SRI VENKATESWARA COLLEGE OF ENGINEERING AND TECHNOLOGY

Project Presentation
On

"SOLAR BASED REMOTE CAR"

Presented
By

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ABSTRACT:

Solartracking system is the system with the efficient utilization of solar energy for various purposes such as charging batteries and heating water etc. The project describes a general purpose to run a vehicles by charging battery by using solar energy. In years to come the need for energy will increase manifold while the reserve of conventional energy will deplete in rapidspace. To meed the growing demand of energy harnessing of non-conventional / renewable energy is the necessity. Among all the available non-conventional sources, solar energy is the most abundant and uniformly distributed.

Though the technology of trapping the solar energy is in existence the process can be improved to increase efficiency and make it cost-effective. Solar energy is free – it needs no fuel and produces no waste or pollution. Solar power is renewable. The sun will keep on shining anyway, so it makes sense to use it. The system is improved system to provide higher efficiency for lower cost. The existing system receives maximum sun energy only from 11 am to 2 pm .

In this work we propose an innovative system for tracking the sun which is based on the use of a commercial SOLAR PANEL. solar tracking systems which currently present a better performance and accuracy depend on sophisticated control systems and complex electronic circuitry. In future may be decrease of fules like coal and petroleum etc. so now days we are trying to use nature like solar energy and water .so we choosed the project to run vehicles by using solar energy.

There is many factors to use solar energy .the factors such as environmental pollution due to the fules .And the major factor is depletion of ozone layer and increase of corbondioxide and causes floods ,tsunami etc. so to reduce such a effects one of factor environmental pollution is reduced by using solar energy to run a vehicle

Introduction:

Solar energy is the most abundant and uniformly distributed. Though the technology of trapping the solar energy is in existence the process can be in proved to increase efficiency and make it cost-effective. Solar energy is free – it needs no fuel and produces no waste or pollution. Solar power is renewable. The system checks the position of the sun and controls the movement of a solar panel so that radiation of the sun comes normally to the surface of the solar panel. The developed-tracking system tracks the sun both in the azimuth as well as in the elevation plane. The existing system receives maximum sun energy only from 11 am to 2 pm because always the solar collector kept at 30 ▪. and charges a small battery. A new method is developed, where sun light is tracked from morning6 am to 6 pm by moving the solar collector along with the movement of the sun using stepper motor based on PIC. Microcontroller and multiple batteries can be charged one after another. When this system is implemented, at least30% extra energy can be created compared with the existing system. The panels are the fundamental solar-energy conversion component. Conventional solar panels, fixed with a certain angle, limits their area of exposure from the sun during the course of the day. Therefore, the average solar energy is not always maximized. Solar tracking system sare essential for many applications such as thermal energy storage systems and solar energy based power generation systems in order to improve system performance. The change in sun's position is monitored and the system always keeps that the plane of the panel is normal to the direction of the sun. By doing so, maximum irradiation and thermal energy would be taken from the sun. The elevation angle of the sun remains almost invariant in a month and varies little

1. SOLAR PANEL

1.1. CONSTRUCTION:

. There is more than enough energy hitting the earth in the form of solar radiation to meet power needs of our species. Estimates indicate that there is four times as much wind energy available for our use as the species uses every year. Solar power is even more dramatic, the sun showers the planet with more energy every day than we use in a year. So the difficulty has never been the availability of sun and wind, they are readily available.

The difficulty with solar panels has always been the efficiency of power transfer. You see, it is one thing to say that the sun showers us with several terawatts of power every day, and another thing to put that power to work for us. The majority of modern human power use is electric. This means we need to convert the radiant solar energy to usable electric current. This presents a technological hurdle for us, because for most of our history, our electric conversion has been turbine based. Solar panels however, don't utilize a turbine at all. Instead sunlight striking silicon crystals creates electric potential.

This transfer of sunlight to electric potential has always been an inefficient one. The scientist who first harnessed this effect, which he dubbed photovoltaic, was only able to elicit a 1% return on the energy he put into his solar cell. He created his cell by coating a semiconductor (selenium) with gold. Through a century of refinement, we have painstakingly reached solar panels that can produce a return of more than 30% of the power they receive.

One of the reasons behind this is that any given semiconductor only responds to a certain wavelength of light. This means a single-substance solar panel will only ever be able to convert a portion of the sunlight it receives to electricity; no matter how well it converts that portion. That, in essence is where we stand today.

Manufacturing advances in the past decade have finally lowered the cost of solar panels to the point that a 30% efficiency panel can pay for the cost of production and installation over the first six years of its life. This means that solar power is finally economically viable, since panels are designed to run for at least 10 years before they start to break down.

1.2 solar panel working:-

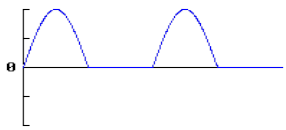
Solar panels are technically any kind of panel that uses solar thermal energy to produce electricity. There are a variety of panel types, from those used to heat water as with solar hot water panels, to those which are used to store solar energy, such as solar thermal energy panels. Furthermore, a solar panel can be described as a photovoltaic panel, which is what is used in the professional solar power industry to generate electricity from the rays of the sun. Despite the type of solar panel being discussed, almost all solar panels are flat. This is due to the fact that the surface needs to be at a 90 degree angle from the suns rays for optimal configuration.

