A

REPORT ON

"TRAIN POWER GENERTION"

(INFORMATIVE REPORT)

2017-2018

SUBMITTED BY:

STUDENT OF FINAL YEAR **ELECTRICAL**

UNDER THE GUIDANCE OF

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DEPARTMENT OF ELECTRICAL ENGINEERING

Anjuman-I-Islam

KALSEKAR TECHNICAL CAMPUS

School of Engineering and Technology

New Panvel

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DECLARATION

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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PREFACE

We take the opportunity to present this report **"TRAIN POWER GENERATION".** The object of this report is to make a with low Train Power Generation cost.

The report is supported by images to bring out the purpose and message. We have made sincere attempts and taken every care to present this report in precise and compact form, the language being as simple as possible.

The task of completion of the project though being difficulty was made quite simple, interesting and successful due to deep involvement and complete dedication of our group members.

ACKNOWLEDGEMENT

We would like to acknowledge the contributions of those who assisted in the preparation of this report.

We are particularly grateful for the work done by members of my group. Before we get into this report we would like to thanks to the members of the group who are a part of this report and have given their unending contribution from start to end of this report.

We would like to our **Prof. RIZWAN FARADE** for providing as the required guidance in process of preparing the report. We would also like to express our deep regards and gratitude to the director **Dr. ABDUL RAZZAK HONNUTAGI**.

We would like to express our gratitude towards our parents for their kind co-operation and encouragement which help us in completion of this project.

We have taken lots of efforts in this project. However, it would not have been possible without the kind support and help of many individuals and organizations. We would like to extend our sincere thanks to all of them.

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ABSTRACT

In India power required for train is near about 2.5% of total demand of power. When the train is at running condition because of un leveling of the track the bogies are continuously having upward and downward motion. It is observed that there is relative upward and downward motion happens within two bogies. Therefore if we use this relative motion for the generation of electricity without affecting the input of train (electrical or mechanical) with this we can make one mechanism which firstly convert this relative motion into rotational motion. This mechanism doesn't have effect of length of displacement of bogies in upward and downward direction as well as rotational motion obtained from this mechanism is unidirectional whose speed of rotational are generally depends on rate of movements of bogies in upward and downward direction and not on the length of displacement of bogies. In this way both the movements that is upward and downward movements can be used for generation of electrical power. The obtained speed of rotational motion is converted to the rated speed of generator by means of gearbox. Once receiving this rotational (mechanical) energy generator converts it into electrical energy.

A method for generating electricity using high wind pressure generated by fast moving vehicles channeling the induced wind in the direction of the wind turbine; converting the energy of the wind into mechanical energy by using wind turbine; and converting the mechanical energy into electrical energy by using a generating device and can be used for applications.

CHAPTER 1: INTRODUCTION

In India on power (electricity) front it is observed that there has been always a Shortage of 7 percent to 8 percent between demand and supply. The present power position of the country during the year 2010-11, requirement was 1, 27,165 MW & the supply was 1, 14,686 MW, has deficient of 12,479 MW. Fossil fuel based thermal power, hydro-electric, and nuclear constitute the conventional sources of power.

Nonconventional sources are less than 5% of total installed capacity in India. The present installed capacity (as in 2011) is about 1, 81, 000 MW, consisting of coal based plants (56%), gas based plants (10%), hydro-electric (26%), nuclear (3%), non-conventional (5%). From the figures it is observed that there is large dependence on fossil fuels for production of energy compared to renewable sources. This acute shortage of energy in the country leads to energy crisis which results in frequent load shedding, power failure, closure of factories, man-hour loss and decrease in production. Part of the problem is related to the insufficient energy resources leading to the shortage in supply which is not able to meet the growing demands of power in the rapidly expanding industrial, transport, agricultural and urban sectors.

Energy conservation can be termed as a new source of energy. Energy conservation refers to efforts made to reduce energy consumption. Electrical energy in railways is needed for feeding Coach lighting, fans, mobile and laptop charger, air conditioning equipment, pumping, hot plates, bottle coolers, water boiler, refrigerators, battery charger for emergency light, radiator motor. So that it requires a large amount of energy. The power consumption of the Indian Railways is around 2.5 percent of the country's total electricity consumption. It is estimated that the railway sector's demand for electricity will grow by seven percent annually. By 2020, the Indian

Railways will have a projected energy demand of 37,500 million kilowatt hour (kWh). While there is tremendous scope to adopt energy-efficient practices for bringing down energy consumption in the Indian Railways. & have to use various methods for power generation in train itself. In our project electricity is generated by using relative motion between the two coaches of a train. Generated energy can be utilized for supplying the lighting load & fan loads. This is an independent system & do not have any effect on train input. The required mechanical energy for its operation is obtained from relative movement of bogies of train. This serve as a measure of energy conservation in railways by reducing the consumption of energy obtained from conventional sources.

BACKGROUND

Train services on the basis of power supply arrangement for lighting load can be classified as follows. Power requirement varies for type of coach being used, and is maximum for air conditioned coach.

In this system two alternators are suspended from a bracket welded on bogie transform and driven by two axle mounted pulleys by means of a set of „V‟ belt drive system. The alternators have double ended shafts with deep „V‟ groove pulley at both ends which are driven by two axle mounted pulleys by means of a set of endless V-belts of „C‟ section. The belts are rubber reinforced with polyester cord and are of low stretch type. The three phase output from the alternators are brought out from bogie area by means of conduits to the rectifier regulator, which are suspended from the under frame. The DC o/p of generator is paralleled with the battery. A rotary switch in the power panel enables isolation of any one of the alternator in case of defect or fault. In order to provide for battery charging at the terminal stations or during pre-cooling, coaches are provided with one 200A capacity battery charger.

This battery charger takes 415V shore supply through special battery charging sockets mounted diagonally one on each end wall. The battery charger consists of a transformer and a simple diode bridge rectifier. The secondary of transformer is provided with tap changing arrangements which enable control of dc o/p voltage from 104 V to 140 V dc.

ADVANTAGES OF NEW INVENTED SCHEME

1) The required mechanical energy is derived from relatives motion of bogies which otherwise wasted.

2) This is independent scheme, do not have any effect on input of train.

3) System does not produce pollution & noise.

4) Will requires less number of electrical staff compare to conventional methods.

5) Helps to improve smooth running of train.

