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INTEGRATED ELECTRIC VEHICLE

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ABSTRACT

Across the globe, governments have been tackling the concerning problem of air polluting. Emission by committing significant resources to improving air quality. Achieving the goal of air purification will require that both the private and public sector invest in clean energy technology. It will also need a transition from conventional houses to smart houses and from conventional vehicles to electrical vehicles (EVs). It will be necessary to integrate renewable energy sources (RESs) such as solar photo-voltaic, wind energy systems and diverse varieties of bio-energies. In addition, there are opportunities for decarburization within the transportation sector itself. Paradoxically, it appears that the same transportation sector might also present an opportunity for speedy decarburization. Statistics indicate that transportation is responsible for 14% of global greenhouse gas (GHG) emissions such as public transportation, vehicle light weighing, start-stop trains, improved engine technology, fuel substitution and production improvement, hydrogen, power-to-gas and naturally gas heavy fleets. This work concentrates on EV adoption integrated with RES. Specially, this chapter examines the feasibility of significantly reducing GHG emissions by integrating EVs with RESs for sustainable mobility.

Keywords: electric vehicles (EVs), renewable energy sources (RESs), solar photovoltaic energy, Vehicle fleet, smart grid, pollutant emission.

INTRODUCTION

The future solution for the fossil fuels scarcity, as well as to the environmental problems associated with their wide usage, will most likely involve an extensive use of EVs. Currently, there are three relevant types of electric vehicles prepared to be launched in the markets: fully EVs, fuel cell EVs, and hybrid EVs. Battery and fuel cell EVs are driven only by electric power while current available hybrid EVs have also an internal combustion engine. Since these vehicles will require the use of batteries with high energy storage capacity and with large electric load charging requirements, a large deployment of this concept will provoke considerable impacts in electric power system design and operation, but will also enable and benefit the usage of non-pollutant energy resources In and, it is shown how EVs will likely change the energy demand, while in, the economic impacts for the electrical utilities are presented. In, the challenges for the rollout of EVs are described, including battery technology and cost, infrastructure financing, regulatory requirements, electrical power sector interface, and consumer acceptance issues. Finally, in, besides the changes in demand patterns, grid technical impacts are also addressed, namely concerning substation transformer loading and influence of temperature in their expected life. When parked and plugged into the electric grid, EVs will absorb energy

SPECIFICATION

Mechanical:-

Platform area is 18*15 feet

Weight of project is approximately 3Kg.

Electrical:-

Operating supply is 230V, 50Hz.

805 regulating IC is used to get +5 V DC supply.

7812 regulating IC is used to get +12 V DC supply.

Microcontroller AT328 is used for all operation

16X2 LCD is used to display voltage of Battery.

Power supply is of 230/5V DC supply.

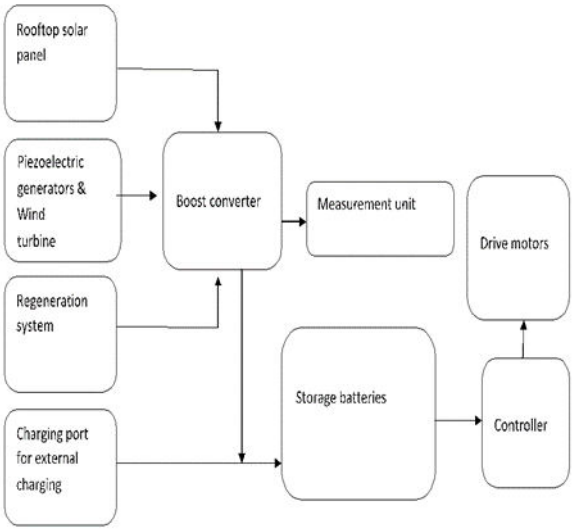
12 V DC motor is used.