Photovoltaic panels, the most common form of solar panels in the professional electrical generation industry, are able to absorb energy from the sun through a variety of smaller solar cells on their surface. Much like how a plant is able to absorb energy from the sun for photosynthetic purposes, solar cells behave in a similar fashion. As the photons from the sun's rays hit the solar cells on a photovoltaic panel, the energy is transferred to a silicon semiconductor. The photon is then transformed into electricity and then passed through connecting wires to finally enter a power generation facility or attery. The solar cells on calculators and satellites are photovoltaic (PV) cells or simply a group of cells electrically connected and parceled in one frame. Photo voltaics, where photo means light and voltaic means electricity, transforms sunlight directly into electricity. ¬Photovoltaic cells are prepared with particular materials called semiconductors such as silicon, which is presently the most generally used. When light hits the Photovoltaic cell, a specific share of it is absorbed inside the semiconductor material. This means that the energy of the absorbed light is given to the semiconductor. The energy unfastens the electrons, permitting them to run freely. ¬Photovoltaic cells also have one or more electric fields that act to compel electrons unfastened by light absorption to flow in a specific direction. This flow of electronic introducing metal links on the top and bottom of the -Photovoltaic cell, the current can be drawn to use it externally

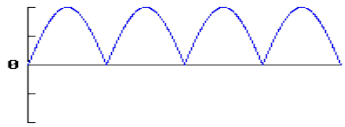
2.RECTIFIERS:

As we have noted when looking at the elements of a power supply, the purpose of the rectifier section is to convert the incoming ac from a transformer or other ac power source to some form of pulsating dc. That is, it takes current that flows alternately in both directions as shown in the first figure to the right, and modifies it so that the output current flows only in one direction, as shown in the second and third figures below.

The circuit required to do this may be nothing more than a single diode, or it may be considerably more complex. However, all rectifier circuits may be classified into one of two categories, as follows:



Half-Wave Rectifiers. An easy way to convert ac to pulsating dc is to simply allow half of the ac cycle to pass, while blocking current to prevent it from flowing during the other half cycle. The figure to the right shows the resulting output. Such circuits are known as half-wave rectifiers because they only work on half of the incoming ac wave.



- **Full-Wave Rectifiers**. The more common approach is to manipulate the incoming ac wave so that both halves are used to cause output current to flow in the same direction. The resulting waveform is shown to the right. Because these circuits operate on the entire incoming ac wave, they are known as full-wave rectifiers.

3.BATTERY:

This battery is made up of very small (likely 1/2 AAA) batteries that are tab welded together and then wrapped in a box with leads to the standard 9V connections. If you need some tiny batteries for a small robot or specific lightweight or size constrained design, these can be torn apart for the smaller batteries. Each battery is roughly a 1.2V 160mAh NiMH battery.

4. FILTERS:

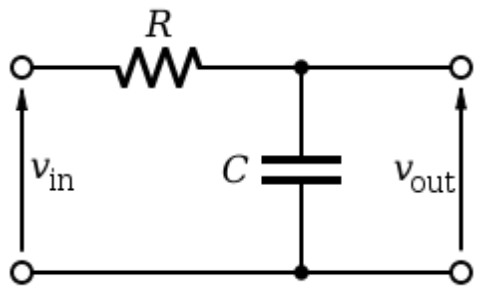
Electronic filters are electronic circuits which perform signal processing functions, specifically to remove unwanted frequency components from the signal, to enhance wanted ones, or both. Electronic filters can be:

- Passive or active
- analog or digital
- high-pass, low-pass, bandpass, band-reject (band reject; notch), or all-pass.
- discrete-time (sampled) or continuous-time
- linear or non-linear
- infinite impulse response (IIR type) or finite impulse response(FIR type)

The most common types of electronic filters are linear filters, Passive implementations of linear filters are based on combinations of resistors (R), inductors (L) and capacitors (C). These types are collectively known as passive filters, because they do not depend upon an external power supply and/or they do not contain active components such as transistors.

The inductors and capacitors are the reactive elements of the filter. The number of elements determines the order of the filter. In this context, an LC tuned circuit being used in a band-pass or band-stop filter is considered a single element even though it consists of two components.

At high frequencies (above about 100 megahertz), sometimes the inductors consist of single loops or strips of sheet metal, and the capacitors consist of adjacent strips of metal. These inductive or capacitive pieces of metal are called stubs.



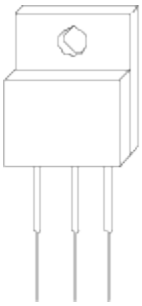
A low-pass electronic filter realised by an RC circuit

The Capacitor Filter:

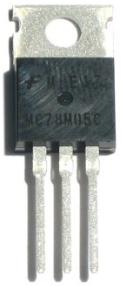
The simple capacitor filter is the most basic type of power supply filter. The application of the simple capacitor filter is very limited. It is sometimes used on extremely high-voltage, low-current power supplies for cathode-ray and similar electron tubes, which require very little load current from the supply. The capacitor filter is also used where the power-supply ripple frequency is not critical; this frequency can be relatively high. it is simple filter connected across the output of the rectifier in parallel with the load.

5. Voltage Regulator:

The Digilab board can use any power supply that creates a DC voltage between 6 and 12 volts. A 5V voltage regulator (7805) is used to ensure that no more than 5V is delivered to the Digilab board regardless of the voltage present at the J12 connector (provided that voltage is less than 12VDC). The regulator functions by using a diode to clamp the output voltage at 5VDC regardless of the input voltage - excess voltage is converted to heat and dissipated through the body of the regulator. If a DC supply of greater than 12V is used, excessive heat will be generated, and the board may be damaged. If a DC supply of less than 5V is used, insufficient voltage will be present at the regulators output.



The 7805 +5VDC voltage regulator produces a 5VDC output as long as 6VDC to 12VDC is input.



If a power supply provides a voltage higher than 7 or 8 volts, the regulator must dissipate significant heat. The "fin" on the regulator body (the side that protrudes upward beyond the main body of the part) helps to dissipate excess heat more efficiently. If the board requires higher currents (due to the use of peripheral devices or larger breadboard circuits), then the regulator may need to dissipate more heat. In this case, the regulator can be secured to the circuit board by fastening it with a screw and nut (see below). By securing the regulator tightly to the circuit board, excess heat can be passed to the board and then radiated away.

All linear regulators require an input voltage at least some minimum amount higher than the desired output voltage. That minimum amount is called the dropout voltage. For example, a common regulator such as the 7805 has an output voltage of 5V, but can only maintain this if the input voltage remains above about 7V, before the output voltage begins sagging below the rated output. Its dropout voltage is therefore 7V - 5V = 2V. When the supply voltage is less than about 2V above the desired output voltage, as is the case in low-voltage microprocessor power supplies, so-called low dropout regulators (LDOs) must be used.

When one wants a voltage higher than the available input voltage, no linear regulator will work (not even an LDO). In this situation, a switching regulator must be used.

