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PORTABLE HYBRID CHARGING UNIT

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Abstract - *A Renewable energy sources i.e. energy created from sunlight based, wind, biomass, hydro control, geothermal and sea assets are considered as a mechanical alternative for producing clean energy. Presently a day, with expanding worry of consumption of petroleum product holds and a worldwide temperature alteration, there is an extraordinary request of utilizing feasible vitality as contrasting option to safeguard and spare the earth for who and what is to come. Such aleternatives incorporate Hydro, wind vitality which have an awesome potential to meet our vitality requests, yet their significant issue is that they require a great deal of room and an immense beginning venture. So,to solve this real issue mix of vibration and sun based can be exceptionally helpful to our general public. They require less space and furthermore their underlying speculation is low when contrasted with different sources. Thus, remembering this we have made a versatile crossover charging framework that can produce control from vibration vitality by utilizing piezoelectric sensors and from sunlight based vitality by utilizing sun oriented boards. Keeping in mind the end goal to guarantee most extreme productivity , we have planned vibration sensor joined with sunlight based following framework.*

Key Words: Piezo-sensor, Solar Tracking System, ATMEGA-328 µc, L293D,

1.INTRODUCTION

Presently a day's vitality is a standout amongst the most essential issues far and wide. As we are already aware that common assets will complete one day. That is the reason scientists are endeavoring to present substitute vitality sources from nature which must be green and not hurtful for the earth. People have just begun to utilize vitality reaping innovation as windmill, geothermal and sun oriented vitality. Sustainable power source gathering plants produce kW or MW level power; it is called full scale vitality reaping innovation. In addition, miniaturized scale vitality additionally deliver from those common sources that are called smaller scale vitality collecting. Miniaturized scale vitality collecting innovation is essentially in view of mechanical vibration, mechanical anxiety, warm vitality from heater, radiators and rubbing sources, daylight or room light, human body, synthetic or organic sources, which can produce mW or µW level power. Smaller scale control supply needs is expanding enormously with time as our innovation is moving to the miniaturized scale and nano manufacture levels. So In our Project we are endeavoring to tackle Vibration and sunlight based vitality and further utilize them to create control. Since both the sources have their own impediments so we make it a blend of both the energies to expel the confinements and increment the effectiveness.

2. LITERATURE SURVEY

A piezoelectric cantilever beam-based energy harvester working with solar energy is proposed in this paper [1] The piezoelectric cantilever beam is excited by a shape memory alloy (SMA) spring actuator. The heating and cooling of the SMA actuator is done by designing an appropriate piping and transport system with water as a working fluid. The frequency and amplitude of excitation force exerted by an SMA actuator to the piezoelectric cantilever beam depend on the flow rate of water used for heating and cooling of SMA and the temperature of the water. The energy harvester is modeled analytically and fabricated to evaluate its performance in the laboratory. The analytical and experimental results show that higher output voltage from the energy harvester can be obtained with higher water temperature and frequency of the output voltage is limited to the dynamics of the SMA actuator. The voltage generated with the proposed energy harvester at the flow rate of 24 ml/s with the temperature of 70 °C is found to be 12 V. The harvester utilizes only the solar energy for its operation and hence the proposed design is a new addition to the area of energy harvesting using piezoelectric cantilever beam.

In this paper [2] we propose a new model of environment friendly solar-piezoelectric hybrid power plant that solely uses renewable energy to generate electricity and is capable of being practically implemented in railway stations. This model plant utilizes both photovoltaic panels which convert sunlight directly into electricity and piezoelectric pads which convert the mechanical stress exerted on it by moving train into electricity. In piezoelectric pads, lead zirconate titanate (PZT) is used. PZT can tolerate the extreme weight of the train and also accumulate fair amount of charge at the two opposite faces of the pad. The association of PV panels and piezoelectric pads increases the overall efficiency of the generation unit. We have taken Kamlapur Railway station, Bangladesh as a representative of a typical railway station. Nevertheless, this model is equally applicable to any typical railway station situated anywhere in the world and it can support the electricity demand of railway stations with high reliability and storage capacity.