Solar (6V, 250 mA) (4 Nos)

Wind turbine

Piezoelectric plates (2 mm diameter)

BLOCK DIAGRAM



BLOCK DIAGRAM OF IEV

WORKING

Integrated electric vehicle works by a small "hybrid" electric system that combines power from solar, wind turbine, regenerative breaking systems, Piezoelectric based vehicle suspension and this technology will offers several advantages over either single system. True solar-powered cars are actually electric vehicles that are powered by solar panels. The panels are used produce electricity by converting the sun's rays into energy, which is then stored in solar batteries. The car runs by using the energy that is stored in the batteries. Wind power has become a popular form of renewable energy, alongside solar power. Transportation and what powers it, is something that has long been in debate. There are questions about what it should run on and which fuel would be most efficient. There are some who thought that a wind powered car might be the answer to problems regarding transport and the pollution it causes. In a battery-powered electric vehicle, regenerative braking is the conversion of the vehicle's kinetic energy into chemical energy stored in the battery, where it can be used later to drive the vehicle. It is braking because it also serves to slow the vehicle. It is regenerative because the energy is recaptured in the battery where it can be used again. Piezoelectric based new type of piezoelectric harvester for vehicle suspension systems is designed and presented that addresses the current problems of low energy density, vibration energy dissipation, and reduced energy harvesting efficiency in current technologies. A suspension dynamic model for the harvester was developed for the inertial mass and the force of the energy conversion component by combining with the piezoelectric power generation model.

IEV is a hybrid system. In its stand-alone mode, which operate "off-grid" -- not connected to an charging system. For the times when neither the wind nor the solar, wind, regenerative breaking power, suspension power system are producing, it will be necessary to connect it to grid power supply. These hybrid systems will store power through batteries and/or an engine generator powered by conventional fuels, such as diesel. If the batteries run low, the engine generator can provide power and recharge the batteries. Any time car slows down the kinetic energy stored in the vehicle has to go somewhere. Let's take a look at where this energy goes. There is always some kinetic energy consumed by the rolling resistance, mechanical friction, and aerodynamics of your car. Among current energy harvesters, electromagnetic energy harvesters are widely used in vehicle suspension systems for vibration energy harvesting because of higher energy conversion efficiency, compact structure, fast response velocity, and strong controllability

COMPONENTS USED

BATTERY

BATTERY

An electrical battery is a combination of one or more Electrochemical cells, used to convert stored chemical energy into electrical energy. The battery has become a common power source for many household and industrial applications. Batteries may be used once and discarded, or recharged for years as in standby power applications. Miniature cells are used to power devices such as hearing aids and wristwatches; larger batteries provide standby power for telephone exchanges or computer data centers.

SOLAR

Monocrystalline Silicon Solar Cell
Product Monocrystalline P-Type Silicon Solar Cell
Format Diameter 156 mm x 156 mm; 200 mm
Description- High performance and premium optical quality and
Appearance cell, suitable for all applications including BIPV. (Efficiency

