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***Review Article** (Open Access)*

RENEWABLE ENERGY BASED ELECTRIC VEHICLE

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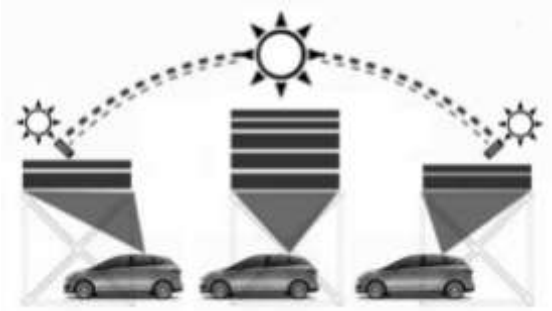
ABSTRACT
The driving of the battery electric vehicles can have a significant impact on the load profile of the distribution grid. Here using renewable energy sources for collecting power. The smart real- time electric vehicle demand predictions to optimize the balance of energy in the grid. The studies for hybrid electric vehicle have attracted considerable attention because of the necessity of developing alternative methods. The aim of the proposed work is to contribute the technology that supports green energy. In this paper, the battery is charged using EB supply followed by battery backup with solar energy and wind energy to drive electric vehicles. Hybrid power from solar photovoltaic and wind technologies can reduce annual grid demand by 24%. The gear motor which ranges 30rpm is connected to the relay and provides a direction signal to the electric vehicle. The vehicle has user interface supported with PIC16F877A for the complete operation. It also deals with electronic keypad, LCD display (voltage readings) and sensor control (proximity sensor, temperature sensor and LDR sensor).

Keywords: *Solar Panel, Wind Dynamo, Battery, PIC Microcontroller, Motor, Relay, Sensors.*

INTRODUCTION
In 1832 Robert Anderson invented a non-rechargeable electric carriage. Electric car became popular between mid 19th century and earlier 20th century. Global acceptance was hampered by a lack of power infrastructure. Now-a-days transportation systems are very important to entire world. The non-renewable resources like coal, natural gas and oil are in very demand, so that the researchers forced towards the development of renewable resources or non-conventionalenergy resources. In recent years many existing automobile manufacturers and new dedicated companies have put a remarkable effort in transforming the conventional vehicle into an electric vehicle that provides green and reliable solution. In terms of market share, electric vehicle demand is raising. It starts replacing conventional vehicle in USA, Europe and Asia. Thus advanced vehicle technology research has been turned to focus on HEVs (Hybrid Electric Vehicles).An electric car is powered by an electric motor and it gets power from controller which is energized by battery. An electric vehicle is a vehicle based on one or multiple motors to ensure propulsion. The degree of electrification varies from one vehicle to another.



Solar electric vehicle:

An electric car that is charged by a solar power system is an excellent way to ensure the transportation is both cost efficient and emissions free. A solar vehicle is powered completely or significantly by direct solar energy. Photovoltaic (PV) cells present in the solar panel convert the sun's energy directly into electric energy. The term solar vehicle implies that solar energy is used to charge for all or part of a vehicle's propulsion.

Wind electric vehicle:

The batteries that operate the vehicles can be recharged when there is surplus of electricity from wind power. Wind energy via wind dynamo is a very common renewable energy source (RES), which however is characterized by great intermittency. The electric vehicles (EVs) offer a new, echo-friendly and more effective means of transportation in order move the EVs the energy is stored in their batteries.

