller.
- The 12th pin of the RS232 is connected to the 26th pin of the microcontroller.
- The 13th and 14th pins are the output pins which are connected to the three pin connector.

2.6 10 MHZ CRYSTAL

To the PIC 18f452 microcontroller the 10 MHz crystal's one leg is connected to the 13 and the other leg is connected to the 14th pin of the microcontroller, for the 13th pin a 33pf capacitor's one leg is connected and the other end is connected to the ground

and from the 14th pin a 33pf capacitor is connected and the other end is connected to the ground.

2.7 16x2 LCD MODULES

In the recent years the LCD is finding widespread use replacing LEDS, seven segment display. This is due to the declining prices of LCDS the ability to display numbers, characters, and graphics. This is in contrast to LEDS, which are limited to numbers and a few characters.Incorporation of a refreshing controller into LCD, thereby relieving the CPU of the task of refreshing the LCD in contrast the LED must be refreshed by the CPU to keep displaying the dataease of programming for characters and graphics.
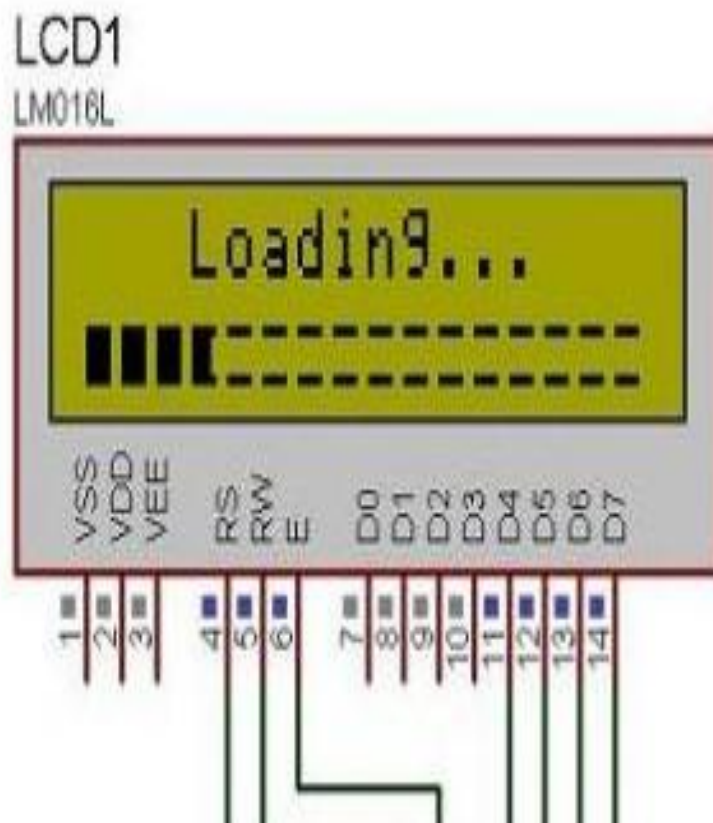

Fig. 2.3: Pin diagram for LCD.

PIN INFORMATION OF THE LCD

Pin No	Symbol	Details
1	GND	Ground
2	Vcc	Supply Voltage +5V
3	Vo	Contrast adjustment
4	RS	0->Control input, 1-> Data input
5	R/W	Read/ Write
6	E	Enable
7 to 14	D0 to D7	Data
15	VB1	Backlight +5V
16	VB0	Backlight ground

Table. 2.3: 16x2 LCD module.

The hardware interfacing of the LCD pins and discussed below:

The LCD has 16 pins.

- The first pin is connected to the ground.
- The second pin is connected to the VCC.
- The third pin is the contrast pin and it is connected to the potentiometers middle pin. (Potentiometer has three pins). The other two pins of the potentiometer are connected to the vcc and ground.
- The fourth pin is the RS pin and it is connected to the 37th pin of the microcontroller.
- The fifth pin is RW pin and it is connected to the 38TH pin of the microcontroller.
- The sixth pin is the enable pin and it is connected to the 39TH pin of the microcontroller.
- Pins 7-14 pins are the data pins and are connected to the PORTD of the microcontroller.
- The 15th pin is back light positive pin and is connected to the VCC.
- And the 16th pin is the back light negative and is connected to the ground.

2.8 RELAYS

Relays are elements connected to the output pins of the microcontroller and are used to turn on/off all that being out off board which has sensitive components: motors, transformers, heaters, bulbs, high voltage components etc
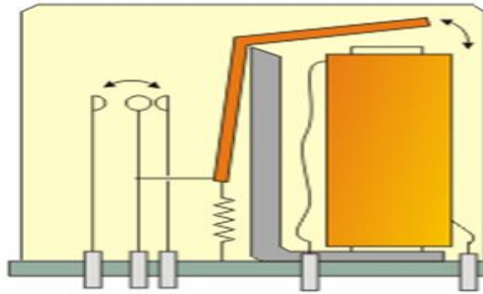

Fig. 2.4: Relays.