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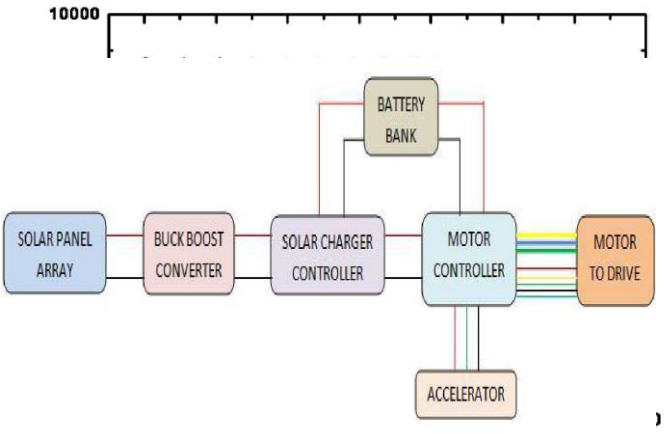
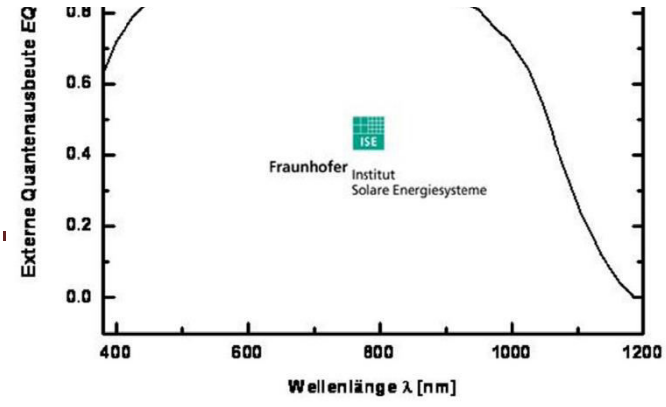
17.5% - 18.39%).
Electrical contacts Front side: grid; 3 busbars Back side: 3 busbars
Material- Monocrystalline Silicon
Surface and colour- Textured, dark blue - black
Dimensions; area- 156 mm x 156 mm; 23,895 mm2 (• } 250 mm2)
Cell thickness (related to silicon)- 180 >m (• } 30>m)
Electrical contacts- Front side: grid; 3 busbars Back side: 3 busbars
Polarity- Front side: negative; back side: positive
Cell structure- n+ p p+
Antireflective coating- Silicon Nitride
Classification voltage- *U*LD (mV) 500 500 500
Voltage at open circuit- *U*OC (mV) 620 618 612
Current at classification voltage- *I*ULD (A) 8.60-8.84 8.36-8.60 8.12-8.36
Mean short circuit current- *I*SC (A) 8.88 8.85 8.75
Mean power- *P*MPP (W) 4.39 4.35 4.18
Mean efficiency- η (%) 18.39 18.20 17.53
Reverse current- *I*Rev12V (A) ≤ 0.5 ≤ 0.5 ≤ 0.5
TEMPERATURE COEFFICIENTS* ABSOLUTE RELATIVE
Voltage at open circuit- *T*KUOC -2.23 mV/K -0.37 %/K
Short circuit current- *T*KISC 3.14 mA/K 0.04 %/K
Power- *T*KP -18.02 mW/K -0.45 %/K
Working temperature of the cell -50 °C to 80 °C
Stocking conditions- Avoid humidity and corrosive atmospheres
Recommended solder- Saturated with silver (2-4% Ag)





Solar output curve

BUCK BOOST CONVERTERS

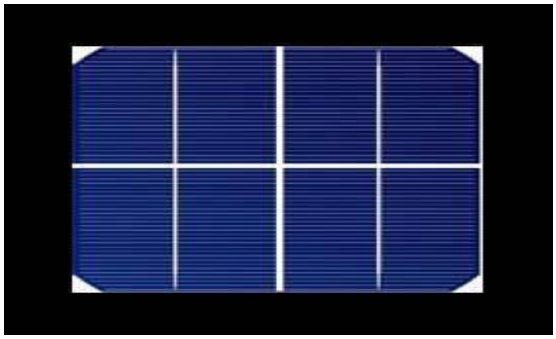
BLOCK DIAGRAM OF BUCK BOOST CONVERTER

It is basically a dc transformer which can step up or step down the voltage on the basis of chopper circuit. We can increase the output voltage by increasing the duty cycle of semiconductor switch. We can directly charge the battery through an inductor to prevent the sudden change in current. We can, as well as connect the Dc motor directly to the circuit.

