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MAKING A MULTIFUNCTIONAL TIME SWITCH

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Abstract- Nowadays, in our country electricity has become one of the most important things that we need to save by stopping its misuse as the production level is much lower than the demanding level. This has motivated me to go with the project making a multifunctional time switch. A Time switch is a switch set to operate at a desired time control consisting of a mechanical or electronic device for making or breaking or changing the connection in a circuit. By this switch one can easily stop misuse of electricity and become able of switching more than one system to turn off/on just in time. Though the construction of this project is very simple but its application is huge. In this project I have tried to make the proper utilization of science which has combined mechanical and electrical technology. Time switch is very simple but by using this in our daily life, we can save power. Time switch is not commonly used in our country. This is such a kind of time switch through which one can control more than one switching system and cost of which is half of those switches available in the current market. It can hope by using this kind of modern technology our country will clearly go ahead in the way of development. It has been thought that, this low cost switch can be of much help in local economy by saving power being wasted.

Keywords: Time switch, LCD display, Microcontroller.

1. INTRODUCTION

The technology in the world is converted from manual control to automatic control. From A to Z in practical life, everyone wants the application of automatic control. Control systems have been widely applied to many industrial systems in the past few years. Recently it is becoming increasingly advantageous to carry our information processing and control functions using digital methods. It is well known fact that the digital control system can offer high accuracy and high speed response. These are the reasons that cause a strong motivation to design and implement the automatic control system based on the microcontroller.

A time switch (also called timer switch) is an electric switch with a built-in clock that plugs into an electric socket, between the socket itself and a power plug. This physical arrangement allows the connected device(s) to automatically receive power for a desired duration of time.

Fig.1: Time switch

2. OBJECTIVES

1. Controlling switch by using time.
2. Study about programming language mikro C.
3. To know about different types of time switch.

2.1 APPLICATION

1. Switching of streetlight and security light for yards farmhouses, gardens, water supply etc.

2. Switching of illumination lights of shopping complexes, high-rise buildings, hotels and Govt. Building etc.
3. By using Time switch we can turn off/on any kind of machine just in time.
4. Specially this switch is ideal for areas such as toilets, bathrooms or any area in industry or home where people have tendency to forget to switch off.
5. Time switch is also used in aquariums, ovens, washing machines etc.

2.2 Investigation and Research

➢ Float option
➢ Circuit design
➢ Ergonomics
➢ Manufacture procedure
➢ Safety factor
➢ Finish detail
➢ Time practical

3. DIFFERENT TYPES OF TIME SWITCH

3.1 Aube by Honeywell TI033/U 7-Day Programmable Timer Switch

This easy-to-install Aube by Honeywell 7-day programmable timer switch handles motors, all types of lighting, and offers the flexibility of 7 programs per week. Works with motors and all types of lighting (compatible with electronic ballasts, compact fluorescent lights and tungsten lights up to 5 A) LCD shows time, day and load status. Manual override enables load to be turned on/off without affecting the program. Built-in rechargeable battery.

3.2 Sylvania SA170 15 Amp Zip-Set Digital Wall Switch Time

Sylvania SA170 Digital Wall Switch Timer The Sylvania SA170 Zip-Set Digital Wall Switch Timer gives you a variety of options for controlling the lights inside and outside your home. By simply entering your area code, you can use the Timer to automatically turn on your lights at sunset and adjust for seasonal time changes. The SA170 is a great way to secure the perimeter of your home, and it's also an intelligent method for conserving energy by automatically shutting off your outdoor lights after bedtime. Additional random or programmable options, as well as a manual control option, make this timer easily customizable to meet your needs. - Wall switch timer with large easy to read digital display - Large easy to set buttons - Random settings provide added security - Battery back-up saves resetting time in the event.

Fig.2: Aube by Honeywell TI033/U 7-Day Programmable Timer Switch

Fig.3: Sylvania SA170 15 Amp Zip-Set Digital Wall Switch Time.