CHAPTER 2: DESIGNING STEP

CHAPTER 2.1: LITERATURE SURVEY

2.1.1 SURVEY ON SOLAR

ABSTRACT

This paper implements an efficient way to power generation system, using solar power. Solar energy system is used to collect maximum power from sun. This proposal is to use the solar panels implemented in this project more efficiently and to carry out a realistic experimental approach to enhance the solar output power to a significant level and piezoelectric energy harvesting circuit. In this paper, piezoelectric-based energy harvesting technology is applied to generate electricity from mechanical stress (vibrations). Using piezoelectric material to harvest vibration energy from humans walking, machinery vibrating, or cars moving on a roadway is an area of great interest, because this vibration energy is otherwise untapped. Since movement is everywhere, the ability to capture this energy cheaply would be a significant advancement toward greater efficiency and cleaner energy production. The goal of this experiment is to investigate whether piezoelectricity would be able to provide sufficient source of voltage to charge the parent battery in case of rainy or cloudy days. . This configuration allows the two sources to supply the load separately or simultaneously depending on the availability of the energy sources. This paper implements an efficient way to electrify or generate electricity using solar power and piezoelectric energy harvesting circuit.

CONCLUSION

In this study, we have investigated the feasibility of applying piezoelectricity to convert the mechanical vibrations of roadway to useful electricity. We have also investigated the practicability of employing solar concentrators to enhance the output power of the solar panel to a considerable level. We hope that our proposal towards an efficient way to electrify the streets of all the city corporations under the prevailing.
“Solar Photovoltaic-Powered LED Street Lighting” project will help to more effectively implement the project within the budget and thereby reducing pressure on conventional power use and current generation.

2.1.2 SURVEY ON WIND

ABSTRACT

Wind Energy is a renewable source of energy. Today, the output power from wind turbines can be utilized in two ways, either by direct use of the mechanical shaft power (through a gearing ratio) or by letting the wind turbine power an electrical generator, and utilizing the generated power as electrical power. Recent advances in the wind energy harnessing techniques have revealed many modern applications [*Anderson, 2007*]. Battery charging at remote telecommunication stations, domestic heating and lighting, hybrid systems, where a generator is run by diesel are few common examples in the present scenario. It is widely accepted fact that we need to switch on to the non-conventional energy sources. This paper brings a new possibility for the utilization of the wind generated power, for various electrical components inside a typical railway train through the batteries charged by the wind energy harnessed by a series of wind turbines mounted at the top of the train coaches. This paper deals with the design and development of a wind turbine system with a concept of generation of electricity as an auxiliary source in the train.

Conclusion

1. The wind energy harnessed from the proposed wind-turbine system can be used for lightening up all the tube-lights, leaving an additional calculated 123W energy, which can be used to run the fans, or as an input to other devices like mobile chargers and night lamps.
2. The harnessed energy is an un-interrupted supply of energy which continues to work even when the diesel-battery system fails.
3. The proposed system as an auxiliary source of energy proves to be important at the times of emergency and accidental hazards when the main supply cuts off. This will add to the safety of the passengers, as well as the property of the railways.
4. The charged batteries from the stationary coaches at the time of cleaning of the train, can be used to run the cleaning devices.

2.1.3 SURVEY ON PIEZO

Abstract

With piezo ceramic materials, it is possible to harvest power from vibrating structures. It has been proven that micro- to milli watts of power can be generated from vibrating systems. We develop definitive, analytical models to predict the power generated from a cantilever beam and cantilever plate. Harmonic oscillations and random noise will be the two different forcing functions used to drive each system. The predictive models are validated by being compared to experimental data. A parametric study is also performed in an attempt to optimize the cantilever beam system's power generation capability.

Conclusion

Our project, ‟Generation of electricity using relative motion between two bogies of a train‟‟‟ is a sincere approach towards energy conservation in train by providing, an alternative source of energy for train lighting. Thus reducing the dependence on conventional schemes for train lighting which is an important aspect of Indian railways.

The relative motion of the bogies of train which is being wasted until now. This waste energy is utilized in our mechanism for driving the generator. There by generating electricity from the relative motion. So that it can also be called as a renewable source of energy.

From economic point of view this project is most advantageous than present conventional schemes used in Indian railways.

The involvement of this project in Indian railways solve the problem of energy crisis & conservation presently faced by them.