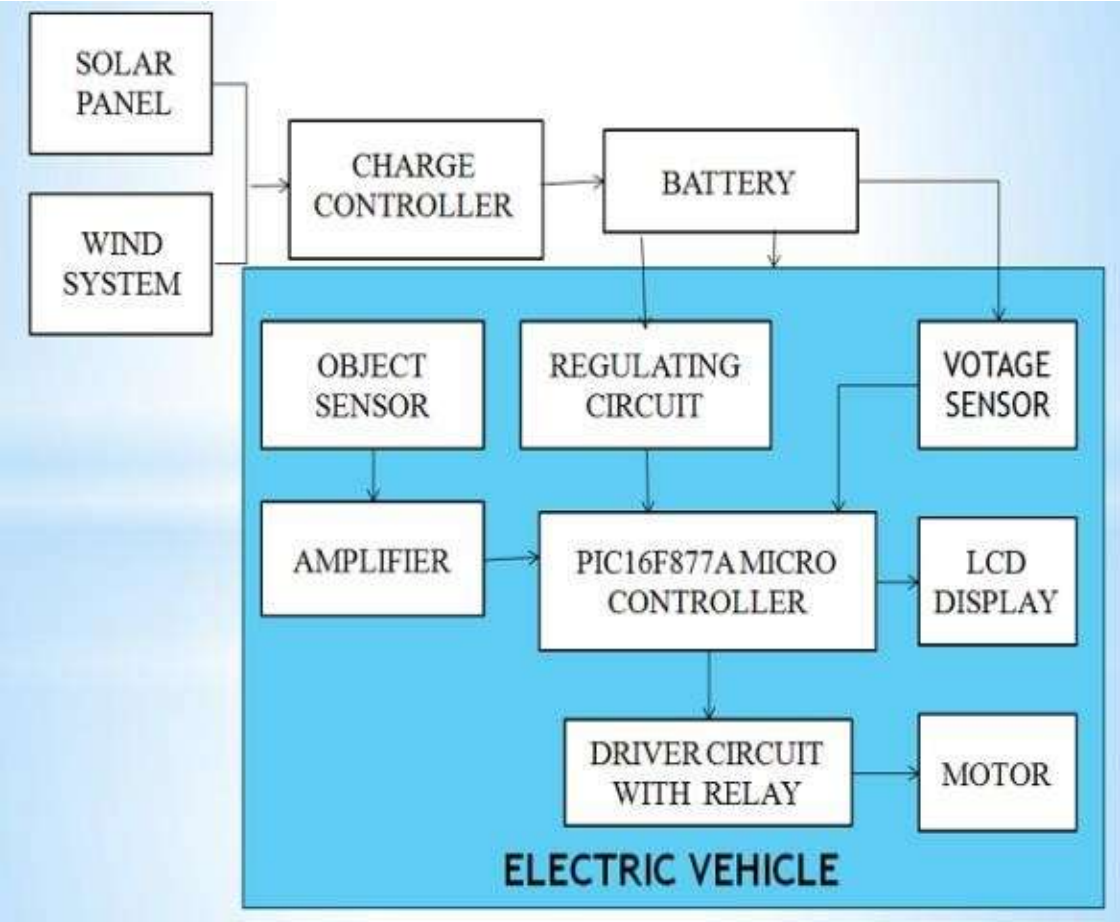
Battery electric vehicle:

A battery electric vehicle (BEV) is a type of electric (EV) that exclusively uses renewable energy and power stored in rechargeable battery backs, with no secondary source of propulsion (e.g. hydrogen fuel cell, internal combustion engine, etc...). Batteries for electric vehicles are characterized by their relatively high power-to-weight ratio, specific energy and energy density; smaller, lighter reduce the weight of the vehicle and improve its performance.

Hybrid electric vehicle:

In accordance with many experts, a small "hybrid electric system" combines wind electric and solar electric technologies offer several advantages over single system. In US, wind speeds are low in the summer when the sun shines longest and brightest. The wind is string in the winter when less availability of sunlight. Because the peak operating times for solar and wind systems occur at different times, hybrid systems are more likely to produce power when you need it.

BLOCK DIAGRAM



Solar panel:

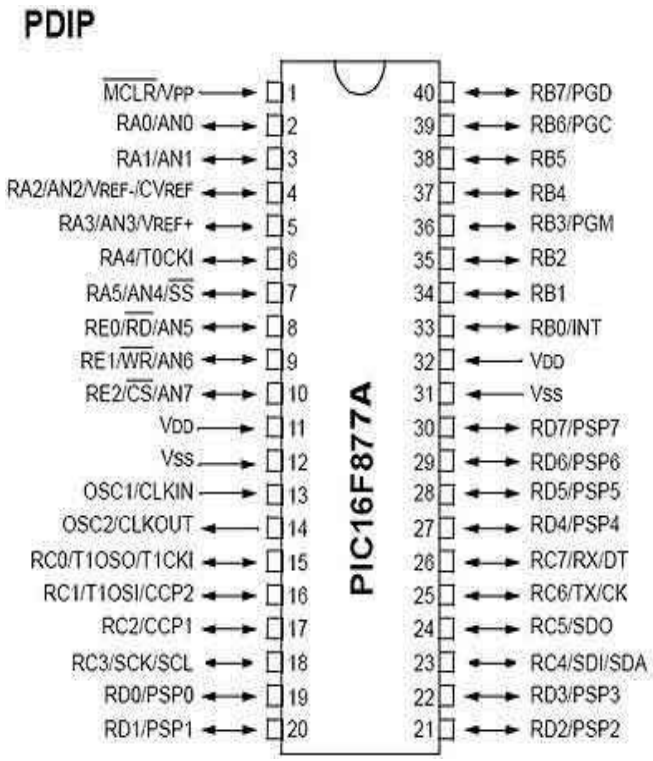
To make the solar panel simpler and cost effective, polycrystalline solar panels are used. The polycrystalline solar panels have low heat tolerance when compared to mono crystalline solar panels.