In paper [3] pressure dependence of photovoltaic (PV) parameters in CdS/CdTe thin film solar cells, attributable to piezo-electric properties of the CdS layer. The significance of

this piezo-PV coupling is that it reveals the indispensable effects of internal pressure developing in the device as a result of its deposition, post-deposition treatments, lattice mismatches, and interfacial morphology. The static piezo-voltage induced by the internal pressure across the CdS layer in a device may be rather significant reaching several tenths of a volt. In addition to the recently reported effect of pressure perpendicular to the device surface, here we apply stress in lateral direction via bending the cells of two different configurations: on 3 mm glass superstrate and on flexible molybdenum (Mo) substrate. The observed reversible changes in major photovoltaic parameters are not small and can be related to the known strong piezoelectric effect in CdS. The effect of lateral stretching is found similar to that observed under pressure applied perpendicular to the film surface.

The main objective of this work [4] is to develop a Solar Piezo Hybrid Power Charging System which works in a well-organized manner with respect to Micro energy harvesting technology which is based on mechanical vibration, mechanical stress and strain, thermal energy from furnace, heaters and friction sources, sun light or room light, human body, chemical or biological sources, which can generate mW or W level power. Micro power supply needs is increasing greatly with time as our technology is moving to the micro and Nano fabrication levels. Our discussion on this is based on generating micro energy from vibration and pressure using piezoelectric material

Advancement in the field of technology in recent years [5], wireless data transmission techniques are commonly used in electronic devices. For powering them we rely upon power supply through wires charging, else power may be supplied from batteries. But while travelling for longer distances continuously we may not be able to obtain power supply for these devices to operate or to recharge their batteries. So in order to operate them continuously we need a power source that provides continuous energy to operate these devices. The mechanical vibrations which are produced by the automobiles can be utilized as a source of energy for generating electrical energy that can be utilized by this electronic equipment to operate. These vibrations are produced by different vehicles around us which are going as a waste.

In this paper on the reference of various researches [1]-[5], we have developed a hybrid portable charging unit which consists of a piezosensors connected in parallel to each other. Due to their parallel connection, overall output of piezoelectric device is much higher in comparison to that series connection. Also, it enables a regular electricity generation in case if any one stops working due to outside fault or any other similar reason. In addition to this, we have a attached a solar panel of 5V attached with a smart tracking system so to enable charging all the day with different positions of sun during day.

3. PROPOSED SCHEME

Our model mainly consists of following components :-

- Piezo-Sensors
- Smart Solar Tracking System
- ATMEGA-328 µc
- Voltage Regulators
- Batteries
- Inverter
- Motor Driver L293d

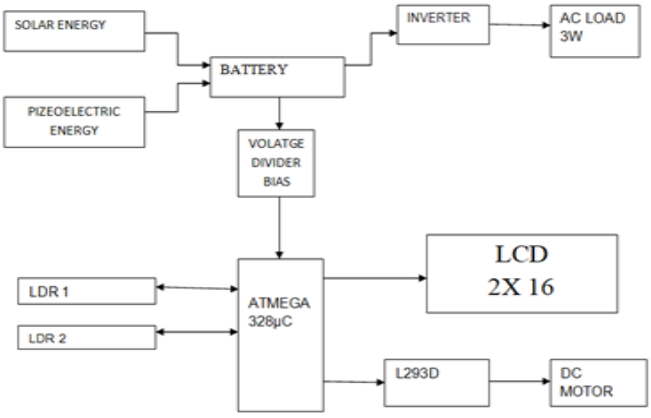
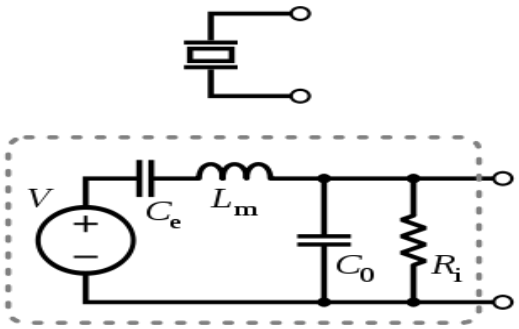


Fig.1 Block Diagram

A. Piezo Sensor

A piezo sensor is a gadget that deals with the guideline of piezoelectric impact. It gauges changes in weight , increasing speed, temperature , strain or power and after that change over them to an electric charge. A piezoelectric transducer has high DC yield impedance that can be demonstrated as a relative voltage source and channel organize. The voltage V at the source is specifically relative to the connected power, weight, or strain. The yield flag is then identified with this mechanical power as though it had gone through the proportional circuit. In our venture we have utilized buzzer type piezo sensor as its cost is low when contrasted with other and furthermore its yield is generally high when contrasted with other.