6. PROJECT MODEL:

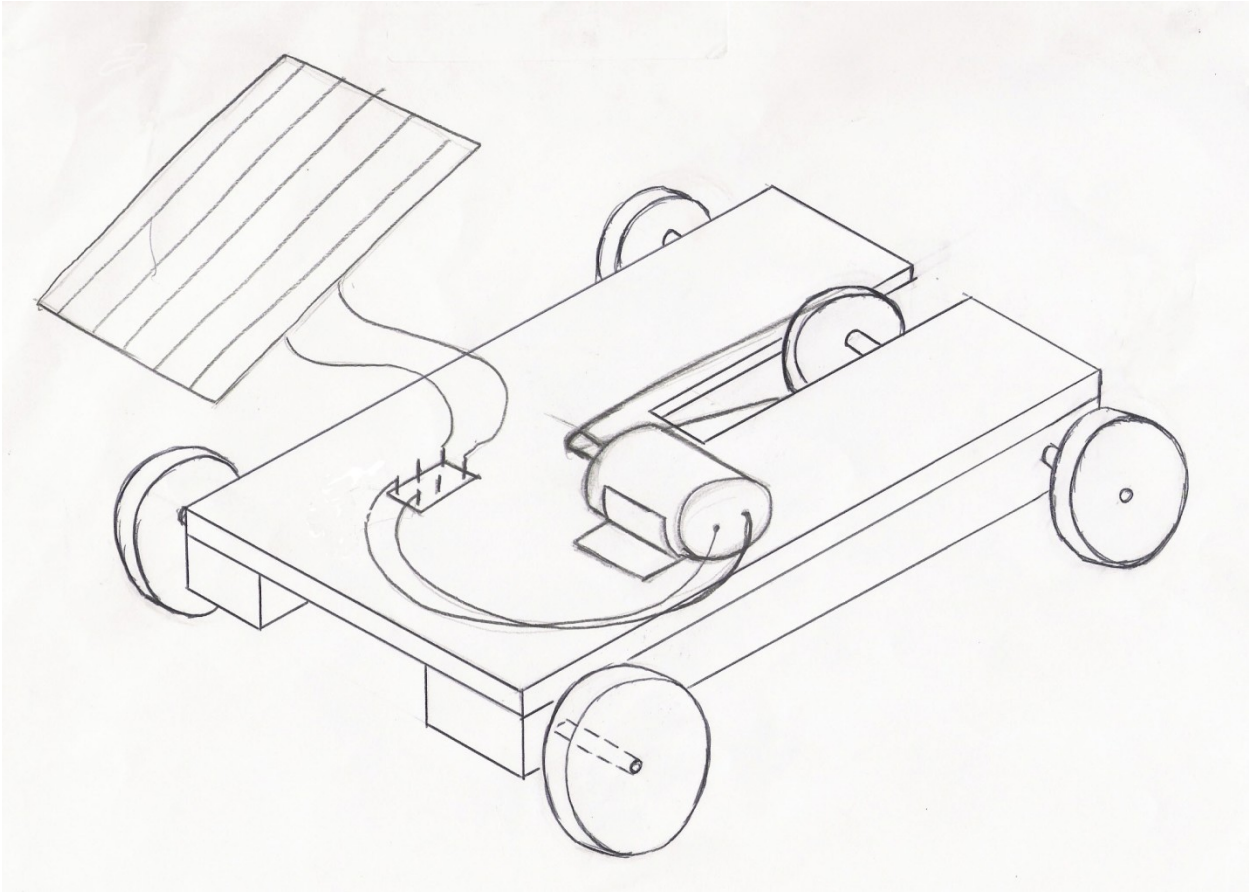
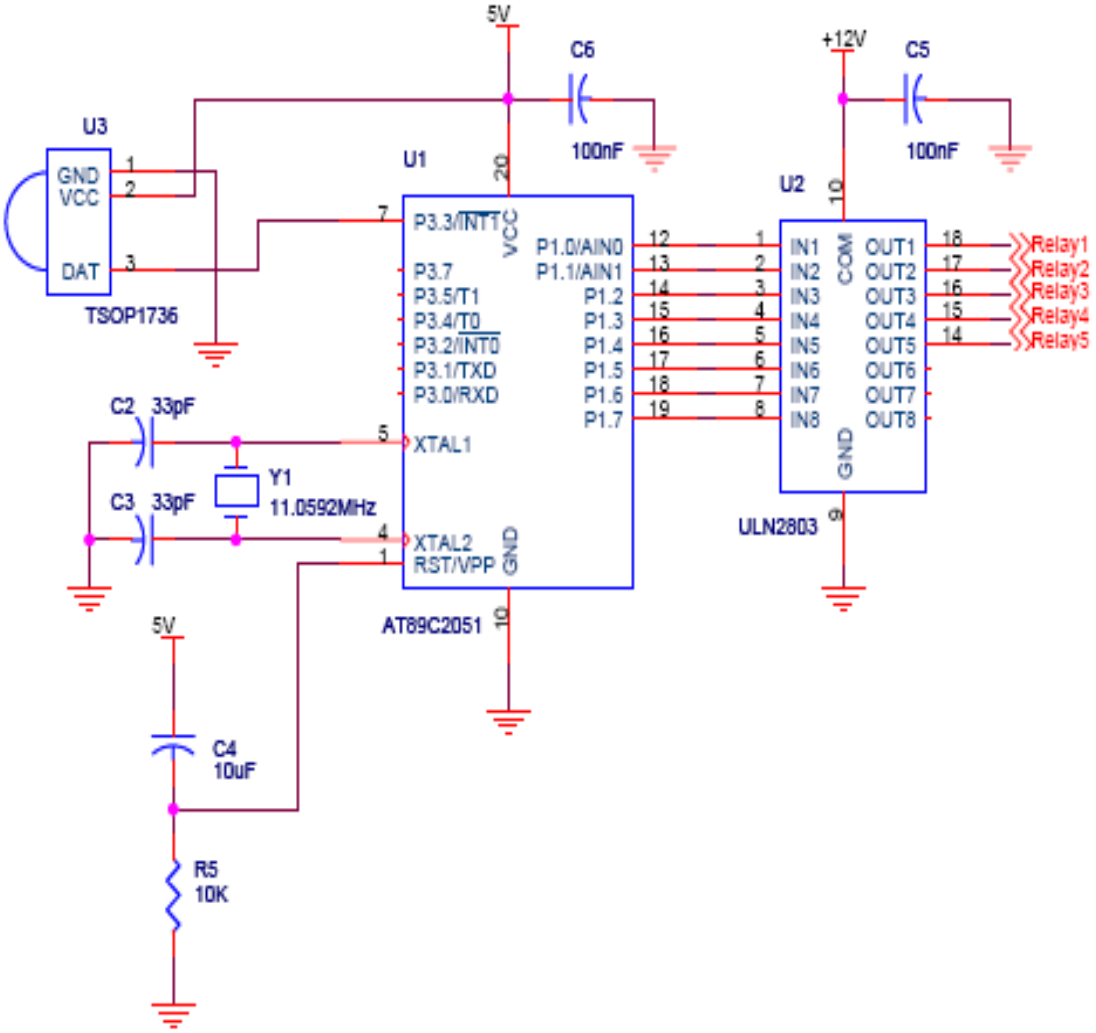