CHAPTER 3: WORKING

CHAPTER 3.1: PROJECT BLOCK DIAGRAM

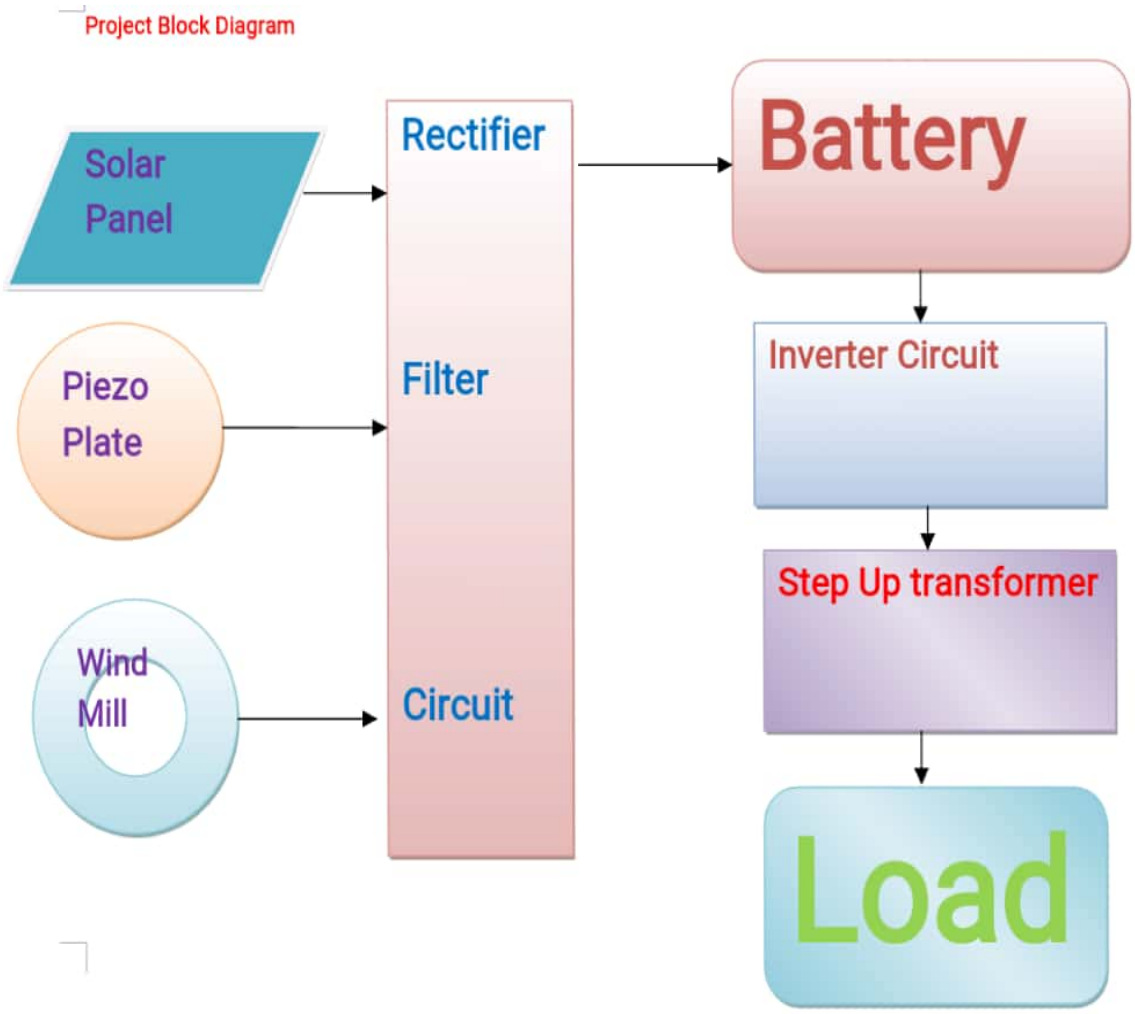


Fig. 1 Block Diagram of Train Power Generation

CHAPTER 3.2: SOLAR GENERATION

Solar energy is unsurpassed by any other form of energy. Solar energy was originally coming from sun. Solar cells convert this solar radiation into useful electrical energy and store them in storage such as batteries, but in these cases, it will directly converted to be used for competition.
Solar radiation strikes the earth surface and creates the paramount source of alternative energy. Solar panels help to harvest this energy and convert it into usable energy.
Solar is an intermittent power source that functions only when the sun is shining. Solar cells or photovoltaic cells are arranged in a grid like pattern on the surface of the solar panel. These solar voltaic cells collect sunlight during the daylight hours and convert it into electricity.

The term "photovoltaic" comes from the Greek (*phōs*) meaning "light", and from "Volt", the unit of electro-motive force, the volt, which in turn comes from the last name of the Italian physicist Alessandro Volta, inventor of the battery (electrochemical cell). The term "photo-voltaic" has been in use in English.

Photovoltaics is the field of technology and research related to the practical application of photovoltaic cells in producing electricity from light, though it is often used specifically to refer to the generation of electricity from sunlight. Cells can be described as photovoltaic even when the light source is not necessarily sunlight (lamplight, artificial light, etc.). In such cases the cell is sometimes used as a photodetector (for example infrared detectors), detecting light or other electromagnetic radiation near the visible range, or measuring light intensity.

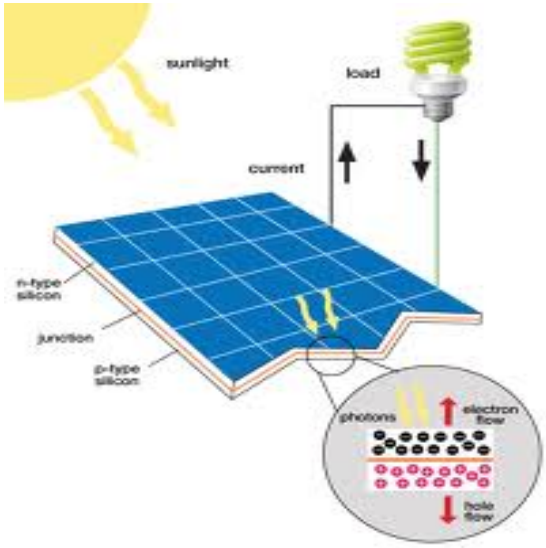


Fig.2 Basic Block Diagram of Solar Panel

The operation of a photovoltaic (PV) cell requires 3 basic attributes:

1. The absorption of light, generating either electron-hole pairs or excitons.
2. The separation of charge carriers of opposite types.
3. The separate extraction of those carriers to an external circuit

In contrast, a solar thermal collector collects heat by absorbing sunlight, for the purpose of either direct heating or indirect electrical power generation. "Photo electrolytic cell" (photoelectrochemical cell), on the other hand, refers either a type of photovoltaic cell (like that developed by A.E. Becquerel and modern dye-sensitized solar cells) or a device that splits water directly into hydrogen and oxygen using only solar illumination.

CHAPTER 3.3: WIND GENERATION

The kinetic energy of the wind movement thus created can be used to generate electricity. The moving vehicles encounters wind may be railway trains or airplanes, will sweep off it, in a faster manner making heavy winds. During this, when a wind turbine, if fit to the moving vehicle will generate adequate amount of energy. The air flow will cause turbine to rotate and thus electricity can be produced.

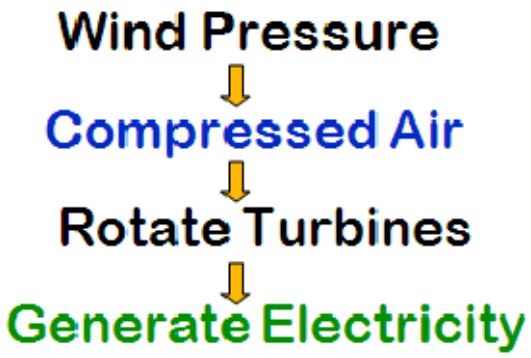


Fig 3. Flow Chart of Wind Generation

If the wind is properly directed towards the wind turbine blades, optimum electricity may be generated. The desired direction of wind is obtained by a means for channeling wind, in the direction of the wind turbine. Channeling of wind in a desired direction may be obtained by, at least one truncated cone or pyramid shaped housing or a pair of planar members converging towards the blades of the wind turbine.

Aerodynamics is the science and study of the physical laws of the behavior of objects in an air flow and the forces that are produced by air flows. The shape of the aerodynamic profile is decisive for blade performance. Even minor alterations in the shape of the profile can greatly alter the power curve and noise level. Therefore a blade designer does not merely sit down and outline the shape when designing a new blade.