In our project , we have utilized buzzer type piezo sensor as its cost is low when contrasted with other and furthermore its yield is moderately high when contrasted with other.

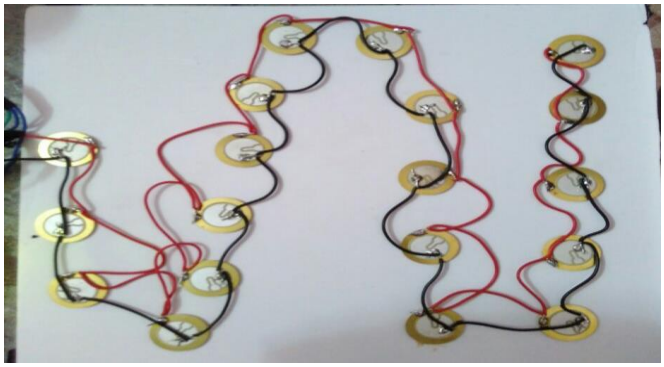


Fig. 2 Parallel Connection of Buzzer

B. Smart Solar Tracking System:-

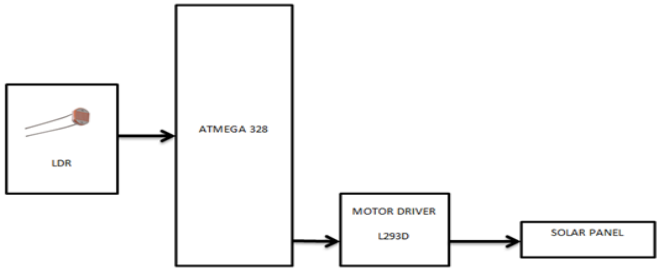


Fig -3 Solar Tracking System

The above fig. appeared above demonstrates the Single Axis Tracking System, in which single hub tracker with one level of opportunity takes after the sun's development from east to west amid day time. The control calculation are executed in an ATMEGA328 µc .The light ward resistors (LDR) are used to detect the sun's position and an input mistake flag was then created to the control framework to constantly screen the most extreme sunlight based radiation on the pv board. The LDR that is utilized as a part of it is a resistor whose protection diminishes with expanding episode light power, and this data is then passed to the light correlation unit. The yield from the light examination unit goes to the contribution of the microcontroller which decides the course of the development of the engine with the assistance of engine driver L293D (utilized for change of double into mechanical information) in both bearing so accordingly the sun's pillar or radiation keep up to stay lined up with the sun powered board.

C. ATMEGA-328 µc:-

The Atmel ATMEGA328 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications. AVR family has a GCC based IDE that is free for whole range of their processors. AVR is an 8-bit CPU and on the same clock it is 4 times faster then 8-bit PIC and 12 times faster then 8051. ARM is 32-bit, so this family µc are more powerful and much more power hungry. However AVR family µc consumes less power and provides greater battery life. So in our Hybrid generation system we used this µc.

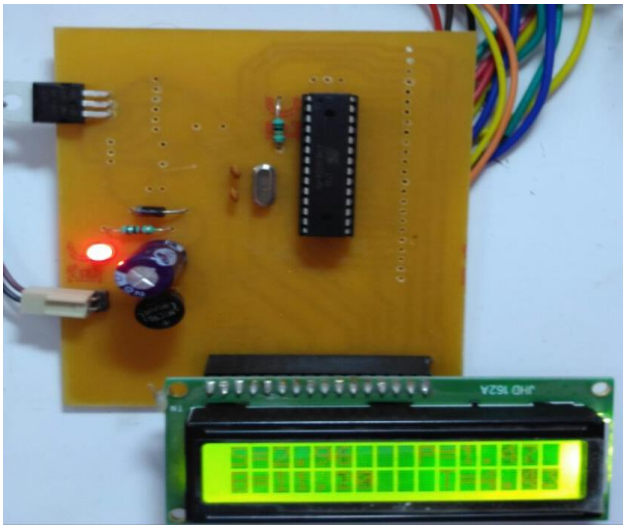


Fig 4. ATMEGA-328 µc Kit

D. Voltage Regulators:-

Voltage regulator is utilized to direct voltage level. At the point when a relentless, solid voltage is required, at that point voltage controller is the favored gadget. It produces a settled yield voltage that remaining parts consistent for any adjustments in an information voltage or load conditions. It goes about as a support for shielding parts from harms. Most regular voltage controller is of arrangement 78xx (some of the time L78xx, LM78xx,MC78xx..) which is a group of independent settled straight voltage controller incorporated circuit.

