

AN EXPERIMENTAL VIEW ON THE SOLAR TRACKING SYSTEM FOR OPTIMAL POWER GENERATION

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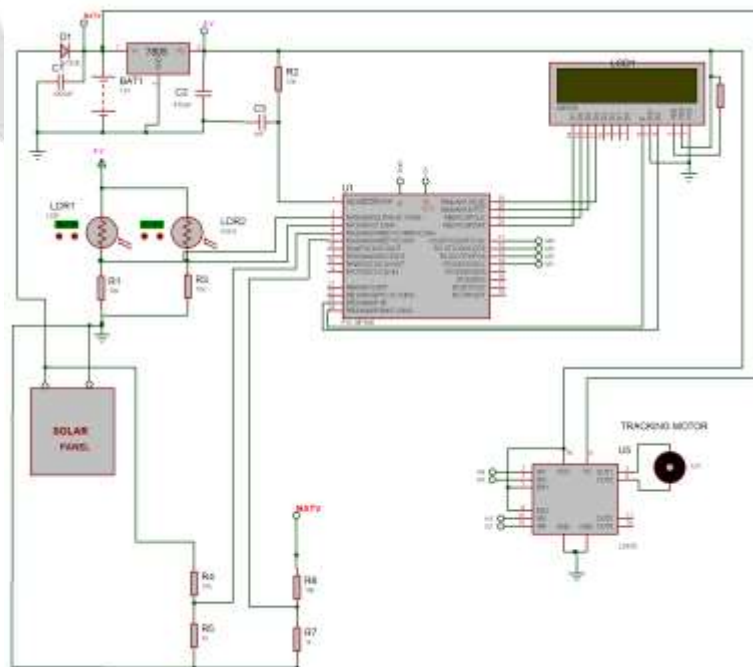
Abstract

When the intensity of light is decreasing, this system automatically changes its direction to get maximum intensity of light. LDR light detector is used to trace the coordinate of the Sun. While to rotate the appropriate position of the panel, a DC geared motor is used. The system is controlled by two relays as a driver and a microcontroller as a main processor. This project is covered for a single axis and is designed for residential usage. Finally, the project is able to track and follow the Sun intensity in order to get maximum power at the output regardless motor speed.