Fig:circuit diagram



COMPONENTS LIST:

1. Integrated circuit:

   U1……AT89C2051

   U2……ULN2803

2. Capacitors:

   C2…….33 Pico Farad

   C3…….33 Pico Farad

   C4…….10 Micro Farad

   C5…….100 Nano Farad

   C6…….100 Nano Farad

3. Resistors:

   R……10Kilo ohms

4. Crystal Oscillator:

   Y1…….11.0592MHz

5. IR sensor::

   U3…….TSOP1736

6. Voltage Regulator:

   U4…….7805

CIRCUIT OPERATION:

The solar panel is used to convert the solar energy absorbred from the sun to the dc current. This is given to the rectifier section to convert entire pure DC. This is given to 9v battery for charging. The intensity of solar energy is tested by led thus the battery is charged completely with the solar panel .This battery supplies energy for the circuit operation to turn the vehicle.

The battery supplies power to the voltage regulator (which produces two kind of voltages 9v and 5v) through a filter which completely reduce the ripples to get pure DC. Which produces to voltages 9v and 5v .5v given to the micro controller for its operation and 9v is supplied to the LDR (light dependent resistor).

We operate the vehicle with a remote using IR sensor .This IR sensor is infrared with the micro controller (89c2051) along with the driver IC circuit .driver IC (ULN2803).the driver circuit pumped with a program for the operation of relays by receiving signals from microcontroller. We use keys in IR transmitter for moving a vehicle the IR receiver input from the IR transmitter it is passed to the micro controller and then to driver IC. According to the signal received from the micro controller the program is executed in the driver through which relays are operated . In use our project we use four 5v relays where

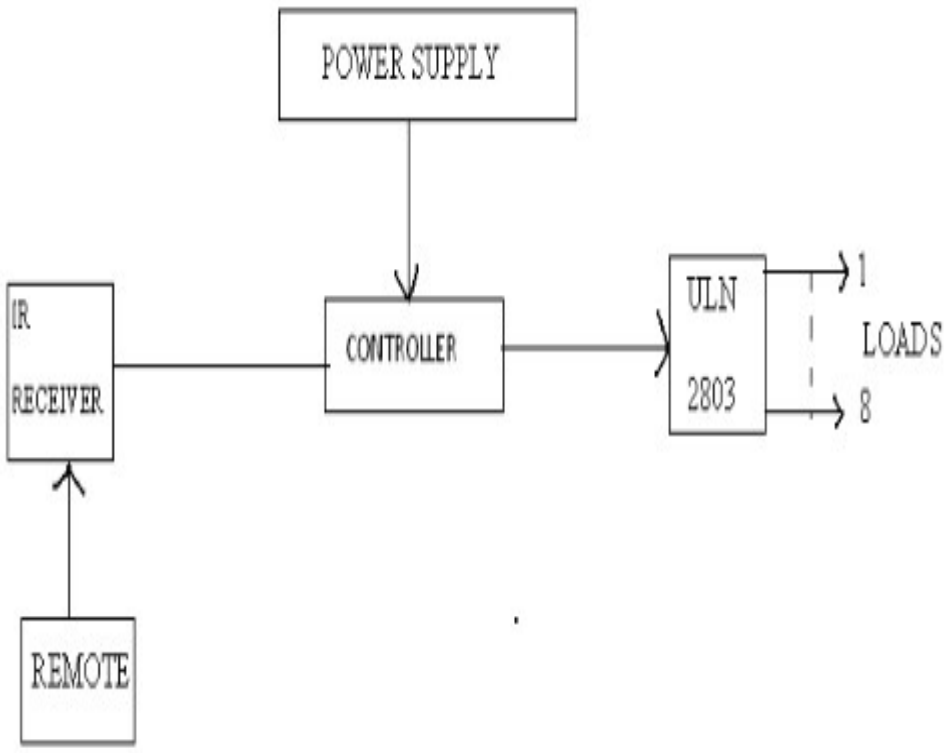
1. First relay for moving front and back.
2. Second relay for moving right.
3. Third relay for moving left.
4. Fourth relay for producing sound horn.

The motor and buzzer are operated with the relay. Thus the vehicle runs the regulator supplies 9v to the LDR (light dependent resistor) which works based on the intensity of light. It is given to a LED(head lights).where they are automatically ON during night times OFF during day and night times during moving of vehicle.

8.IR REMOTE SWITCH:

With most pieces of consumer electronics, from camcorders to stereo equipment, an infrared remote control is usually always included.Video and audio apparatus, computers and also lighting installationsnowadays often operate on infra-red remote control.The carrier frequencyof such infra-red signals is typically in the order of around 36 kHz. The control codes are sent in serial format modulated to that36 kHz carrier frequecy (usally by turning the carrier on and off).There are many different coding systems in use, and generallydifferent manufacturers use different codes and different datarates for transmission."IR" stands for infrared. Infrared light is invisible since its frequency is below that of visible red. Otherwise, it is like any other light source, operating under the same laws of physics

8.1.BLOCK DIAGRAM OF IR REMOTE SWITCH:



EXPLANATION:

IR Sensor is used to receive signals from the remote and send it to controller. The controller processes the signal and decides the pin to give signal to driver IC. The driver IC is used to control 5 DC load, through relays.

