

A. 10 W Solar Panel

Solar panel Solar panels, also called photovoltaic or PV modules as it directly converts sunlight into electricity. It reduces the amount of electricity coming from fossil fuels by supplying your operations with clean, renewable energy from the sun. By providing more energy and lasting longer than other brands, solar panels are the best choice for cutting your carbon footprint down to size. Financial benefits dramatically reduce your electricity bill when there are more than 2 batteries in the series, it will equalize the voltage in them and ensure they do not have different voltages.

B. LM35

LM35 is a temperature measuring device having an analog output voltage proportional to the temperature. It provides output voltage in Centigrade (Celsius). It does not require any external calibration circuitry. The sensitivity of LM35 is 10 mV/degree Celsius. As temperature increases, output voltage also increases.

C. Relay Module

Relay is basically a switch which is operated by an electromagnet .the electromagnet require a small voltage to get activated which we will give from the arduino and once it is activated, it will pull the contact to make the high voltage circuit. It can be controlled with low voltage,like the five volt provided by the arduinopins .

D. Four Channel Relay Module - 12V

Relay module with 4 onboard relays. Each relay can switch devices with current up to 10A. Optical isolators are included in the circuit to protect your driver device from a reverse voltage surge.

E. Single Channel Relay Module - 5V

Single channel 5V relay module can be used in interactive combination of AC-DC projects, such as smart home and etc. This module uses a SINGLE 5v high-quality relay. It can also be used to control lighting, electrical and other equipment. The modular design makes it easy to expand with the Arduino board (not included). It can be controlled through digital IO port, such as solenoid valves, lamps, motors, and other high current or high voltage devices.

F. LDR

A photoresistor is an active component that decreases resistance with respect to receiving luminosity on the component's sensitive surface. The resistance of a photoresistor decreases with increase in incident light intensity; in other words, it exhibits photoconductivity.

G. DC Motor

A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor.

H. Wifi Module ESP8266

The ESP8266 WiFi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.

I. 16x2 LCD

An LCD is an electronic display module which uses liquid crystal to produce a visible image. The 16x2 LCD display is a very basic module commonly used in DIYs and circuits. The 16x2 translates to a display 16 characters per line in 2 such lines. In this LCD each character is displayed in a pixel matrix.

J. Motor Driver

A motor controller is a device or group of devices that serves to govern in some predetermined manner the performance of an electric motor.

VI. TESTING RESULTS

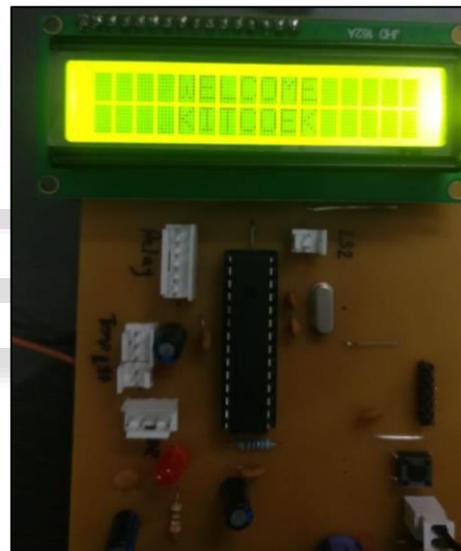


Fig. 2:



Fig. 3:

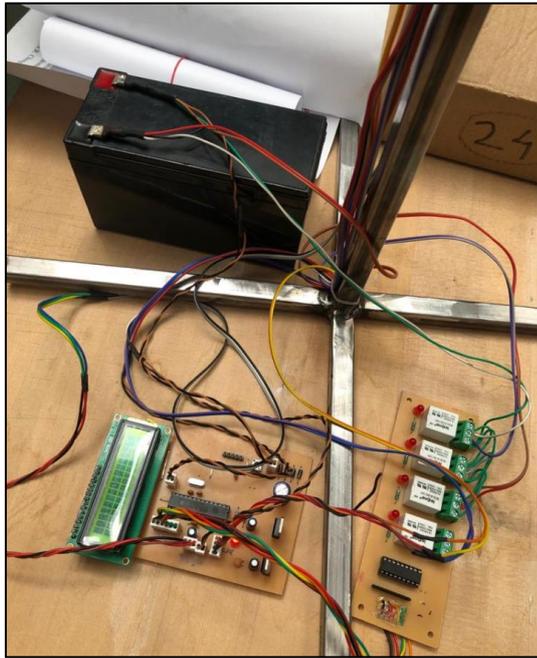


Fig. 4:



Fig. 5:

tracking. Also the status of the results are updated on the webpage to keep the user also updated.

Hence this is a cost efficient automation system which can be utilized for the future energy conservation.

REFERENCES

- [1] IEEE paper of 'Solar energy monitoring system'.
- [2] IEEE paper of 'Real time remote solar monitoring system'.
- [3] IEEE paper of 'Solar power monitoring system using IOT'.

VII. CHALLENGES WHILE IMPLEMENTATION

- The major problem was to establish a panel rotation system using motors and gear with a fix locking mechanism.
- Making the mechanical solar panel stand was crucial and quite difficult.

VIII. CONCLUSION

It is very important nowadays to make use of the renewable energy resources. For the same purpose, we used a 10W solar panel and using motor and gear, availed its automatic