Solar Powered Intelligent Power Management for Electric Vehicles

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Abstract— **Electric vehicles are rapidly becoming viable options for consumer use as regular transportation. Charging solutions should be both intelligent and renewable. This project focuses on the design and construction of an intelligent power management for optimal battery charging in solar powered electric vehicles. The aim is to complete the process of charging a battery independently while the other battery provides all the energy required for the consumption of electric vehicle. The power generated from the synchronized dynamo is stored in the battery. Wireless technology is used to control vehicle. Vehicle movement is controlled using ASK TX/RX.**
To charge battery renewable energy is used , if any dust on solar panel it will effect the power generation , manual cleaning is not correct method it may cause error, so automatic cleaning mechanism is implemented

Index Terms— **Arduino , Dynamo**

I. INTRODUCTION

As consumers increase their adoption for electric vehicles (EV), which include more charging solution for electric vehicles will become necessary. We know that this becomes significant in the near future by renewable power options for charging battery.

Proposed is a solar photovoltaic (PV) battery that serves as a storing energy to enhance management of the power resource.US consumers purchase millions of vehicles each year. With the price of gasoline elevated for the past few years, EV'S are rapidly growing in acceptance. As millions of these vehicles come onto the roads , and intelligent management of these vehicles will become necessary. However, EV's batteries could become an important resource for storing energy such as that produced from renewable sources.

Usually dust particles will be accumulated on solar panels. Due to this accumulation of dust 30% efficiency of the panels will be reduced. Hence it requires regular cleaning. So here we have used self cleaning technique for the cleaning of these panels.

II. METHODOLOGY

A. Battery Management System

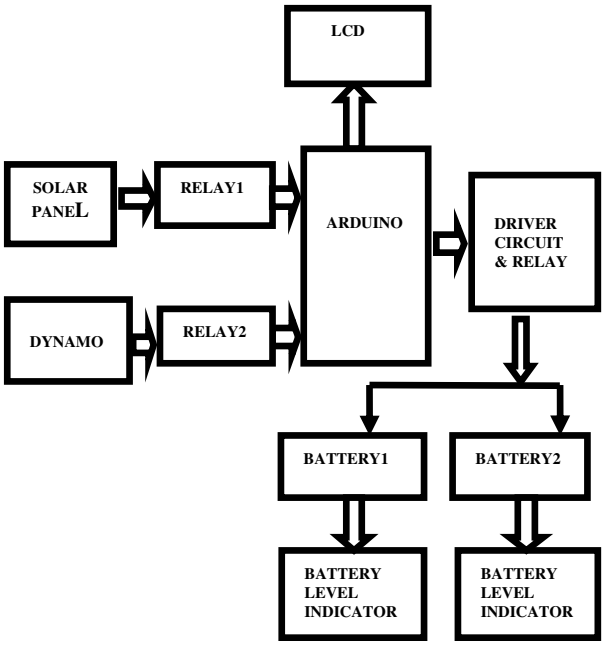

Figure.1.Block Diagram Of Battery Management System

Above block diagram explains vehicle charging using solar power as well as dynamo. Here two batteries are used for vehicle charging, battery level is also indicated through LED's. Whenever solar is available battery is charged using solar energy. During running of vehicle power is generated by dynamo and which will be stored in battery.

When solar energy is available, signals are fed to relay and message will be displayed on LCD. When battery1 is full through input port of arduino, battery1 will start charging it switches automatically to battery2. During running of vehicle dynamo will work and signal is fed to arduino input and energy will be stored in battery.

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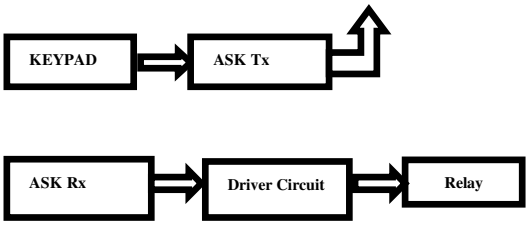
B. Bus Movement Control



Figur.2.Block Diagram Of Bus Movement Control

RF controlled robot is controlled by using Four push button placed at transmitter side. Here we only need to push the buttons to control the robot. A transmitting device is used which also contains a RF Transmitter and a RF Encoder. This transmitter part will transmit command to robot so that it can do the required task like moving forward, reverse, turning left, turning right and stop. All these tasks will perform by using four push buttons that are placed on RF transmitter.

C. Automatic Cleaning of Solar Panel

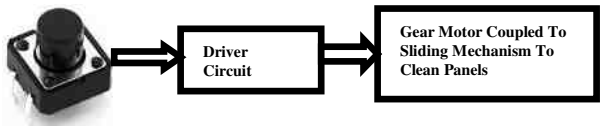


Figure.3. Block Diagram of Automatic Cleaning Of Solar Panel

When user press switch, signal is fed to driver circuit to drive motor. So motor will start moving upside and down to clean the solar panel which will increase the efficiency of solar panel.