PANEL RATINGS

Model type	12-10W		
Rated Max Power (Pmax)	10W	Current at Pmax (Imp)	0.58Amps
Voltage at Pmax (Vmp)	17.40V	Short Circuit Current (Isc)	0.66Amps
Open Circuit Voltage (Voc)	21.20V		
Operating Temperature	-40 to 85 deg C	Max System Voltage	DC 1000

PIC16F877A microcontroller:

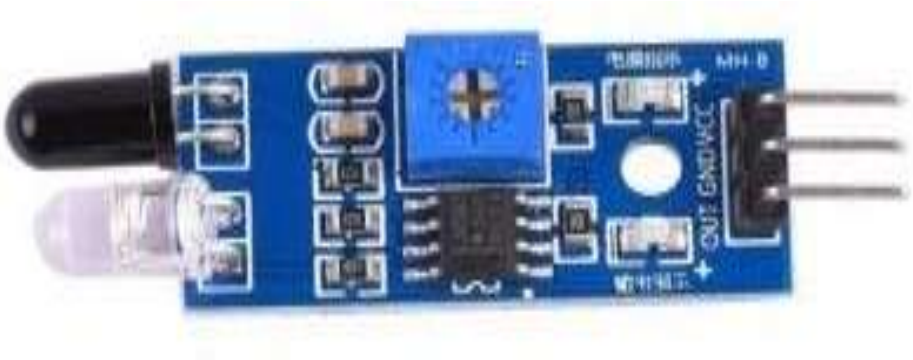
The Peripheral Interface Controller (PIC) has the high performance RISC (Reduced Instruction Set Computer) CPU. It has 35 single word instruction set and its operating speed DC-20MHz clock input DC-20ns instruction cycle. The PIC supports Flash Program Memory, Data Memory (RAM) and EEPROM Data Memory.



CONTROLLING METHODS

Sensors:

Object sensor (Proximity sensor): ***A proximity sensor emits the beam of electromagnetic radiation and looks for changes in the field or return signal. The sensed object is often referred to as the target of the proximity sensor.***

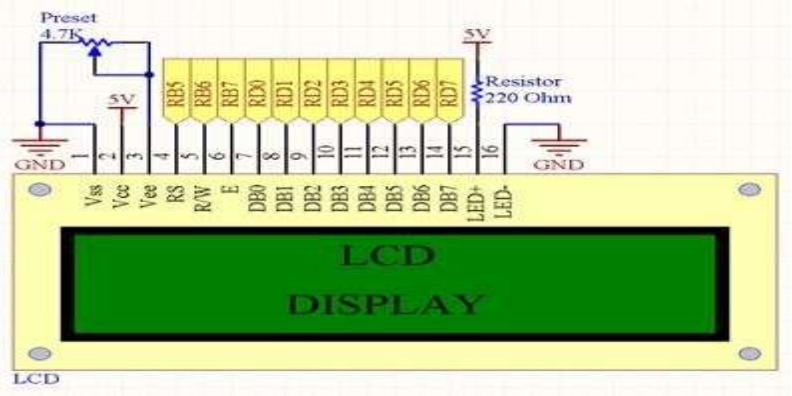


Temperature sensor: The electronic module plays a vital role to control and monitor the health of battery and motor with the help of reliable sensors. Here, LM35 is used to sense the motor heat. Its tolerance of R value and B value is around ±1%. According to the requirements of vehicle's shocks and ambient temperature conditions the customization of temperature sensor is available.