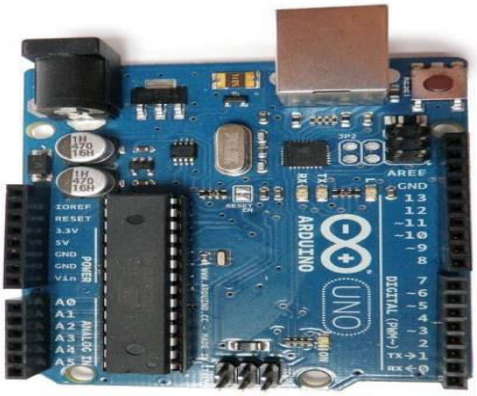
DC MOTOR

DC MOTOR

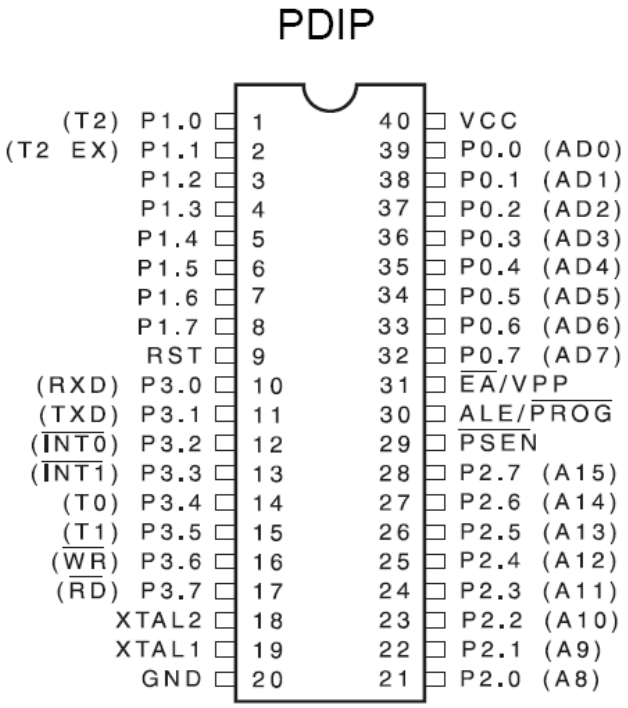
The armature a tensional force is generated as a reaction between the motor's field and the armature causing the motor's armature to turn. As the



armature turns, the brushes switch to adjacent bars on the commutator.The direct current (DC) motor is one of the first machines devised to convert electrical power into mechanical power. Permanent magnet (PM) direct current converts electrical energy into mechanical energy through the interaction of two magnetic fields. One field is produced by a permanent magnet assembly, the other field is produced by an electrical current flowing in the motor windings. These two fields result in a torque which tends to rotate the rotor. As the rotor turns, the current in the windings is commutated to produce a continuous torque output. That output is given to ADC which will farther generate the signal The stationary electromagnetic field of the motor can also be wire-wound like the armature (called a wound-field motor) or can be made up of permanent magnets (called a permanent magnet motor). In either style (wound-field or



permanent magnet) the commutator acts as half of a mechanical switch and rotates with the armature as it turns. The commutator is composed of conductive segments (called bars), usually made of copper, which represent the termination of individual coils of wire distributed around the armature. The second half of the mechanical switch is completed by the brushes. These brushes typically remain stationary with the motor's housing but ride (or brush) on the rotating commutator. As electrical energy is passed



through the brushes and consequently through r. This switching action transfers the electrical energy to an adjacent winding on the armature which in turn perpetuates the tensional motion of the armature. 100 Rpm DC geared motors for robotics applications. Very easy to use and available in standard size. Nut and threads on shaft to easily connect and internal threaded shaft for easily connecting it to blades.

FEATURES

- Long life
- High quality
- High output
- Low noise
- Long-life Intermittent operation over 1 million cycles with optimized brush design*1
- Continuous operating life of 3000 hours*1
- High output: High heat dissipation and heat resistance achieves higher output
- High strength: High radial load capacity due to robust construction, large diameter output shaft and ball bearings
- Low noise and increased insulation due to new resin brush holders

ARDUINO AT MEGA 328

ARDUINO UNO

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Revision 2 of the Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

PIN DIAGRAM OF MICROCONTROLLER AT MEGA 328

PIN DESCRIPTION

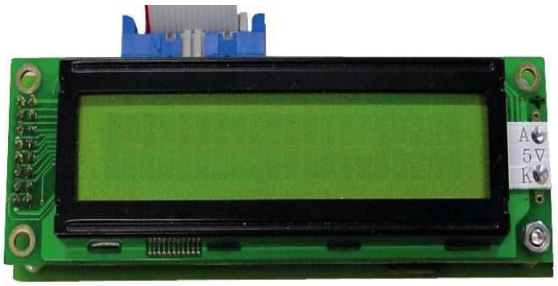
VCC: supply voltage.
GND: ground.