The wind turbine will start to rotate very slowly at first, but as it gathers speed it begins to accelerate faster and faster. The change from slow to fast acceleration is a sign that the blade's aerodynamic shape comes into play, and that the lift greatly increases when the blade meets the head wind of its own movement. The fast acceleration, near the wind turbine's operational rotational speed, places great demands on the electrical cut in system that must capture and engage the wind turbine without releasing excessive peak electrical loads to the grid.

CHAPTER 3.4: PIEZO GENERATION

The constructed a piezo-generator that transforms mechanical impact energy to electrical energy by using a steel ball which impacts the generator. The steel ball is initially 5*mm* above a bronze disk (27*mm* in diameter and 0.*25mm* thick). The ball falls and strikes the center of the disk producing a bending vibration. The ball continues to bounce on the disk till it stops. The piezo patch converts the vibrational energy of the bouncing ball to electrical energy and stores a voltage in a capacitor. They performed analyses on two things. The first case was on the first impact. The second case was on multiple impacts from the ball. For the first case, higher voltage and capacitance affects the generator. A higher voltage decreases the time during which the current flows. If the capacitance is small, the voltage will go up quickly, limiting the time current will flow. On the other hand, if the capacitance is large, it takes time for the voltage to build up and allows the current to flow for more time. For the second case, the capacitance affects multiple impacts the same way it does for a single impact. As the initial voltage increases, the charge decreases for each capacitance. The achieved a maximum efficiency of 35% which is over three times higher than a solar cell.

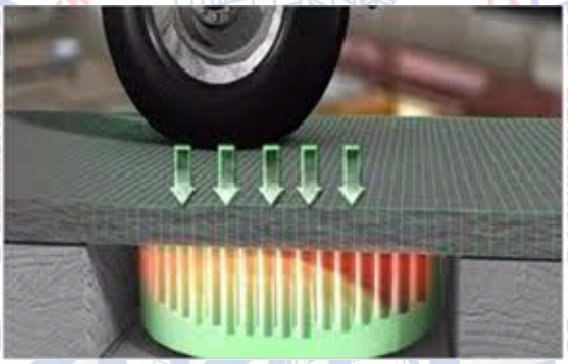


Fig 4. Arrangement of Piezo Plate

They calculate that at dropping the ball from a height of *20mm*, the steel ball had 67.5% of its kinetic energy after the bounce. So, in order to harvest that unused energy, they conclude that the ball would need to stay in contact and not bounce off of the plate. A simulation of this gives a maximum efficiency of 52%. Keeping the ball from bouncing would be difficult and impractical, but internal inertia of the generator, if accelerated and stopped quickly, would be similar. They discover several things: the waveform of output voltage is changed by the load resistance, an optimum value exists for the load resistance which gives the maximum efficiency, much of the mechanical impact energy is transferred to the steel ball after the bounce as kinetic energy, the output energy to the load resistance will increase if the steel ball does not bounce off and vibrates with the transducer until the vibration stops. The efficiency increases if the mechanical quality factor increases, the electromechanical coupling coefficient increases and the dielectric loss decreases.

CHAPTER 3.5: POWER SUPPLY DESIGN

Power supply is the first and the most important part of our project. For our project we require +5V regulated power supply with maximum current rating 500Ma.

Following basic building blocks are required to generate regulated power supply.

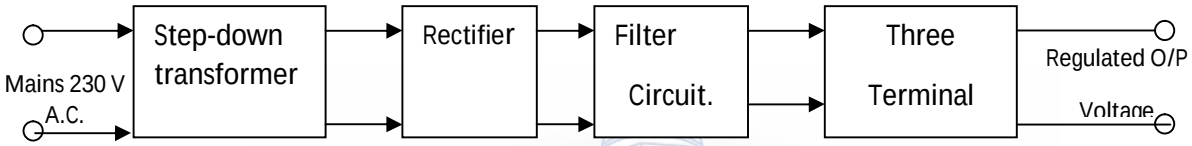


FIGURE 5 BLOCK DIAGRAM OF POWER SUPPLY

3.5.1 Step down Transformer:-

Step down transformer is the first part of regulated power supply. To step down the mains 230V A.C. we require step down transformer. Following are the main characteristic of electronic transformer.

1) Power transformers are usually designed to operate from source of low impedance at a single freq.
2) It is required to construct with sufficient insulation of necessary dielectric strength.
3) Transformer ratings are expressed in volt–amp. The volt-amp of each secondary winding or windings are added for the total secondary VA. To this are added the load losses.
4) Temperature rise of a transformer is decided on two well-known factors i.e. losses on transformer and heat dissipating or cooling facility provided unit.

3.5.2 Rectifier Unit:-

Rectifier unit is a circuit. Which converts A.C. into pulsating D.C. Generally semi-conducting diode is used as rectifying element due to its property of conducting current in one direction only. Generally there are two types of rectifier.

1) Half wave rectifier
2) Full wave rectifier.

In half wave rectifier only half cycle of mains A.C. is rectified so its efficiency is very poor. So we use full wave bridge type rectifier, in which four diodes are used. In each half cycle, two diodes conduct at a time and we get maximum efficiency at o/p.

Following are the main advantages and disadvantages of a full-wave bridge type rectifier circuit.

Advantages:

1) The need of center tapped transformer is eliminated.
2) The o/p is twice that of center tap circuit for the same secondary voltage.
3) The PIV rating of diode is half of the center tap circuit.

Disadvantages:

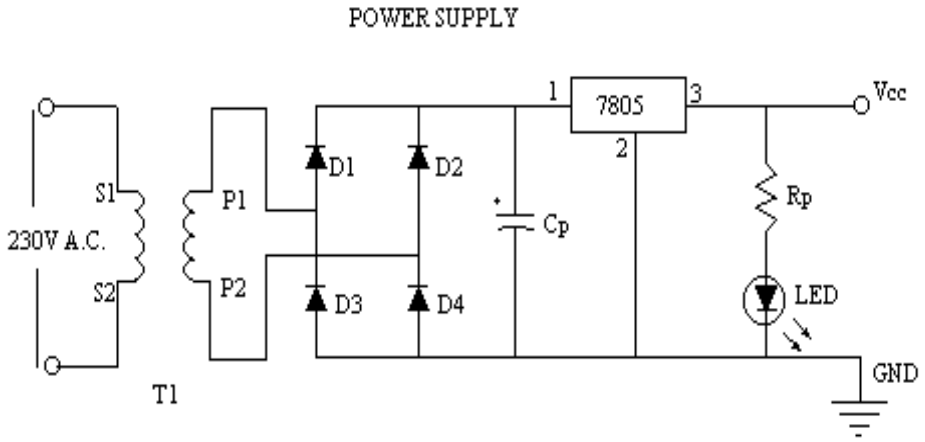
1) It requires four diodes.
2) As during each half cycle of A.C. input, two diodes are conducting therefore voltage drop in internal resistance of rectifying unit will be twice as compared to center tap circuit.