Controller used manufactured by ATMEL in advanced CMOS. The driver IC ULN2803, a monolithic high voltage and high current Darlington transistors arrays.

Power supply unit supplies 5V DC to the controller and crystal oscillator generates 11.0592 MHz of frequency to drive the controller. The controller used here is manufactured by ATML in advanced CMOS.

8.2.IR SENSOR:

The IR sensor receiver is a three terminal device used to decrease the size of circuit, which consists of three terminals, VCC, ground and output signal.

When any key is pressed(from 1 to 8), the sensor receives the signal and sends it to controller. The controller senses the particular switch pressed and enables the particular pin number in the port connected to IC ULN2803. The driver circuit of the IC is activated and relay is in such a way to switch ON/OFF the load.

Suppose consider that key 1 is pressed, then p1.0 of controller will be enabled and relay will be operated, making the load of that relay to get ON. If once again key 1 is pressed, then p1.0 is enabled and relay 1 will be operated, making the load of that relay OFF.

The TSOP1736 is a miniaturized sensor for receiving the modulated signal of infrared remote control systems. A PIN diode and preamplifier are assembled on a lead frame, the epoxy package is designed as an IR filter. The modulated output signal, Carrier Out, can be used for code learning applications. This component has not been qualified according to automotive specifications.

FEATURES:

- Photo detector and preamplifier in one package
- Ac coupled response from 20 khz-455 khz , all data formats
- Improved shielding against electrical field disturbance
- TTL and CMOS compatibility
- Output active low

- Supply voltage: 2.7 V to 5.5 V
- Carrier out signal for code learning functions
- Lead (Pb)-free component

8.3. APPLICATIONS OF IR REMOTE SWITCH:

1) It can be used to control the ON and OFF of 5 different devices with the help of a single remote in homes.

2) It can be used in industries to make the heaters on and off

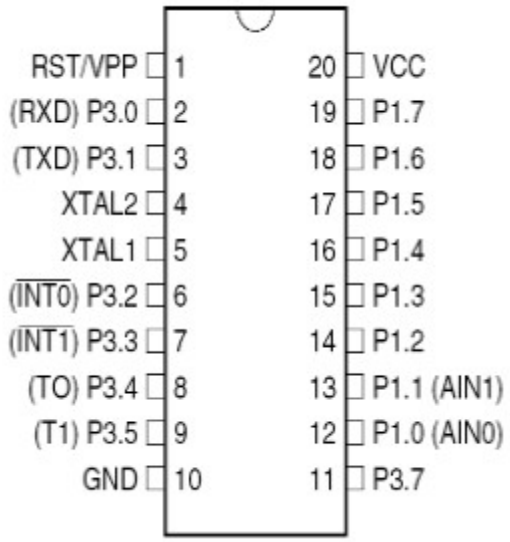
3) With slight modification we can convert this project for power controlling in industries such as speed control of motors.

4) It can be used in office cabins

5) It avoids electric shock and gives long life to the loads and switches….etc.,

9.MICRO CONTROLLER:

9.1 PIN DIAGRAM OF AT89C2051:



9.2 DESCRIPTION:

The AT89C2051 is a low-voltage, high-performance CMOS 8-bit microcomputer with 2K bytes of Flash programmable and erasable read-only memory (PEROM). The device is

manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard MCS-51 instruction set. By combining aversatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C2051 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications.

The AT89C2051 provides the following standard features: 2K bytes of Flash, 128bytes of RAM, 15 I/O lines, two 16-bit timer/counters, a five vector two-level interrupt architecture, a full duplex serial port, a precision analog comparator, on-chip oscillator and clock circuitry. In addition, the AT89C2051 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes.

The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port and interrupt system to continue functioning. The power-down mode saves the RAM contents but freezes the oscillator disabling all other chip functions until the next hardware reset.

Features:

• Compatible with MCS®-51Products

• 2K Bytes of Reprogrammable Flash Memory

– Endurance: 1,000 Write/Erase Cycles

• 2.7V to 6V Operating Range

• Fully Static Operation: 0 Hz to 24 MHz

• Two-level Program Memory Lock

• 128 x 8-bit Internal RAM

• 15 Programmable I/O Lines

• Two 16-bit Timer/Counters

• Six Interrupt Sources

• Programmable Serial UART Channel

• Direct LED Drive Outputs

• On-chip Analog Comparator

• Low-power Idle and Power-down Modes

• Green (Pb/Halide-free) Packaging Option

PIN DESCRIPTION

1. VCC: Supply voltage.

2. GND: Ground.

3. Port 1: The Port 1 is an 8-bit bi-directional I/O port. Port pins P1.2 to P1.7 provide internal pull-ups. P1.0 and P1.1 require external pull-ups. P1.0 and P1.1 also serve as the positive input (AIN0) and the negative input (AIN1), respectively, of the on-chip precision analog comparator. The Port 1 output buffers can sink 20 mA and can drive LED displays directly. When 1s are written to Port 1 pins, they can be used as inputs. When pins P1.2 to P1.7 are used as inputs and are externally pulled low, they will source current (IIL) because of the internal pull-ups. Port 1 also receives code data during Flash programming and verification.

4. Port 3: Port 3 pins P3.0 to P3.5, P3.7 are seven bi-directional I/O pins with internal pull-ups. P3.6 is hard-wired as an input to the output of the on-chip comparator and is not accessible as a general- purpose I/O pin. The Port 3 output buffers can sink 20 mA. When 1s are written to Port 3 pins they are pulled high by the internal pull-ups and can be used as inputs. As inputs, Port 3 pins that are externally being pulled low will source current (IIL) because of the pull-ups. Port 3 also serves the functions of various special features of the AT89C2051 as listed below:

Port Pin	**Alternate Functions**
P3.0	RXD (serial input port)
P3.1	TXD (serial output port)

P3.2	INT0 (external interrupt 0)
P3.3	INT1 (external interrupt 1)
P3.4	T0 (timer 0 external input)
P3.5	T1 (timer 1 external input)

5. RST:

Reset input. All I/O pins are reset to 1s as soon as RST goes high. Holding the RST pin high two machine cycles while the oscillator is running resets the device. Each machine cycle takes 12 oscillator or clock cycles.