3.3 Intermatic 30909 Indoor Time Switch Timer 120 Volt
This heavy duty mechanical time switch is designed for industrial, commercial and residential applications. The high horsepower rating is ideal for loads up to 40 amps resistive from 120-volts providing direct 24 hour time switch control of most loads. All Models Are Equipped With: One "ON" And One "OFF" Tripper 1 Circuit Standard On/Off Single Pole Single Throw 40 Amps, 4000 Watt Capacity, 120 Volts.

Fig.4: Intermatic 30909 Indoor Time Switch Timer 120 Volt

**3.4 Jasco 15069 White, Indoor, Wall Switch Timer**

Conserve energy and save money with this UL listed GE 15 amp 60-Minute In-Wall Shutoff Timer. It's CFL ready and is great for controlling electronics such as lights, exhaust fans and heaters. This dial timer installs indoors and can replace standard wall switches or older spring-wound timers.


Fig.5: Jasco 15069 White, Indoor, Wall Switch Timer

4. WORKING PRINCIPLE

The working procedure of a time switch is given below:
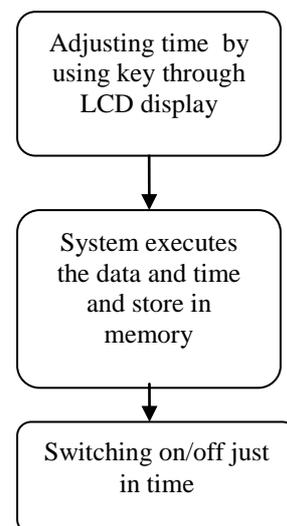
4.1 CIRCUIT DIAGRAM OF HOLE SETUP
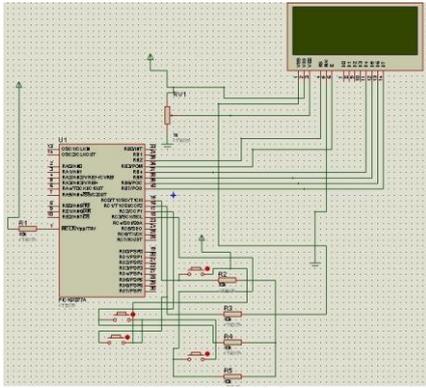
5. DESIGN PRINCIPLE

Electricity is wasted in many ways. To reduce the loss of electricity time switch can be used. So to make an automatic system design is needed. It will be a great achievement if this system able to reduce the waste of electricity.

Short description of components used in this project is given below:

5.1 Mircocontroller

A microcontroller is a single chip computer. Micro suggests that the device is small, and controller suggests that the device can be used in control applications. Another term used for microcontrollers is embedded controller, since most of the microcontrollers are built into (or embedded in) the devices they control.Developing a PIC microcontroller-based project simply takes no more than five or six steps:

1) Type the program into a PC.
2) Assemble the programmed.
3) Optionally simulate the program on a PC.
4) Load the program into microcontroller program memory.
5) Design and construct the hardware.
6) Test the project.
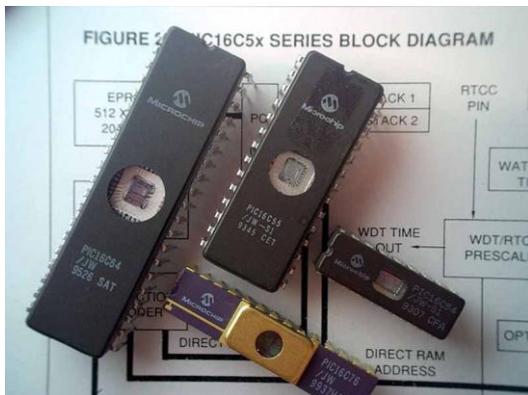
Fig.6: Some PIC microcontroller

5.2 Light Emitting Diode (LED)

A light-emitting diode, usually called an **LED**, is a semiconductor diode that emits incoherent narrow-spectrum light when electrically biased in the forward direction of the p-n junction, as in the common LED circuit. This effect is a form of electroluminescence.