There are various types of relays but all have same operating principles: when a current flows through the coil, it makes or breaks the electrical connections, between one or more pair of contacts. As it is case with opt couplers, there is nogalvanically connection (electrical contact) between input and output circuit. Relays usually demands both higher voltage and current to start operating but there are also miniature versions which can be activated with a low current directly obtained from a microcontroller port pins.

Below figure shows one solutions specific to the microcontroller. In this very case Darlington transistor is used to activate the relay because of its high current gain. This is not in accordance with "rules", but it is necessary in case of logic one activation since the current is than very low. In order to be prevented from appearance of high voltage of self induction caused by a sudden stop of current flow through the coil, an inverted polarize diode is connected in parallel with the coil. The purpose of this diode is to cut off the voltage pick.
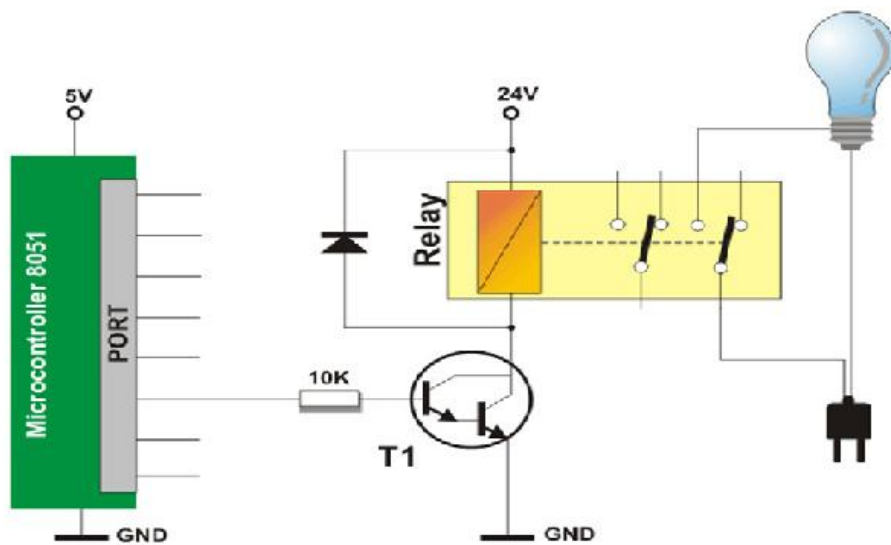
Fig. 2.5: Relay circuit.

This can be seen in the circuit diagram of the mini project.

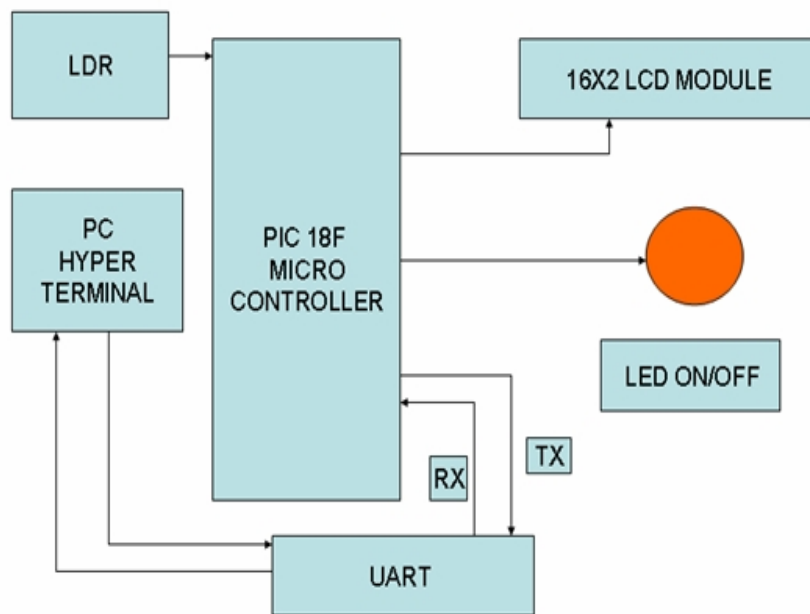**Hardware circuit diagram of the project is given below:**

Fig. 2.6: Circuit diagram of the project.

2.9 BLOCK DIAGRAM OF THE PROJECT

Fig. 2.7: Block diagram of the project.

CHAPTER-3

RESULT ANALYSIS

RESULT

The fastest field of development in the electronic engineering is the field of embedded systems engineering it is used in a variety of applications. In this project the designing of the hardware circuit and interfacing the 16x2 LCD module and the Rs232 IC is successfully done.