III. HARDWARE

1. Arduino :

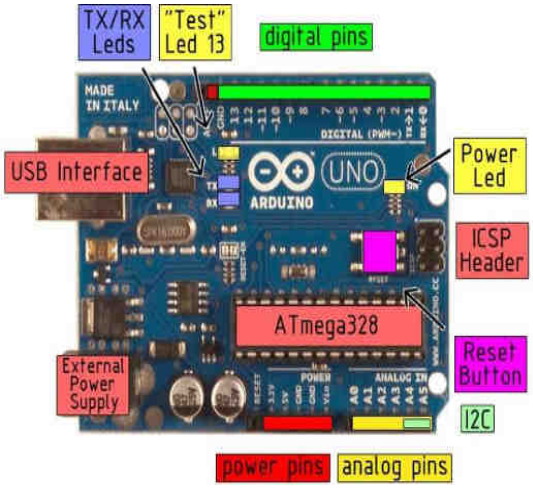


Fig.1.1.Arduino

Arduino Uno is powered by Atmega328 microcontroller, it consists of everything needs to support the microcontroller. Power supply to Arduino can be given through USB connection or from an external power supply. It operates at external supply of 6 to 20 volts. It has 8Kb of flash program memory and 1Kb internal SRAM.

2. Dynamo :

It is an electrical generator that creates direct current using a commutator. Also, converting alternating to direct current using power rectification devices is effecting and usually economical.

3. Relay

Relay is used to switch on or off electrical circuits operating at high AC voltage using a low DC control voltage. It has two parts, a coil which operates at the rated DC voltage and a mechanically movable switch.

4. LCD :

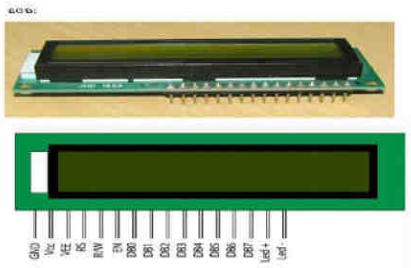


Fig.4.1.LCD Display

LCD screen is an electronic display module and have wide range of applications. A LCD is 16X2 and character is displayed at 5X7 pixel matrix. This LCD has two registers command and data. Command register stores the command instruction given to LCD. The data register stores the data to be displayed which is the ASCII value of character to be displayed on LCD.

5. ASK Tx and Rx :

Fig.5.1.ASK Transmitter and Receiver

ASK Tx transmits the bits in serial mode with a carrier frequency of 433MHz. Encoder converts the parallel data into serial data and fed to the ASK transmitter for serial transmission.

ASK Rx receives the digital data transmitted from Tx and is fed to decoder and decoder converts the serial data into parallel data and then fed to relay.

6. Regulator :

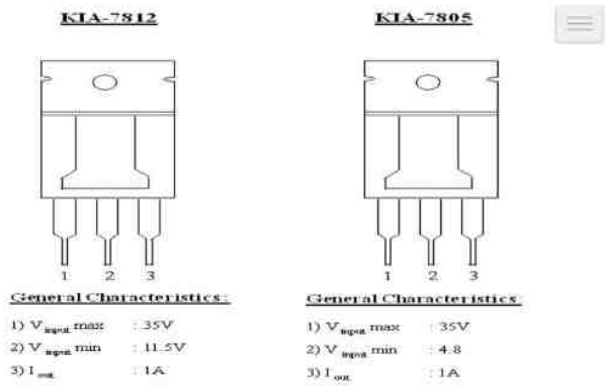


Fig.6.1.Regulators

Regulator is an electronic circuit whose function is to keep output always constant though the input is varied. In this project three terminals IC is used for output DC voltages. The IC7812 and IC7805 is used to get the regulated power supply of 12V and 5V.

ADVANTAGES

- No interruption of power.
- No need of backup.
- Economical
- Solar panel life span is more
- Solar power reduces pollution and global warming
- Solar is of free source available every where
- Affordable and Efficient.
- Eliminating dependence on fossil fuels and limited resources

V. CONCLUSION

This project includes the intelligent power management. And the novel idea takes the concerns of the grid which impacts on Electric vehicle charging by both intelligent and renewable. The process of completing the charging of battery is independent while the energy required for electric vehicles is provided by the other battery.

To charge battery, solar energy is used i.e., by solar panel. And the manual cleaning of solar panel is not required due to the automatic cleaning mechanism implemented on solar panel.

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