6. XTAL1:

Input to the inverting oscillator amplifier and input to the internal clock operating circuit.

Note: 1. Only used in 12-volt programming mode.

XTAL 2 :

Output from the inverting oscillator amplifier.

Oscillator Characteristics:

The XTAL1 and XTAL2 are the input and output, respectively, of an inverting amplifier which can be configured for use as an on-chip oscillator, as shown in Figure 5-1. Either a quartz crystal or ceramic resonator may be used. To drive the device from an external clock source, XTAL2 should be left unconnected while XTAL1 is driven as shown in Figure 5-2. There are no require-ments on the duty cycle of the external clock signal, since the input to the internal clocking circutime specifications must be observed. Is through a divide-by-two flip-flop, but minimum and maximum voltage high and lows

Branching Instructions LCALL, LJMP, ACALL, AJMP, SJMP, JMP @A+DPTR – These unconditional branching instructions will execute correctly as long as the programmer keeps in mind that the destination branching address must fall within the physical boundaries of the program memory size (loca-tions 00H to 7FFH for the 89C2051). Violating the physical space limits may cause unknown program behavior. **CJNE [...], DJNZ [...], JB, JNB, JC, JNC, JBC, JZ, JNZ** – With these conditional branching instructions the same rule above applies. Again, violating the memory boundaries may cause erratic execution. For applications involving interrupts the normal interrupt service routine address locations of the 80C51 family architecture have been preserved.

MOVX-related Instructions, Data Memory The AT89C2051 contains 128 bytes of internal data memory. Thus, in the AT89C2051 the stack depth is limited to 128 bytes, the amount of available RAM. External DATA memory access is not supported in this device, nor is external PROGRAM memory execution. Therefore, no MOVX [...] instructions should be included in the program. A typical 80C51 assembler will still assemble instructions, even if they are written in violation of the restrictions mentioned above. It is the responsibility of the controller user to know the physical features and limitations of the device being used and adjust the instructions used correspondingly.

Program Memory Lock Bits On the chip are two lock bits which can be left unprogrammed (U) or can be programmed (P) to obtain the additional features .

Idle Mode In idle mode, the CPU puts itself to sleep while all the on-chip peripherals remain active. The mode is invoked by software. The content of the on-chip RAM and all the special functions regis-ters remain unchanged during this mode. The idle mode can be terminated by any enabled interrupt or by a hardware reset. The P1.0 and P1.1 should be set to “0” if no external pull-ups are used, or set to “1” if external pull-ups are used**.** It should be noted that when idle is terminated by a hardware reset, the device normally resumes program execution, from where it left off, up to two machine cycles before the internal reset algorithm takes control. On-chip hardware inhibits access to internal RAM in this event, but access to the port pins is not inhibited. To eliminate the possibility of an unexpected write to a port pin when Idle is terminated by reset, the instruction following the one that invokes Idle should not be one that writes to a port pin or to external memory.

Power-down Mode : In the power-down mode the oscillator is stopped, and the instruction that invokes power-down is the last instruction executed. The on-chip RAM and Special Function Registers retain their values until the power-down mode is terminated. The only exit from power-down is a hardware reset. Reset redefines the SFRs but does not change the on-chip RAM. The reset should not be activated before VCC is restored to its normal operating level and must be held active long enough to allow the oscillator to restart and stabilize. The P1.0 and P1.1 should be set to "0" if no external pull-ups are used, or set to "1" if external pull-ups are used.

11. Programming The Flash : The AT89C2051 is shipped with the 2K bytes of on-chip PEROM code memory array in the erased state (i.e., contents = FFH) and ready to be programmed. The code memory array is pro-grammed one byte at a time. Once the array is programmed, to re-program any non-blank byte, the entire memory array needs to be erased electrically.

Internal Address Counter: The AT89C2051 contains an internal PEROM address counter which is always reset to 000H on the rising edge of RST and is advanced by applying a positive going pulse to pin XTAL1.

Data Polling: The AT89C2051 features Data Polling to indicate the end of a write cycle. During a write cycle, an attempted read of the last byte written will result in the complement of the written data on P1.7. Once the write cycle has been completed, true data is valid on all outputs, and the next cycle may begin. Data Polling may begin any time after a write cycle has been initiated.

Ready/Busy: The Progress of byte programming can also be monitored by the RDY/BSY output signal. Pin P3.1 is pulled low after P3.2 goes High during programming to indicate BUSY. P3.1 is pulled High again when programming is done to indicate READY.

Program Verify: If lock bits LB1 and LB2 have not been programmed code data can be read back via the data lines for verification: 1. Reset the internal address counter to 000H by bringing RST from "L" to "H". 2. Apply the appropriate control signals for Read Code data and read the output data at the port P1 pins. 3. Pulse pin XTAL1 once to advance the internal address counter. 4. Read the next code data byte at the port P1 pins. 5. Repeat steps 3 and 4 until the entire array is read. The lock bits cannot be verified directly. Verification of the lock bits is achieved by observing that their features are enabled.

12. Programming Interface Every code byte in the Flash array can be written and the entire array can be erased by using the appropriate combination of control signals. The write operation cycle is self-timed and once initiated, will automatically time itself to completion. Most major worldwide programming vendors offer support for the Atmel AT89 microcontroller series. Please contact your local programming vendor for the appropriate software revision. Notes: 1. The internal PEROM address counter is reset to 000H on the rising edge of RST and is advanced by a positive pulse at XTAL1 pin. 2. Chip Erase requires a 10 ms PROG pulse. 3. P3.1 is pulled Low during programming to indicate RDY/BSY.

9.3. IC VOLTAGE REGULATOR:

A voltage regulator is an electrical regulator designed to automatically maintain a constant voltage level.