3.5.3 Filter Circuit:-

Generally a rectifier is required to produce pure D.C. supply for using at various places in the electronic circuit. However, the o/p of rectifier has pulsating character i.e. if such a D.C. is applied to electronic circuit it will produce a hum i.e. it will contain A.C. and D.C. components. The A.C. components are undesirable and must be kept away from the load. To do so a filter circuit is used which removes (or filters out) the A.C. components reaching the load. Obviously a filter circuit is installed between rectifier and voltage regulator. In our project we use capacitor filter because of its low cost, small size and little weight and good characteristic. Capacitors are connected in parallel to the rectifier o/p because it passes A.C. but does not pass D.C. at all.

Three terminal voltage regulator:-

A voltage regulator is a circuit. That supplies constant voltage regardless of change in load current. IC voltage regulators are versatile and relatively cheaper. The 7800 series consists of three terminal positive voltage regulator. These ICs are designed as fixed voltage regulator and with adequate heat sink, can deliver o/p current in excess of 1A. These devices do not require external component. This IC also has internal thermal overload protection and internal short circuit and current limiting protection. For our project we use 7805 voltage regulator IC.

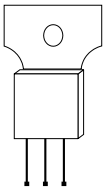


FIGIRE 5.1 POWER SUPPLY CIRCUIT

3.5.4 Design & Specification

The following information must be available to the designer before he commences for the design of transformer

1) Power Output.
2) Operating Voltage.
3) Frequency Range.
4) Efficiency and Regulation.



Specification

Available o/p D.C. Voltage = + 5V.

Line Regulation = 0.03

Load Regulation = 0.3

V_{in} maximum = 35 V

Ripple Rejection = 66-80 (dB)

CHAPTER 3.6: PASSIVE INFRARED SENSOR (PIR SENSOR)

A Passive Infrared sensor (PIR sensor) is an electronic device that measures infrared (IR) light radiating from objects in its field of view. PIR sensors are often used in the construction of PIR-based motion detectors .Apparent motion is detected when an infrared source with one temperature, such as a human, passes in front of an infrared source with another temperature, such as a wall.

All objects above absolute zero emit energy in the form of radiation. Usually infrared radiation is invisible to the human eye but can be detected by electronic devices designed for such a purpose. The term passive in this instance means that the PIR device does not emit an infrared beam but merely passively accepts incoming infrared radiation. “Infra” meaning below our ability to detect it visually, and “Red” because this color represents the lowest energy level that our eyes can sense before it becomes invisible. Thus, infrared means below the energy level of the color red,

Design

Infrared radiation enters through the front of the sensor, known as the sensor face. At the core of a PIR sensor is a solid state sensor or set of sensors, made from an approximately 1/4 inch square of natural or artificial pyroelectric materials, usually in the form of a thin film, out of gallium nitride (GaN), caesium nitrate (CsNO3), polyvinyl fluorides, derivatives of phenyl pyrazine, and cobalt phthalocyanine. Lithium tantalate (LiTaO3) is a crystal exhibiting both piezoelectric and pyroelectric properties.

The sensor is often manufactured as part of an integrated circuit and may consist of one (1), two (2) or four (4) 'pixels' of equal areas of the pyroelectric material. Pairs of the sensor pixels may be wired as opposite inputs to a differential amplifier. In such a configuration, the PIR measurements cancel each other so that the average temperature of the field of view is removed from the electrical signal; an increase of IR energy across the entire sensor is self-cancelling and will not trigger the device. This allows the device to resist false indications of change in the event of being exposed to flashes of light or field-wide illumination. (Continuous bright light could still saturate the sensor materials and render the sensor unable to register further information.) At the same time, this differential arrangement minimizes common-mode interference, allowing the device to resist triggering due to nearby electric fields. However, a differential pair of sensors cannot measure temperature in that configuration and therefore this configuration is specialized for motion detectors.

In a PIR-based motion detector (usually called a PID, for Passive Infrared Detector), the PIR sensor is typically mounted on a printed circuit board containing the necessary electronics required to interpret the signals from the pyroelectric sensor chip. The complete assembly is contained within a housing mounted in a location where the

sensor can view the area to be monitored. Infrared energy is able to reach the pyroelectric sensor through the window because the plastic used is transparent to infrared radiation (but only translucent to visible light). This plastic sheet also prevents the intrusion of dust and/or insects from obscuring the sensor's field of view, and in the case of insects, from generating false alarms.

A few mechanisms have been used to focus the distant infrared energy onto the sensor surface. The window may have multiple Fresnel lenses molded into it.

Multi-Fresnel lens type of PID

Fig 6. Typical residential and/or commercial PID with multi-Fresnel lens cover

Fig 6.2 PID front cover only with point light source behind to show individual lenses.

Fig 6.3 PID with front cover removed showing location of pyroelectric sensor.

Alternatively, some PIDs are manufactured with internal plastic, segmented parabolic mirrors to focus the infrared energy. Where mirrors are used, the plastic window cover has no Fresnel lenses molded into it. This filtering window may be used to limit the wavelengths to 8-14 micrometer's which is closest to the infrared radiation emitted by humans (9.4 micrometer's being the strongest).

The PID can be thought of as a kind of infrared camera that remembers the amount of infrared energy focused on its surface. Once power is applied to the PID, the electronics in the PID shortly settle into a quiescent state and energize a small relay. This relay controls a set of electrical contacts that are usually connected to the detection input of a burglar alarm control panel. If the amount of infrared energy focused on the pyroelectric sensor changes within a configured time period, the device will switch the state of the alarm relay. The alarm relay is typically a "normally closed (NC)" relay, also known as a "Form B" relay.

A person entering a monitored area is detected when the infrared energy emitted from the intruder's body is focused by a Fresnel lens or a mirror segment and overlaps a section on the chip that had previously been looking at some much cooler part of the protected area. That portion of the chip is now much warmer than when the intruder wasn't there. As the intruder moves, so does the hot spot on the surface of the chip. This moving hot spot causes the electronics connected to the chip to de-energize the relay, operating its contacts, thereby activating the detection input on the alarm control panel. Conversely, if an intruder were to try to defeat a PID, perhaps by holding some sort of thermal shield between himself and the PID, a corresponding 'cold' spot moving across the face of the chip will also cause the relay to de-energize — unless the thermal shield has the same temperature as the objects behind it.