Keyword Solar Power, Optimization, Component,

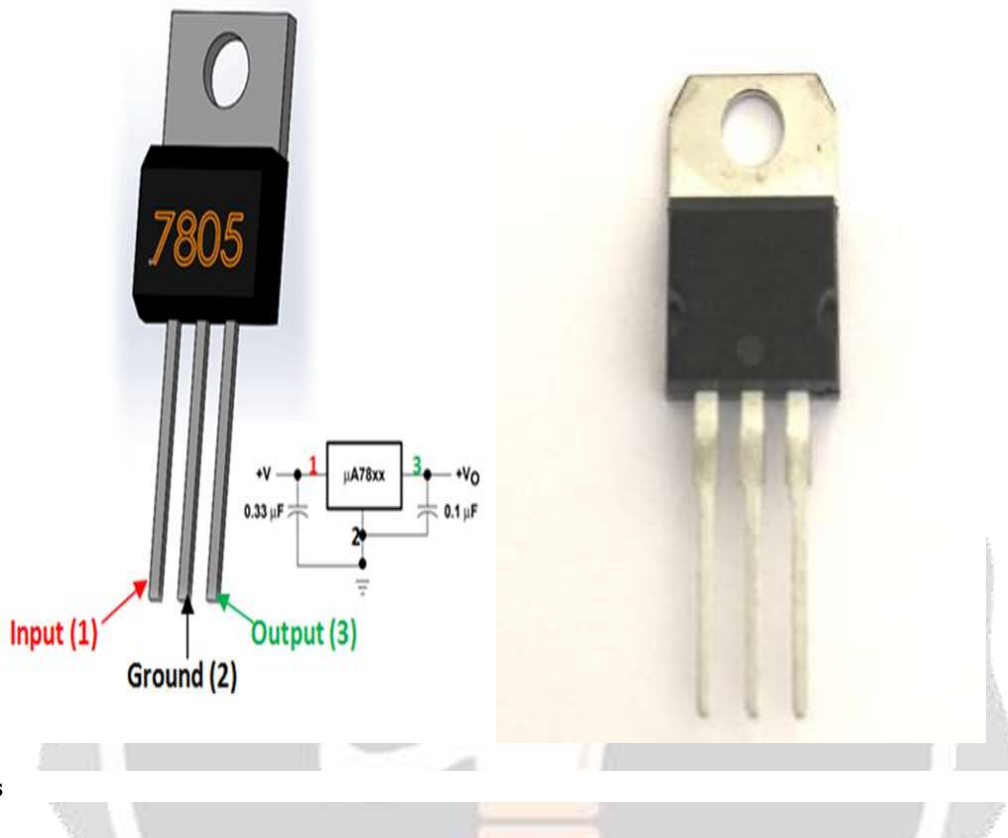
Introduction

The solar tracker is very useful for device that needs more sunlight for higher efficiency such as solar cell. Many of the solar panels had been positioned on a fixed surface such as a roof. As sun is a moving object, this approach is not the best method. One of the solutions is to actively track the sun using a sun tracking device to move the solar panel to follow the Sun. With the Sun always facing the panel, the maximum energy can be absorbed, as the panel is operating at their greatest efficiency. The main reason for this project is to get the maximum efficiency for the solar cells. Although there are many solar trackers in the market, the price is expensive and unaffordable because the market for solar tracker is still new.



Methodology

REGULATOR IC 7805

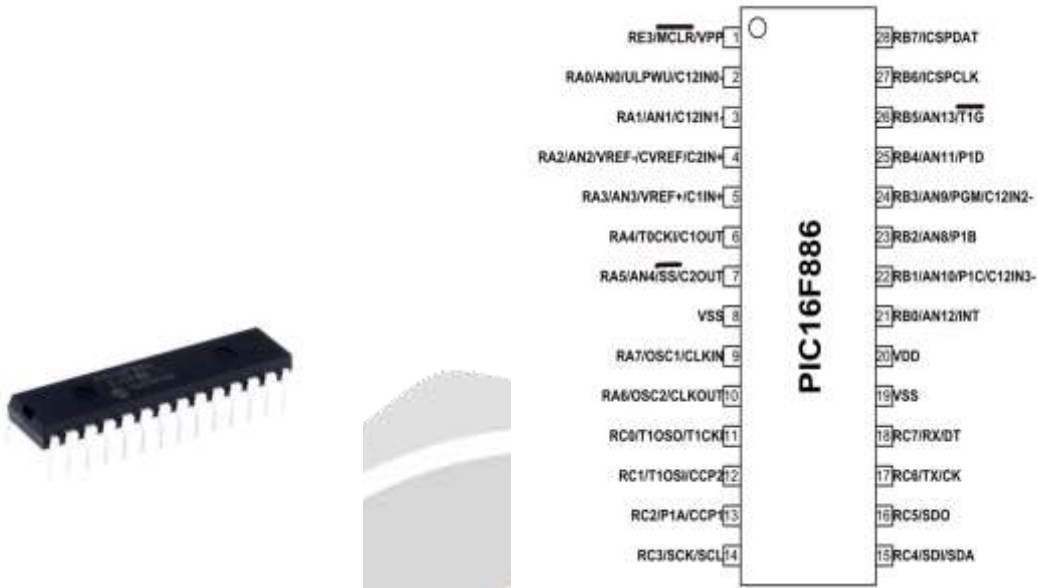


Features

- 5V Positive Voltage Regulator
- Minimum Input Voltage is 7V
- Maximum Input Voltage is 25V
- Operating current(I_Q) is 5mA
- Internal Thermal Overload and Short circuit current limiting protection is available.
- Junction Temperature maximum 125 degree Celsius
- Available in TO-220 and KTE package

Voltage regulators are very common in electronic circuits. They provide a constant output voltage for a varied input voltage. In our case the 7805 IC is an iconic regulator IC that finds its application in most of the projects. The name 7805 signifies two meaning, “78” means that it is a positive voltage regulator and “05” means that it provides 5V as output. So our 7805 will provide a +5V output voltage. The output current of this IC can go up to 1.5A. But, the IC suffers from heavy heat loss hence a Heat sink is recommended for projects that consume more current. For example if the input voltage is 12V and you are consuming 1A, then $(12-5) * 1 = 7W$. This 7 Watts will be dissipated as heat.