It may use an electromechanical mechanism, or passive or active electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages.

With the exception of passive shunt regulators, all modern electronic voltage regulators operate by comparing the actual output voltage to some internal fixed reference voltage. Any difference is amplified and used to control the regulation element in such a way as to reduce the voltage error. This forms a negative feedback servo control loop; increasing the open-loop gain tends to increase regulation accuracy but reduce stability (avoidance of oscillation, or ringing during step changes). There will also be a trade-off between stability and the speed of the response to changes. If the output voltage is too low (perhaps due to input voltage reducing or load current increasing), the regulation element is commanded, up to a point, to produce a higher output voltage - by dropping less of the input voltage (for linear series regulators and buck switching regulators), or to draw input current for longer periods (boost-type switching regulators); if the output voltage is too high, the regulation element will normally be commanded to produce a lower voltage. However, many regulators have over-current protection, so that they will entirely stop sourcing current (or limit the current in some way) if the output current is too high, and some regulators may also shut

• 2.7V to 6V Operating Range

• Fully Static Operation: 0 Hz to 24 MHz

• Two-level Program Memory Lock

• 128 x 8-bit Internal RAM

NECESSITY FOR VOLTAGE REGULATOR:

The output of transformer will have less voltage compared to its input but our designated voltage is 12V & 5V i.e., 5V for sensor and 12V for Micro controller.

9.4.CRYSTAL OSCILLATOR:

Crystal oscillators are oscillators where the primary frequency determining element is a quartz crystal. Because of the inherent characteristics of the quartz crystal the crystal oscillator may be held to extreme accuracy of frequency stability. Temperature compensation may be applied to crystal oscillators to improve thermal stability of the crystal oscillator.

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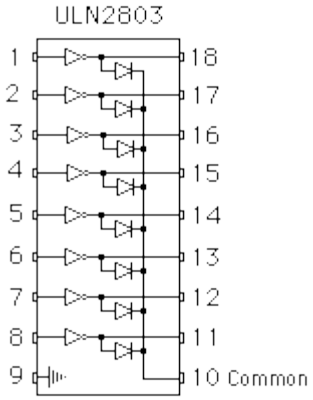
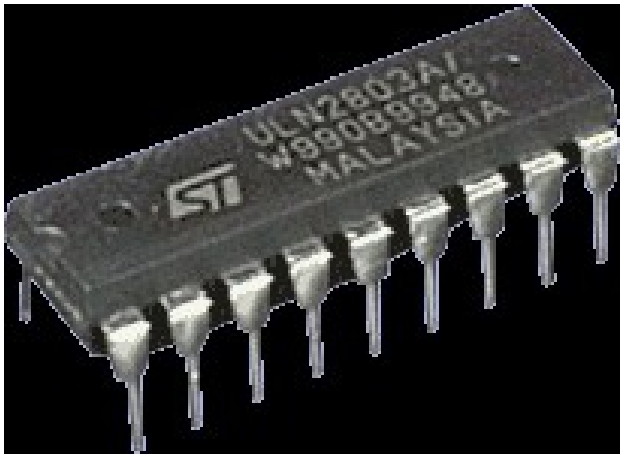
Crystal oscillators are usually, fixed frequency oscillators where stability and accuracy are the primary considerations. For example it is almost impossible to design a stable and accurate LC oscillator for the upper HF and higher frequencies without resorting to some sort of crystal control. Hence the reason for crystal oscillators.

10.ULN2803

PIN DIAGRAM OF ULN 2803:

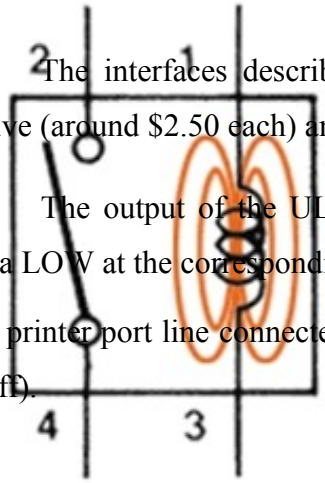




DESCRIPTION:

The ULN2803 is described as a "8-line driver". This means that it contains the circuitry to control eight individual output lines, each acting independently of the others. The IC

can be thought of a an 8-line 'black box'. There is no need to know what its internal design is (although one representative 'line' is shown below for interest.) The 'schematic diagram' (above) is all we need to understand.



The interfaces described on this site make extensive use of the ULN2803. It is inexpensive (around $2.50 each) and very easy to use.

The output of the ULN2803 is "**inverted**". This means that a HIGH at the input becomes a LOW at the corresponding output line.

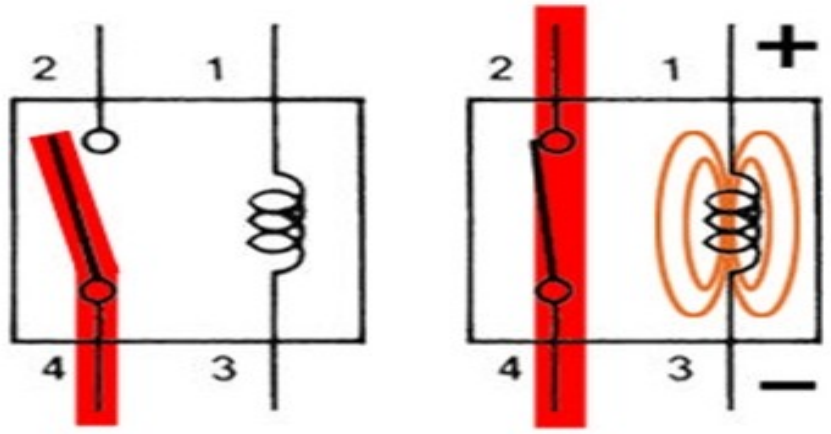
eg :If the printer port line connected to pin 1 goes HIGH, pin 18 on the ULN2803 will go LOW (switch off).

CONNECTING THE ULN2803 TO THE PRINTER PORT:

The ULN2803 is connected between each of the eight 'output' lines of the printer port and the device it controls. The output 'device' can be as simple as a LED, a motor, or a relay which in turn controls a much larger device.