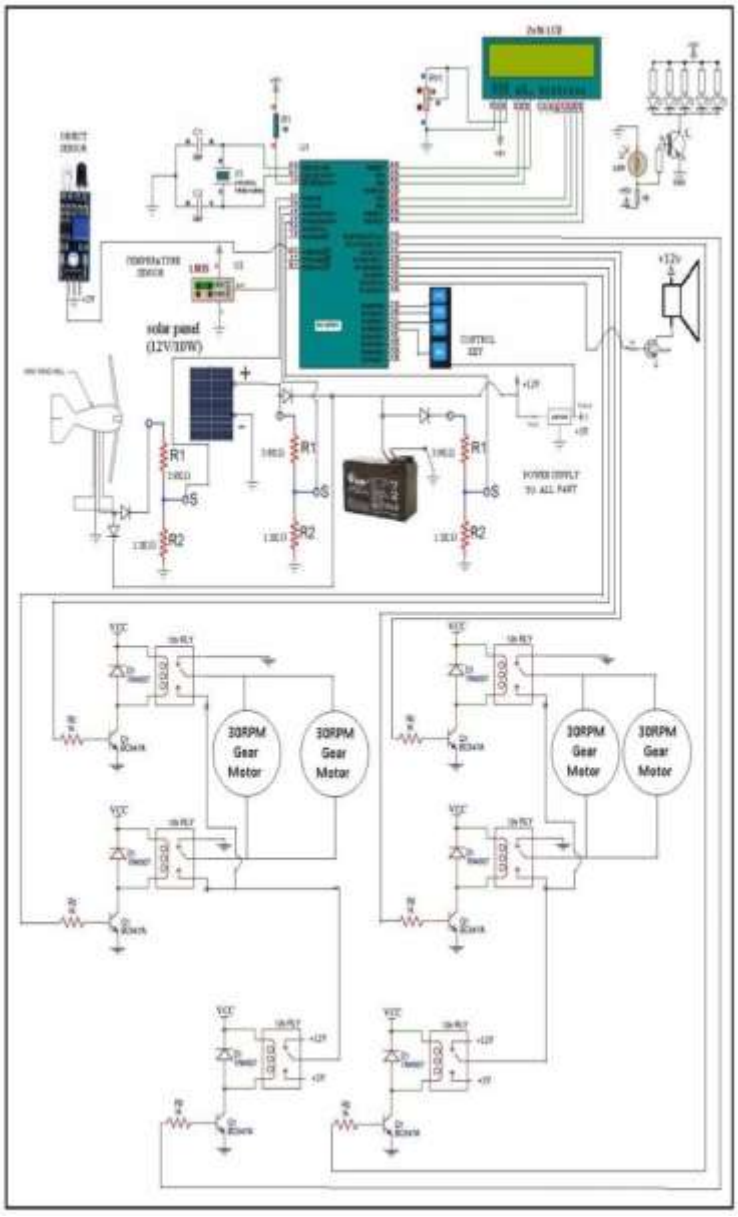
LDR sensor: Light Dependent Resistor or photocell is a light-controlled variable resistor. When the intensity of light increases the resistance of the sensor decreases and vice versa. The LDR should be exposed to light hence it must be placed in a way that the opposite car's light approaching you must fall on the LDR and not on your own car's light.

LCD display:

PIC16F877A – Interfacing LCD. PIC16F877A Mini Development Board comes with an LCD module (2*16) operating at 5V. The board has a potentiometer to adjust the LCD contrast. Some certain commands must be given to the initialization of LCD for reliable performance. It shows the voltage readings of solar, wind and battery.



CIRCUIT DIAGRAM



Driver circuit:

Driver circuit acts as a bridge between the controller and the motor. Motor drives are made from discretecomponents which are integrated inside an integrated circuits.

Relay operation

RESULT

The electric vehicle has several features based on their movement and their operation is controlled by sensors. The purpose of enhancing the electric vehicle is to avoid the conventional energy resources. The whole system is operated by using renewable energy source with battery backup. Battery electric vehicle

uses electric motor and high capacity batteries for propulsion. The initial charging of battery is taken from electric power supply followed by the recharging done from hybrid (solar and wind) renewable sources.

Direc -tion	R 1	R 2	R 3	R 4	R 5	R 6	Working
For -ward	ON	OFF	ON	OFF	OFF	OFF	Left,right motor moves forward
Back -ward	OFF	ON	OFF	ON	OFF	OFF	Two motors moves backwar d
Left	ON	OFF	ON	OFF	ON	OFF	Left motor off and right motor moves forward
Right	ON	OFF	ON	OFF	OFF	ON	Left motor moves forward, right motor off

CONCLUSION

In the future, by combining diverse energy sources and power trains in optimal way, as well as performing an accurate and robust power management control algorithm, will be very essential to build a reliable and affordable electric vehicle while preserving our environment and efficiently using are limited resources. Many different approaches have been proposed to enhance our understanding of the basic vehicle system performance challenges. Compared to all the control methods, each control techniques has its merits and demerits. Our future work will focus on developing power management supervisory level

taking advantage of today's achievements and our vision is to optimize a multi power source management in BEVs and HEVs.

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