Manufacturers recommend careful placement of their products to prevent false (non-intruder caused) alarms. They suggest mounting the PIDs in such a way that the PID cannot 'see' out of a window. Although the wavelength of infrared radiation to which the chips are sensitive does not penetrate glass very well, a strong infrared source such as from a vehicle headlight or sunlight reflecting from a vehicle window can overload the chip with enough infrared energy to fool the electronics and cause a false alarm. A person moving on the other side of the glass however would not be 'seen' by the PID.

They also recommended that the PID not be placed in such a position that an HVAC vent would blow hot or cold air onto the surface of the plastic which covers the housing's window. Although air has very low emissivity (emits very small amounts of infrared energy), the air blowing on the plastic window cover could change the plastic's temperature enough to, once again, fool the electronics.

PIDs come in many configurations for a wide variety of applications. The most common, used in home security systems, have numerous Fresnel lenses or mirror segments and an effective range of about thirty feet. Some larger PIDs are made with single segment mirrors and can sense changes in infrared energy over one hundred feet away from the PID. There are also PIDs designed with reversible orientation mirrors which allow either broad coverage (110° wide) or very narrow 'curtain' coverage.

CHAPTER 3.7: CIRCUIT DIAGRAM

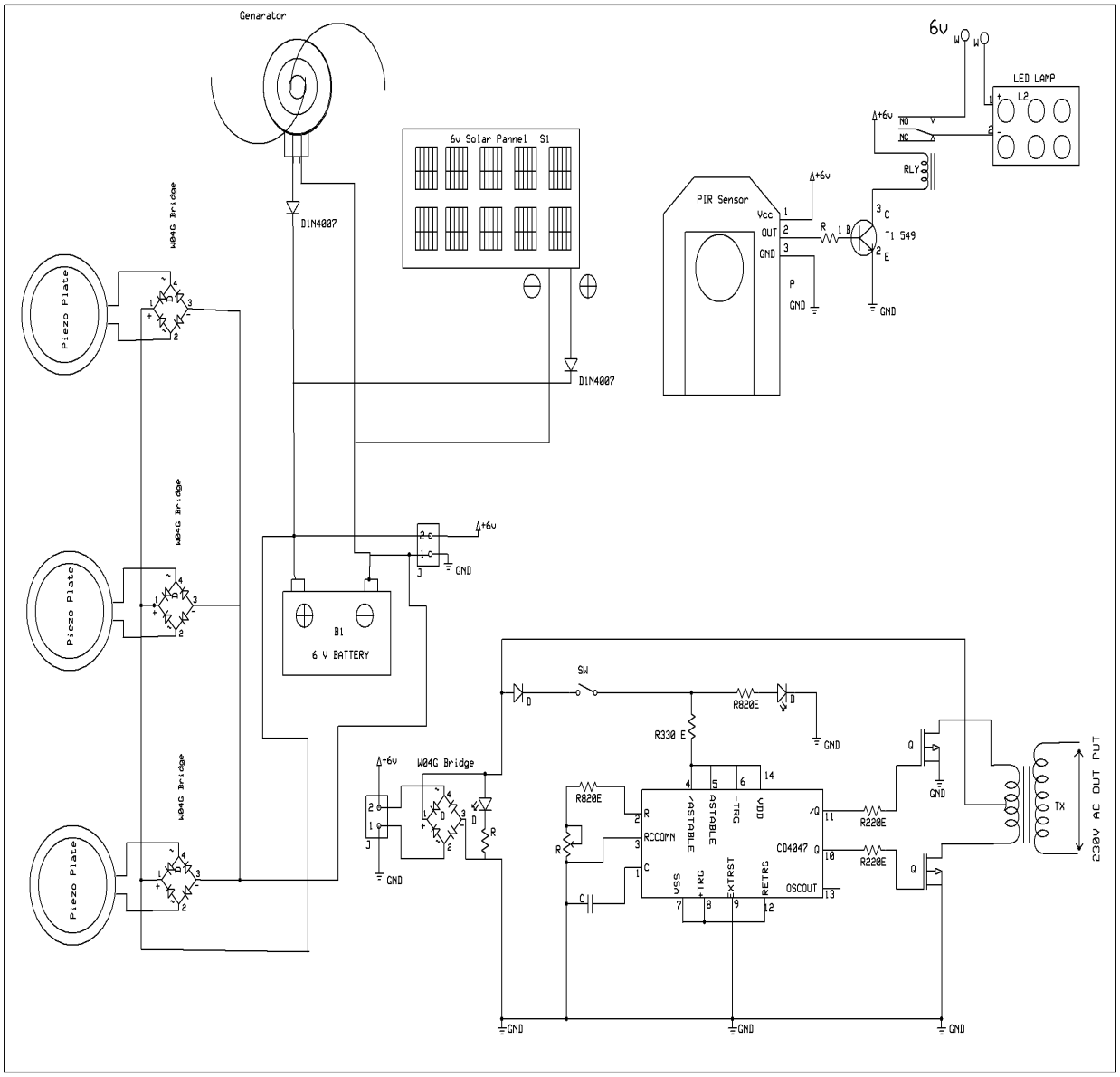


Fig 7. Circuit Diagram of Train Power Generation

CHAPTER 4: ANALYSIS AND RESULT

CHARGING TIME

Total Power Generated = 6watt

Battery Voltage Rating = 6 volt

Total Battery Current = 4.5A

Formula of power (P) = volt (V)* Current (I)

Current (I) = P / V

= 6 /6

Total Current (I) = 1 Amp

Formula for Time = Total Battery Current/ Total Current

= 4.5 AH / 1A

= 4.5 Hrs.