Port 0

Port 0 is an 8-bit open drain bidirectional I/O port. As an output port, each pin can sink eight TTL inputs. When 1s are written to port 0 pins, the pins can be used as high impedance inputs. Port 0 can also be configured to be the multiplexed low order address/data bus during accesses to external program and data memory. In this mode, P0 has internal pull-ups. Port 0 also receives the code bytes during Flash programming and outputs the code bytes during program verification. External pull-ups are required during program verification.

Port 1

Port 1 is an 8-bit bidirectional I/O port with internal pull-ups. The Port 1 output buffers can sink/source four TTL inputs. When 1s are written to Port 1 pins, they are pulled high by the internal pull-ups and can be used as inputs. As inputs, Port 1 pins that are externally being pulled low



will source current (IIL) because of the internal pull-ups. In addition, P1.0 and P1.1 can be configured to be the timer/counter 2 external count input (P1.0/T2) and the timer/counter 2 trigger input (P1.1/T2EX), respectively, as shown in the following table.

Port 2

Port 2 is an 8-bit bidirectional I/O port with internal pull-ups. The Port 2 output buffers can sink/source four TTL inputs. When 1s are written to Port 2 pins, they are pulled high by the internal pull-ups and can be used as inputs. As inputs, Port 2 pins that are externally being pulled low will source current (IIL) because of the internal pull-ups. Port 2 emits the high-order address byte during fetches from external program memory and during accesses to external data memory that uses 16-bit addresses (MOVX @ DPTR). In this application, Port 2 uses strong internal pull-ups when emitting 1s.

Port 3

Port 3 is an 8-bit bidirectional I/O port with internal pull-ups. The Port 3 output buffers can sink/source four TTL inputs. 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 AT89C55, as shown in the following table. Port 3 also receives the highest-order address bit and some control signals for Flash programming and verification.

ALE/PROG

Address Latch Enable is an output pulse for latching the low byte of the address during accesses to external memory. This pin is also the program pulse input (PROG) during Flash programming. In normal operation, ALE is emitted at a constant rate of 1/6 the oscillator frequency and may be used for external timing or clocking purposes. Note, however, that one ALE pulse is skipped during each access to external data memory. If desired, ALE operation can be disabled by setting bit 0 of SFR location 8EH. With the bit set, ALE is active only during a MOVX or MOVC instruction. Otherwise, the pin is weakly pulled high. Setting the ALE-disable bit has no effect if the microcontroller is in external execution mode.

EA/VPP

External Access Enable. EA must be strapped to GND in order to enable the device to fetch code from external program memory locations starting at 0000H up to FFFFH. Note, however, that if lock bit 1 is programmed, EA will be internally latched on reset. EA should be strapped to VCC for internal program executions. This pin also receives the 12-volt programming enable voltage (VPP) during 12-volt Flash programming.

XTAL1

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

XTAL2

Output from the inverting oscillator amplifier.

LIQUID CRISTAL DISPLAY

LCD

LCD stands for **L**iquid **C**rystal **D**isplay. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the following reasons: The declining prices of LCDs.The ability to display numbers, characters and graphics. This is in contrast to LEDs, which are limited to numbers and a few characters. Incorporation of a refreshing controller into the LCD, thereby relieving the CPU of the task of refreshing the LCD. In contrast, the LED must be refreshed by the CPU to keep displaying the data. Ease of programming for characters and graphics. These components are "specialized" for being used with the microcontrollers, which means that they cannot be activated by standard IC circuits. They are used for writing different messages on a miniature LCD. A model described here is for its low price and great possibilities most frequently used in practice.