PIC16F886 – 8 Bit Microcontroller



PIC16F886 is microcontroller from ‘PIC16F’ family and is made by MICROCHIP TECHNOLOGY. It is an 8-Bit CMOS Microcontroller with nano-Watt Technology. This microcontroller is popular among hobbyists and engineers due its features and cost.

PIC16F886 Microcontroller Overview

PIC16F886 is a microcontroller good for experimenting and developing applications because it has high flash memory rewrite cycle. Also there are a lot of tutorials and support available online. The controller has 16KBytes flash memory which is enough for many applications. Along with 24 programmable Input/output pins which are developed to handle 20mA current (direct LED driving capability) the system can interface many peripherals easily. With Watchdog timer to reset under error automatically the controller can be used to develop applications of permanent installation.

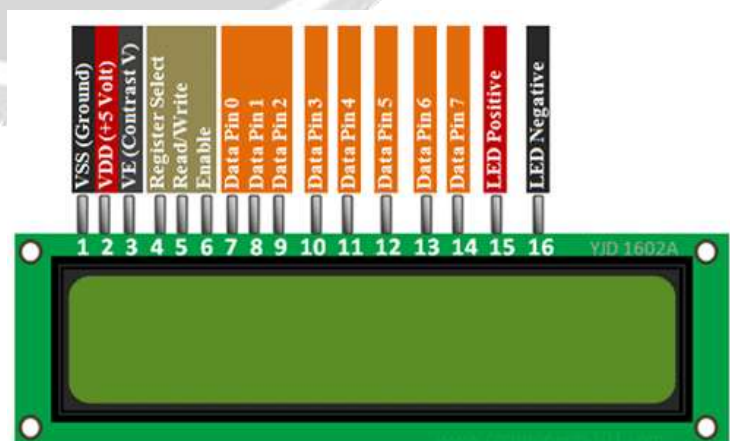
Pin Configuration

PIC16F886 is a 28 pin IC and each pin can perform multiple functions as shown in above PIC16F886 pin diagram. The description for each of these pins is given below.

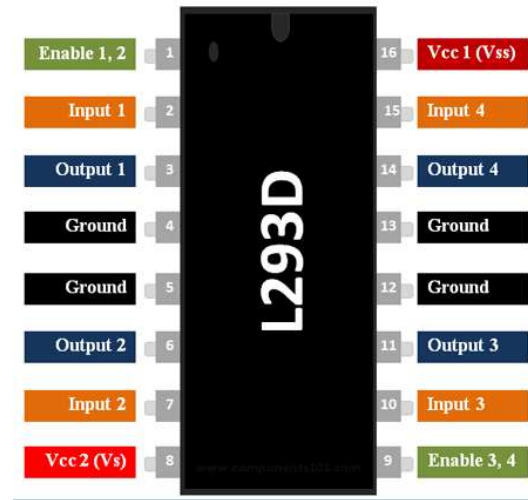
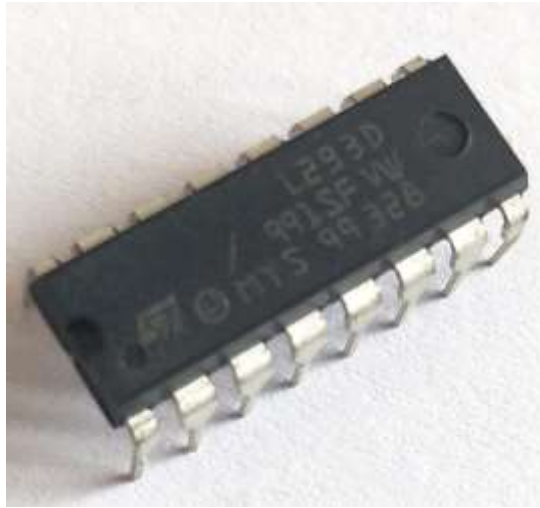
LIQUID CRYSTAL DISPLAY(LCD)