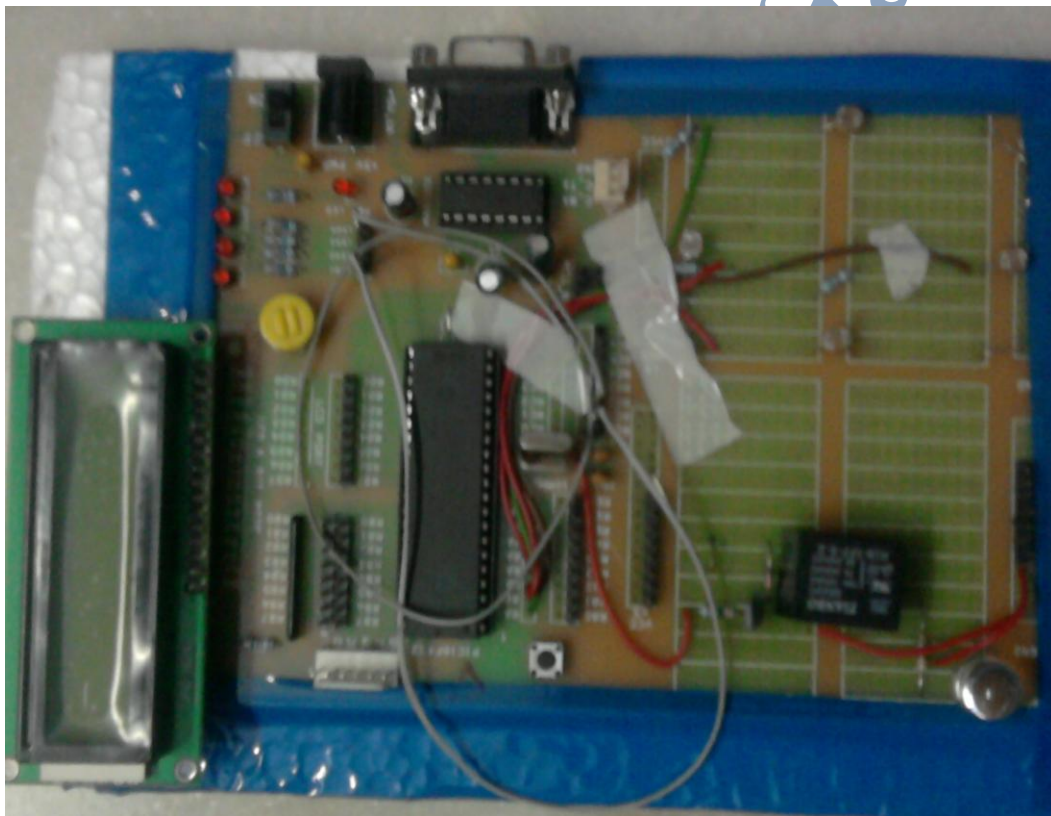The hardware designing and the software both are successfully done.

Fig. 3.1: Photograph of the project.

ADVANTAGES AND DISADVANTAGES

Advantages:

- Photo resistors convert light into electricity and are not dependent on any other force.
- LDRs are sensitive, inexpensive, and readily available devices. They have good power and voltage handling capabilities, similar to those of a conventional resistor.
- They are small enough to fit into virtually any electronic device and are used all around the world as a basic component in many electrical systems.
- Photo resistors are simply designed and are made from materials that are widely available, allowing hundreds of thousands of units to be produced each year.
- A LDR may be connected either way round and no special precautions are required when soldering.

Disadvantages:

- Can be more complicated to align detector pairs.
- Is sensitive to ambient light and require careful shielding.
- Photo resistors are only sensitive to light and no other force can power it without risking damage. Also, they are unable to detect low light levels and may take a few seconds to deliver a charge while their electrons build up momentum.

APPLICATIONS

- Photo resistors have many uses, most of which involve detecting the presence of light. Street lights use photo resistors to detect whether it is day or night and turn the light on or off accordingly.

- Photo resistors are also used in digital cameras to detect how much light camera sees and adjust the picture quality accordingly.

- They are also used in some clocks, alarms, and other electronic devices that are semi-dependent on sunlight.

- Smoke detection.

- Automatic lighting control.

- Burglar alarm systems.

- Camera (electronic shutter).

- Strobe (color temperature reading).

CONCLUSION AND FUTURE SCOPE

CONCLUSION

In this project work we have studied and implemented a complete working model using a PIC microcontroller. The programming and interfering of PIC microcontroller has been mastered during the implementation. This work includes the study of energy saving system in many applications.

FUTURE SCOPE

The above project we can develop Solar Street light system with Automatic street light controller**.** The system can be powered from a battery, which can be charged during day time by harvesting the solar energy through a solar cell. The solar energy harvested from sunlight can be stored, inverted from DC voltage to AC voltage using sun tie converter. The AC voltage can be stepped up and given to the electric grid. The AC voltage from the electric grid can be stepped down, rectified and used for powering the circuit. Meanwhile, the street light can also be powered by the A.C. voltage, which is controlled by a relay switch connected to the switching part of the circuit. The above mentioned strategy will enable us to harvest solar energy in an effective way for the operation of the circuit and for powering the street light also.

REFERENCES

- www.google.com
- www.wikipedia.com
- www.studymafia.org