NEED FOR SOLAR ENERGY AT PRESENT SITUATION

Earth has limited amount of energy resources which is very soon going to extinct. Fortunately, population models have suggest that the world's population will probably level out at about two to three times the present numbers over the next hundred years. As the population is increasing the demands of people is also increasing. The question is whether the earth's resources are sufficient to sustain that population at a high standard of living for all. In this the key issue is energy. Now-a-days, dealers of natural resources like fuel, coal etc. are facing a hard time to keep pace with the increasing demand. At one hand, there are more cars or motor vehicles are dominating the transport medium, on the other hand these cars are being dominated by the fuel. As a result, the limited resources are being quashed by the producers and dealers to satisfy this need which is leading us to an uncertain future with having the scarcity of fuel and minerals. So, it is clear that present trends in energy consumption, especially oil, cannot be sustained much longer. Also these are responsible for Global Warming, Environmental Imbalance, Ozone layer depletion etc. which in turn is a big threat to the future human race. Again, in view of the possibility of global warming, these resources are playing a negative role. Therefore, under this circumstance, it is quite necessary to make a new exploration of natural resource of energy and power. But why exploration when the resource is in front of our bear eye. It is effective, less expensive and above all, it is an endless source of energy.

ADVANTAGES

Now a days EHV drives per charging a driving range of 40-50% of full load but with IEV it increases a driving range of 60-75%.
Remote areas don't have charging station, integrated EV can self-act as a charger.
Noise & Air pollution will be 90-95% less.
Eco-friendly environment.

DISADVANTAGES

It does not generated continuous power all the time.
Speed is less.
Developed for Smart/Metro cities only.

APPLICATION

Automobile Sectors.
Millitary War Vehicle.
Aerospace Vehicle.
.

CONCLUSION

EVs have great potential of becoming the future of transport while saving this planet from imminent calamities caused by global warming. They are a viable alternative to conventional vehicles that depend directly on the diminishing fossil fuel reserves. The EV types, configurations, energy sources, motors, power conversion and charging technologies for EVs have been discussed in detail in this paper. The key technologies of each section have been reviewed and their characteristics have been presented. The impacts EVs cause in different sectors have been discussed as well, along with the huge possibilities they hold to promote a better and greener energy system by collaborating with smart grid and facilitating the integration of renewable sources. Limitations of current EVs have been listed along with probable solutions to overcome these shortcomings. The current optimization techniques and control algorithms have also been included. A brief overview of the current EV market has been presented. Finally, trends and ways of future developments have been assessed followed by the outcomes of this paper to summarize the whole text, providing a clear picture of this sector and the areas in need of further research.

FUTURE EXAPANTION

Design of model can be modified to obtained better result. The induced wind may be used for improve braking system of vehicle. Small compressor can be integrated with model to compress air and this compressed air is useful for vehicle cleaning. Fluctuation of electricity generation will be overcome by supplying air to wind turbine using compressor of vehicle.

REFERENCES

[1] Rule Book of ISIE Electric Solar Vehicle Championship 2014-15 (page no 5& page no 7).
[2] Bosch Automotive Handbook (pg. no 6)
[3] EL MOGAHZY Y E 2009 engineering textiles, Integrating the design and manufacture of textile products, The Textile Institute. Woodhead Publishing Limited, Cambridge, England. ()
[4] FUNG W, HARDCASTLE M 2001 Textiles in automotive engineering, The Textile Institute, Woodhead Publishing Limited, Cambridge, England.
[5] DREAN E, SCHACHER L, BAUER F, ADOLPHE D 2005 Measurement of induced stresses in automotive textiles: Example of integrated poled ferroelectric polymer sensor, 5th World Textile Conference AUTEX 2005. Porto rosé, Slovenia, p 122–126
[6] UJEVI] D, KOVA^EVI] S 2004. International NONWOVENS
[7] Journal 13 (1): 33–41
[8] G. Eason, B. Noble, and I. N. Sneddon, ―On certain integrals of Lipschitz-Hankel type involving products of Bessel functions, ‖ Phil. Trans. Roy. Soc. London, vol. A247, pp. 529–551, April 1955. (References)
[9] J. Clerk Maxwell, a Treatise on Electricity and Magnetism, 3rd ed., vol. 2. Oxford: Clarendon, 1892, pp.68–73.
[10] S. Jacobs and C. P. Bean, ―Fine particles, thin films and exchange anisotropy,‖ in Magnetism, vol. III, G. T. Rado and H. Suhl, Eds. New York: Academic, 1963, pp. 271–350.