11. RELAY

When no voltage is applied to pin 1, there is no current flow through the coil. No current means no magnetic field is developed, and the switch is open. When voltage is supplied to pin 1, current flow though the coil creates the magnetic field needed to close the switch allowing continuity between pins 2 and 4.



RELAY APPLICATIONS

Relays are remote control electrical switches that are controlled by another switch, such as a horn switch or a computer as in a power train control module. Relays allow a small current flow circuit to control a higher current circuit. Several designs of relays are in use today, ent flow though the coil creates the magnetic field needed to close the switch allowing continuity 3-pin, 4-pin, 5-pin, and 6-pin, single switch or dual switches.

12.MOTOR:

Electric motors are everywhere! In your house, almost every mechanical movement that you see around you is caused by an AC (alternating current) or DC (direct current) electric motor.

A simple motor has six parts:

- **Armature or rotor**
- **Commutator**
- **Brushes**
- **Axle**
- **Field magnet**
- **DC power supply of some sort**

By understanding how a motor works you can learn a lot about magnets, electromagnets and electricity in general. In this article, you will learn what makes electric motors tick.

13.BUZZER:

This is a very simple circuit just uses a couple of resistors ,a capacitor and the easily available 555 timer IC.

The 555 is setup as astable multivibrator operating at a frequency of about 1KHz that produces a shrill noise when switched on.

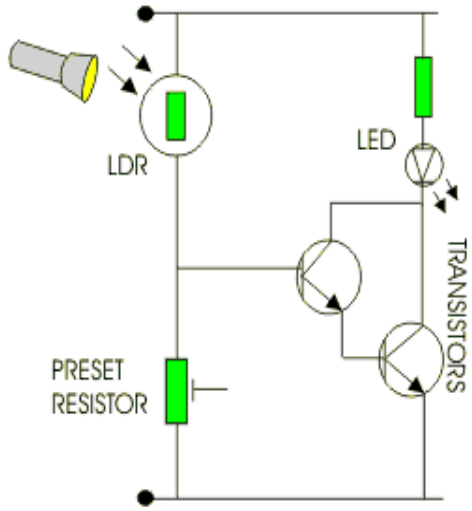
The frequency can be changed by varying the 10K resistor.

14.LDR :(LIGHT DECTECTING 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 1000 000 ohms, but when

they are illuminated with light resistance drops dramatically.

When the light level is low the resistance of the LDR is high. This prevents current from flowing to the base of the transistors. Consequently the LED does not light. However, when light shines onto the LDR its resistance falls and current flows into the base of the first transistor and then the second transistor. The LED glows.

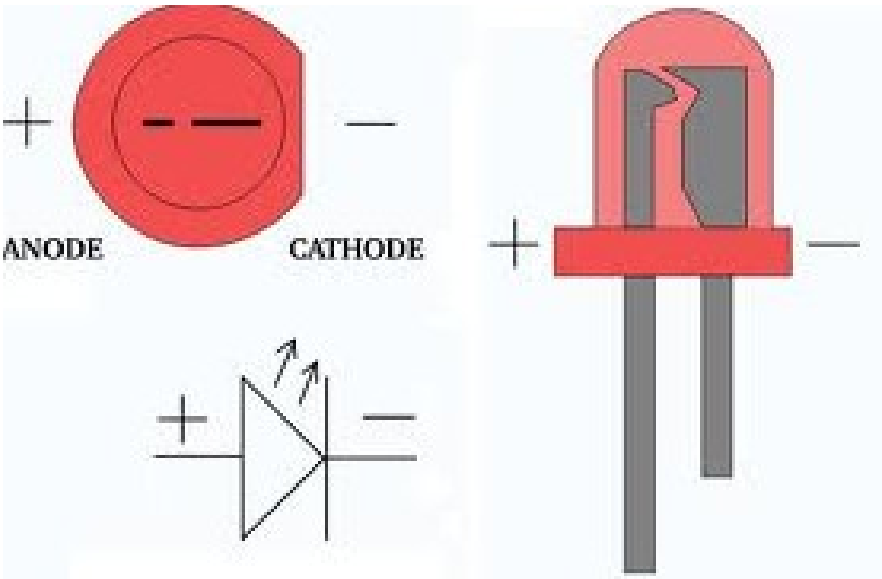


15.LED :(LIGHT EMITTING DIODE)

Led is a p-n junction device which emits light when forward biased by a phenomenon called electro luminescence . when led is forward biased the electrons and holes move towards the junction and recombination takes place as a result of recombination the electrons lying in the valence band of p-region .the difference energy between conduction band and valence band is radiated in the form of light energy.

Leds are always encased to protect their delicate wires then the efficiency of generation of light increases with the increase in injected current and decrease in temperature. Leds radiate different colours such as red, green, yellow, orange and white .

In order to protect led resistance of 1k ohm or 1.5k ohms must be connected in series with the led. Leds emit no light when reverse biased. Leds operate at voltage levels from 1.5 to 3.3 volts and with the current of sum 10's of milli amps. The power requirement is typically from 10 to 150 milliwatts . leds can be switched on and off at a very fast speed of 1ns.



Advantages:-

The tracking system is not constrained by the geographical location of installation of the solar panel.

It is designed for searching the maximum solar irradiance in the whole azimuth and tilt angle.

The operator interference is minimal because of not needing to be adjusted

Applications:-

Solar tracking system is used in satellites as a source of fuel.

- It is used in solar thermal collector to collect heat.
- It is used in solar hot water panel that uses the sun's energy to heat a fluid ,
- which is used to transfer the heat to a heat storage vessel
- It is used in water heaters.
- It is used in heat exchangers.
- It is used in solar power plants
- It is used for desalination of sea water
- It is used in inverters (AC to DC).
- It is used in solar water pumps.

.CONCLUSION:

- To collect the greatest amount of energy from the sun, solar panels must be aligned orthogonally to the sun.

- For this purpose, a new solar tracking technique based on micro-controller was implemented and tested in this study.

- There are several new solar cell concepts that aim at making better use of the solar spectrum and achieve much higher energy conversion efficiencies

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