E. Batteries :-

The batteries in the system provide to store the electricity that is generated from the Hybrid energy system. Any required capacity can be obtained by serial or parallel connections of the batteries. It is connected to the the bidirectional polarity controller for its protection and implemented with solar tracking system in order to provide operation of the tracker

Fig 5. Batteries

F. Inverter:-

Energy stored in the battery is drawn by electrical loads through the inverter, which converts DC power into AC power. The inverter has in-built protection for Short-Circuit; Reverse Polarity, Low Battery Voltage and Over Load

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G. Motor Driver L293d:-

The L293D is a 16-PIN Motor Driver IC which can control an arrangement of two DC engines at the same time toward any path. The L293D is intended to give bidirectional drive streams of up to 600 mA (per channel) at voltages from 4.5 V to 36 V (8 PIN). Engine drivers go about as ebb and flow enhancers since they take a low-momentum control flag and give a higher-ebb and flow flag. This higher current flag is utilized to drive the engines.

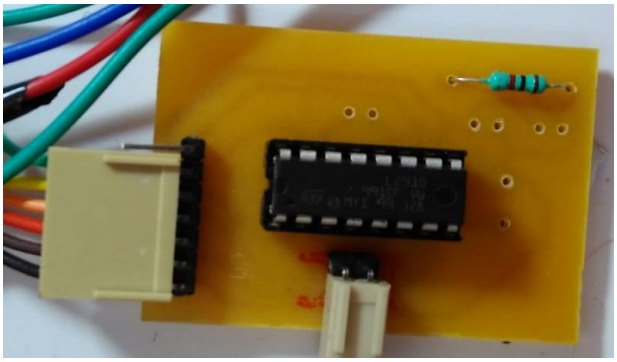

Fig 6. Motor Driver L293D

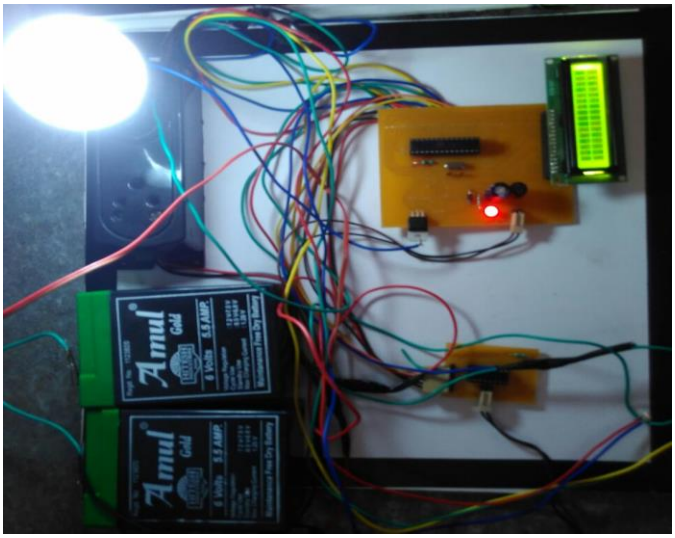

Fig 7. Working Kit

Fig 8. Portable Solar Tracking System

3. SYSTEM SCOPE

3.1 Advantages.

- Its working expense is zero as it doesn't expend fuel or materials
- It can create control just by basic mechanical vibration, sounds and development.
- It is Self-producing i.e no outer power is required.
- Being convenient, it can be moved anyplace according to prerequisite.
- It is ecofriendly.

3.2 Limitations.

- It piezosensor produce comparatively low power.

4. CONCLUSION

The motivation behind this task is to dispense with the issue of low power required for activities like charging, shining low controlled knobs. It can be extremely helpful for the zones which has deficiency of energy uniquely remote zones. Besides, being portable,it can be additionally be utilized while travelling.

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