Hence the battery Require 4.5 hrs for full Charging

DISCHARGING TIME

Total Power Generated = 6watt

Battery Voltage Rating = 6 volt

Total Battery Current = 4.5A

Formula of power (P) = volt (V)* Current (I)

Current (I) = P / V

= 6 /6

Total Current (I) = 1 Amp

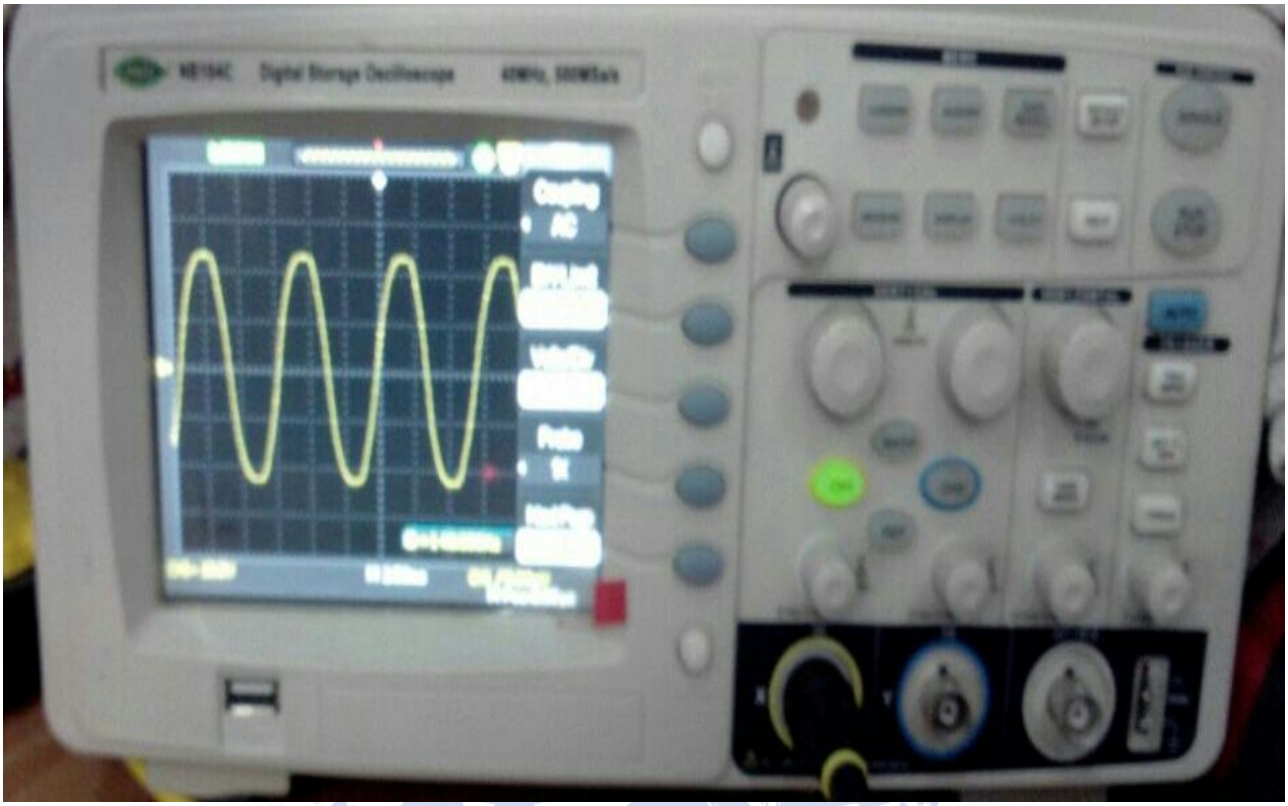
Formula for Time = Total Battery Current/ Total Current

= 4.5 AH / 1A

= 4.5 Hrs.

Total Backup Time is 4.5 hrs.

FINAL OUTPUT WAVEFORM



CHAPTER 5: TESTING & TROUBLESHOOTING

Before you apply power, read the instructions carefully to check you haven't missed anything, and whether there are any specific instructions for switching on and testing. Check again that you have all polarity sensitive components the right way around, and that all components are in the correct places. Check off - board components are connected correctly. Check the underside of the board carefully for short circuits between tracks - a common reason for circuits failing to work.

When you are sure everything is correct, apply power and see if the circuit behaves as expected, again following the kit manufacturer’s instructions.

If it works, WELL DONE! You have your first working circuit - be proud of it! Skip the rest of this page and click the right arrow at the bottom, or here.

If it doesn't quite work as expected, or doesn't work at all, don't despair. The chances are the fault is quite simple. However, disconnect the power before reading on.

Check the basic's first - is the battery flat? Are you sure the 'On' switch really is on? (Don't laugh, it's easily done) If the project has other switches and controls check these are set correctly.

Next - check again all the components are in the correct place - refer to the diagram in the instructions. Look again at the underside of the board - are there any short circuits? These can be caused by almost invisible 'whiskers' of solder, so check for these with a magnifying glass in good light. Brushing the bottom of the board vigorously with a stiff brush can sometimes remove these.

Pull the components gently to see if they are all fixed into the board properly. Check the soldered joints - poor soldering is the most common cause of circuits failing to work. The joints should by shiny, and those on the circuit board should be volcano shaped with the component wire end sticking out of the top. If any look suspect then redo them. Remove the solder with a solder sucker or braid and try again.

Check for solder splashes shorting across adjacent tracks on the circuit board, especially where connections are very close such as on integrated circuits ('chips'). Solder splashes are most likely on stripboard. You can check for shorts using a multimeter set it to its continuity range, or low resistance range. Be aware if you do this though, that there will be a resistance between some tracks due to the components. Any resistance below 1 ohm between tracks is likely to be a solder splash. Run the soldering iron between tracks on stripboard to remove any solder bridges.

If the circuit still fails to work you will need to refer to the circuit diagram and take voltage readings from the circuit to find out what's wrong. You will need a multimeter to do this (see tools). Remember that if you find one fault such as a reversed component and correct it, it might have caused damage to other components.

Beginners Guide - More Tools & Test Equipment

To design your own circuits, or build more complex kits, you will probably need more in the way of tools and test equipment. If you did not buy a multimeter before then this is essential now, a basic power supply is also very useful. More expensive items such as an oscilloscope can be useful, but think carefully about whether you really need them - after all, you can build a lot of projects for the price of an oscilloscope. PC-based virtual instruments could perhaps be more suitable. Other tools can be useful too.

Here is a list of other useful items, although this by no means covers all the tools and equipment available. Maplin codes are included, however similar items are available from most suppliers.

Tools:

Helping Hands - Useful for holding PCB's, connectors etc. while you solder them. Also normally have a magnifying glass to help see small components. Can save hours of aggravation! Maplin code YK53H A small vice can also be useful and provides a more rigid mounting than a Helping Hands.