Fig.7: LED

5.3 Resistor

A resistor is a two-terminal electrical or electronic component that opposes an electric current by producing a voltage drop between its terminals in proportion to the current, that is, in accordance with Ohm's law: $V = IR$. The *electrical resistance R* is equal to the voltage drop V across the resistor divided by the current I through the resistor. Resistors are used as part of electrical networks and electronic circuits.

Fig.8: Resistor

5.4 Capacitor

A capacitor is an electrical/electronic device that can store energy in the electric field between a pair of conductors (called "plates"). The process of storing energy in the capacitor is known as "charging", and involves electric charges of equal magnitude, but opposite polarity, building up on each capacitor.

Fig.7 : Capacitor

5.5 Transistor

In electronics, a transistor is a semiconductor device commonly used to amplify or switch electronic signals. The transistor is the fundamental building block of computers, and all other modern electronic devices. Some transistors are packaged individually but most are found in integrated circuits.
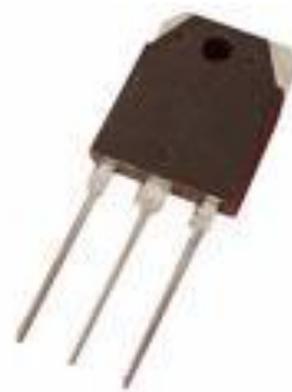
Fig.10: Transistor

5.6 Relay

The relay takes advantages of the fact that when electricity flows through a coil, it becomes an electromagnet. The electromagnetic coil attracts a steel plate, which is attached to a switch. So the switch's motion (on & off) is controlled by the current flowing in the coil or not respectively. A very useful feature of a relay is that it can be used to electrically isolate different parts of a circuit. It will allow a low voltage circuit (e.g. 100 VAC or more). The relay operates mechanically, so it cannot operate at high speed.
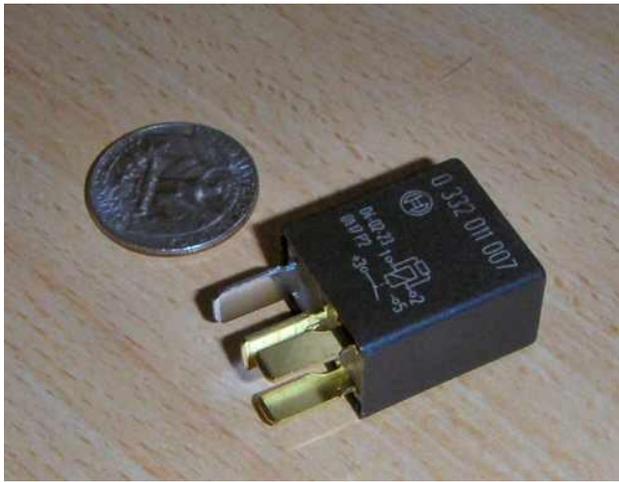
Fig.11: Relay
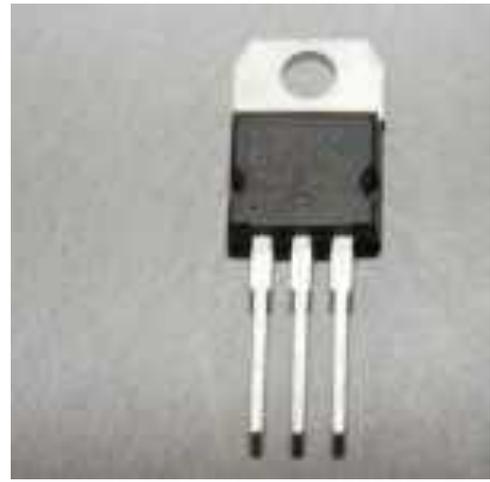
5.7 Op-amp