Features of 16x2 LCD module

- Operating Voltage is 4.7V to 5.3V
- Current consumption is 1mA without backlight
- Alphanumeric LCD display module, meaning can display alphabets and numbers
- Consists of two rows and each row can print 16 characters.
- Each character is build by a 5x8 pixel box
- Can work on both 8-bit and 4-bit mode
- It can also display any custom generated characters
- Available in Green and Blue Backlight



MOTOR DRIVER IC L293D



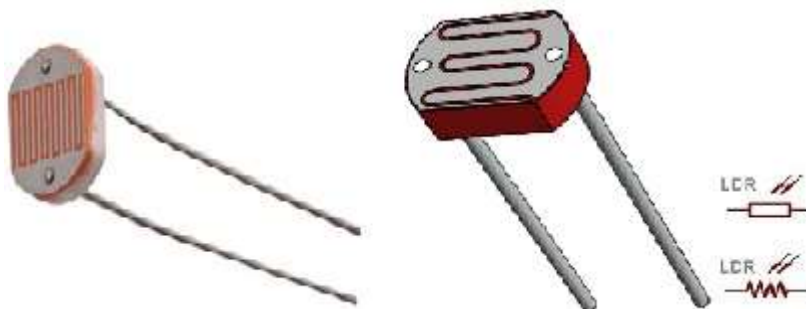
Features

- Can be used to run Two DC motors with the same IC.
- Speed and Direction control is possible
- Motor voltage Vcc2 (Vs): 4.5V to 36V
- Maximum Peak motor current: 1.2A
- Maximum Continuous Motor Current: 600mA
- Supply Voltage to Vcc1(vss): 4.5V to 7V
- Transition time: 300ns (at 5V and 24V)
- Automatic Thermal shutdown is available
- Available in 16-pin DIP, TSSOP, SOIC packages

Where to use L293D IC

The L293D is a popular 16-Pin **Motor Driver IC**. As the name suggests it is mainly used to drive motors. A single **L293D IC** is capable of running two **DC motors** at the same time; also the direction of these two motors can be controlled independently. So if you have motors which has operating voltage less than 36V and operating current less than 600mA, which are to be controlled by digital circuits like Op-Amp, 555 timers, digital gates or even Micron rollers like Arduino, PIC, ARM etc.. this IC will be the right choice for you.

1) LDR(LIGHT DEPENDENT RESISTOR)



The **Light Dependent Resistor (LDR)** is just another special type of Resistor and hence has no polarity. Meaning they can be connected in any direction. They are breadboard friendly and can be easily used on a perf board also.

The symbol for LDR is just as similar to Resistor but adds to inward arrows as shown above. The arrows indicate the light signals.

Features

- Can be used to sense Light
- Easy to use on Breadboard or Perf Board
- Easy to use with Microcontrollers or even with normal Digital/Analog IC
- Small, cheap and easily available

LIST OF COMPONENTS

SR	MATERIAL	QTY	EACH
1	PIC MICROCONTROLLER	1	800=00
2	REGULATOR 7805	1	25=00
4	DRIVER L293D	1	95=00
5	LCD 16x2 ALPHANUMERIC	1	150=00
6	CAPACITOR S(1000Uf, 470uF)	2	30=00
7	POWER DIODES(1N5408, 8 Amp)	1	20=00
8	RESISTANCES(1k,100E,Variable)	5	5=00
9	BERG CONNECTORS(MALE & FEMALE)	2	25=00
10	POWER CONNECTORS(2 PIN)	1	30=00
11	IC BASES(16 PIN)	1	15=00
12	SOLAR PANEL 12V 15W	1	1500=00
13	MOTOR 12V 100RPM	1	750=00
14	MISC(WIRES, NUTS,SCREWS,MOUNTING BOARDS,ETC, , PCB ASSY)	LOT	3500=00

Conclusion

A solar panel tracking system was designed and implemented. The aim of the solar panel tracking system is to track the position of the sun for better efficiency of the solar panel has shown in the experimental results.

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