An operational amplifier, which is often called an op-amp, is a DC coupled high gain electronic voltage amplifier with differential inputs and usually a signal output. I have used LM-324 series op-amp.
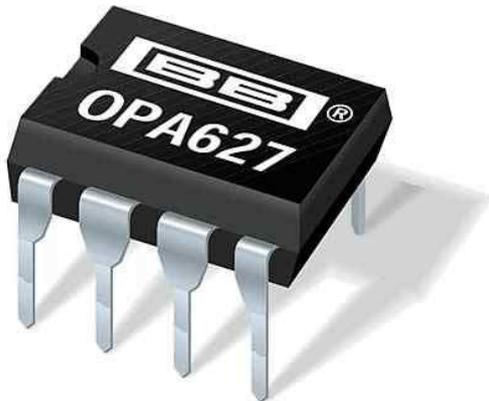

Fig.12: Op-amp

5.8 Voltage regulator

The device is used in order to get the voltage of stable +5V .1A type used. When there is little LED made to turn on simultaneously, 100 mA type 78L05 can be used.

Features

❖ Output current in excess of 0.5A
❖ No external components
❖ Internal thermal overload protection
❖ Internal short circuit current limiting
❖ Output transistor safe area compensation
❖ Available in TO-220, TO-39, and TO-252 D-PAK packages
❖ Output voltages of 5V, 12V, and 15V

5.9   LCD (Liquid crystal display)

A liquid crystal display (LCD) is a thin, flat, electronic visual display that uses the light modulating properties of liquid crystals (LCs). LCs do not emit light directly.
They are used in a wide range of applications including computer monitors, television, instrument panels, aircraft cockpit displays, signage etc. They are common in consumer devices such as video players, gaming devices, clocks, watches, calculators and telephones. LCDs have displayed cathode ray tube (CRT) displays in most applications. LCDs are more energy efficient and offer safer disposal than CRTs.

Fig.13: Voltage regulator

Fig.14: LCD

5.10 Adaptor

An adaptor is a device used to much the physical or electrical characteristics of two different things so that a connection may be made between them. An adaptor may be very simple, connection one kind of plug to another kind of socket, but not changing what passes through. Other adaptor may include a device that changes what is passing through, such as a transformer that adapts household electrical current from higher voltage to lower voltage suitable for consumer electronics. In my project I used one DC power supply and it is done by adaptor.

6. CAMERA VIEW OF TIME SWITCH
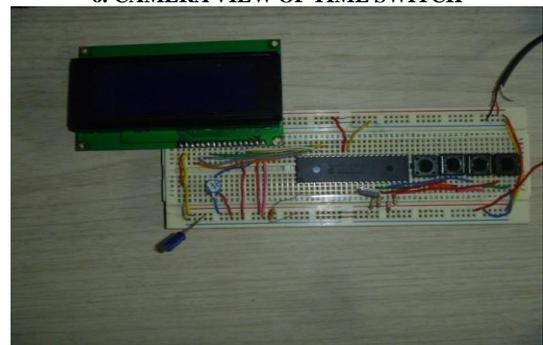
Fig : camera view of time switch

7. RESULT AND DISCUSSION

7.1 Result

The result of this project was satisfactory. All the components of the circuit worked properly. The date and time at which the system required to start is set by using switches provided on the bread board. The LCD display shows the given data. The microcontroller executes the data and performs just in time.

7.2 Discussion

With the advancement of science and technology the whole world is enjoying the facilities of technology. As Bangladesh is a poor country, she is failed to enjoy the fruits of technology. We are failure in applying technology in utilization of our limited wealth as like water, electricity etc.If anyone forgets to turn off the switch off the lights, fans or street lights, then these will remain on and a loss of electricity will occur. In this case this project is most effective to reduce the loss.

7.3 Further Study

This project was not designed as a remote controlled switch. It can be possible by using the infrared radiation system. Besides, there is a limitation of the number of switches (more than two) to be controlled. By using better program this problem can be solved.

5.1 Conclusion

Time switch is very simple but by using this in our daily life, we can save power. Time switch is not commonly used in our country. A time switch had been made which one can control more than one switching system and cost of which is half of those switches available in the current market. It is hoped that by using this kind of modern technology in our country will clearly go ahead in the way of development. It can be thought that, this low cost switch can be of much help in a local economy by saving power being wasted.

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