Pearl Catcher - Useful for the retrieving those screws that inevitably fall into the most inaccessible corner of a project! Maplin code BK43W

Heat Shunt - an inexpensive item for soldering heat sensitive devices. Clipped onto the component lead between the joint and the component it will soak up the heat to save you melting your components. As you get faster at soldering you probably won't need it so much. Maplin code FR10L

RCD Circuit Breaker - If you start building mains projects (only do this when you are more experienced and are aware of the safety requirements) then one of these is ESSENTIAL. It could also prevent a shock if you accidentally melt through the soldering iron flex. These are sold very cheaply in most electrical shops. Well worth the price, although check if you building wiring is already protected by an RCD in the consumer unit first.

Breadboard - If you want to test a circuit without soldering it together permanently then these are useful. Just push the wires into holes joined by metal strips to build the circuit. If the circuit doesn't work, you can easily make changes. Different sizes are available, e.g. Maplin code AG10L

Other items - Other sizes of screwdriver, 0.5Kg reel of solder, tool roll or box etc.

Test Equipment:

Multimeter - almost essential for all but the absolute beginner. See the tools section for more information.

Power Supply - Also very useful for powering circuits that you are testing. One with a variable voltage up to at least 12V is best. The current rating doesn't need to be that high, 1A maximum is fine for most jobs. If you can afford it then one with an adjustable current limit is useful - set right it can prevent damage to an incorrect circuit, rather than frying it instantly!

Oscilloscope - Quite expensive and not really worth it for all but the advanced constructor. Nonetheless a very useful piece of test equipment, especially on audio circuits. There are some cheaper PC based alternatives, and some hand - held 'scopes now, although I haven't tried them.

Signal Generator - Useful when testing audio circuits, again not really necessary for beginners. Produces variable frequency waves of several different waveforms (sine, square, and triangle).

CHAPTER 6: ADVANTAGES & DISADVANTAGES

ADVANTAGES

- The required mechanical energy is derived from relatives motion of bogies which otherwise wasted.
- This is independent scheme, do not have any effect on input of train
- System does not produce pollution & noise.
- Will requires less number of electrical staff compare to conventional methods.
- Helps to improve smooth running of train.
- There are 14,300 trains operating daily on 63,000 route kilometers of railway in India. This technique would be capable of producing 1,481,000 megawatt (MW) of power in India alone.
- Small turbines can be used to generate more power and can be used for commercial applications as we store the retrieved energy in batteries.
- Does not interference current railway.
- Not Noisy and safe from harm birds.
- Train Accident will be less.
- Require of Diesel and Coal in Power plant will be Decrease.
- The requirement of overhead transmission line get reduce.
- Less Loading Effect on motor.

DISADVANTAGE

- Piezoelectric Windmill is a new concept that may replace Dynamo Wind turbine power generator.
- Efficiency of Piezoelectric Windmill is 50% higher than conventional Wind turbine.
- Small Scale of product.
- Current Generated by piezo is very less.
- Efficiency of Solar Goes on Decreasing after some duration.
- Require more place to set up.
- Time to Time maintenance Require

CHAPTER 7: FUTURE PLAINING

- This concept is the big solution for future electric powered vehicle concept and as power generator. Besides, emission of Carbon dioxide and use earth limited source can be reduced. Even though the power output is not much high, quantity can increase the output as long renewable energy is fully utilized
- Energy is transferred to charge battery which can be use or direct use for suitable electronic devices.
- Energy is transferred to charge vehicle powered electric battery. Vehicle that arrive to the station can straight away replace full charged battery on the station. This concept act as energy resource station
- Wind farm is good to act as electric power generation where energy is transferred to power station and powered a particular area by network grid. The recommend placed is stated on Malaysia wind rate analysis.

CHAPTER 8: CONCLUSION

- Our project „"Generation of electricity using relative motion between two bogies of a train is a sincere approach.
- Towards energy conservation in train by providing, an alternative source of energy for train lighting.
- The dependence on conventional schemes for train lighting which is an important aspect of Indian railways.
- From economic point of view this project is most advantageous than present conventional schemes used in Indian.
- The involvement of this project in Indian railways solve the problem of energy crisis & conservation presently faced.

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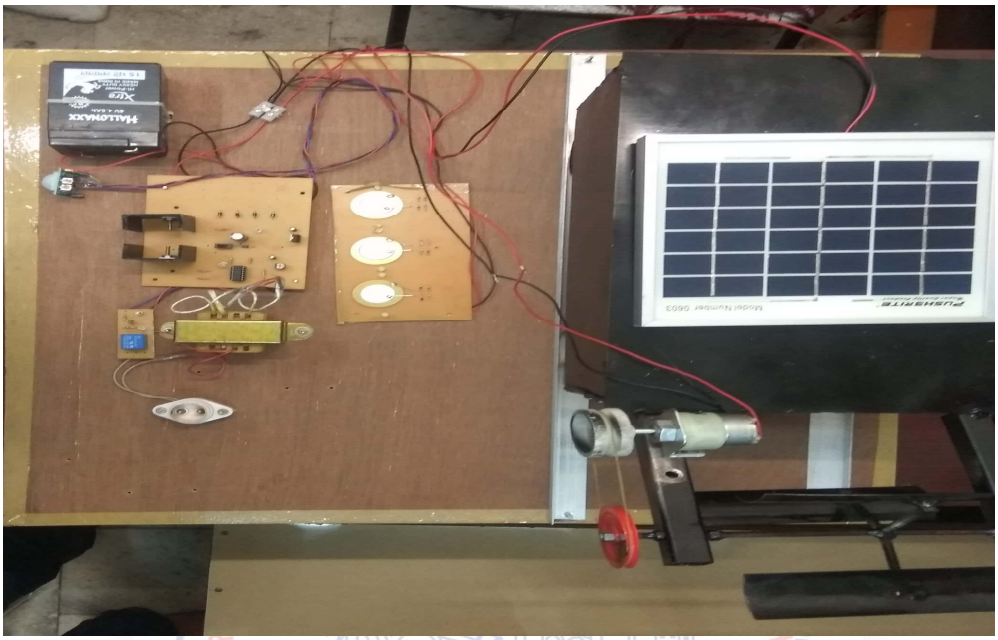
[6] Electrification of Streets of Dhaka City Using Solar and Piezoelectric Energy Rahnuma Rifat Chowdhury _1, Muhammad Salahuddin Kabir _2 _ Department of Electrical, Electronic and Communication Engineering, Military Institute of Science and Technology Dhaka, Bangladesh 3rd on informatics, electronics & vision 20.

COMPONENT LIST

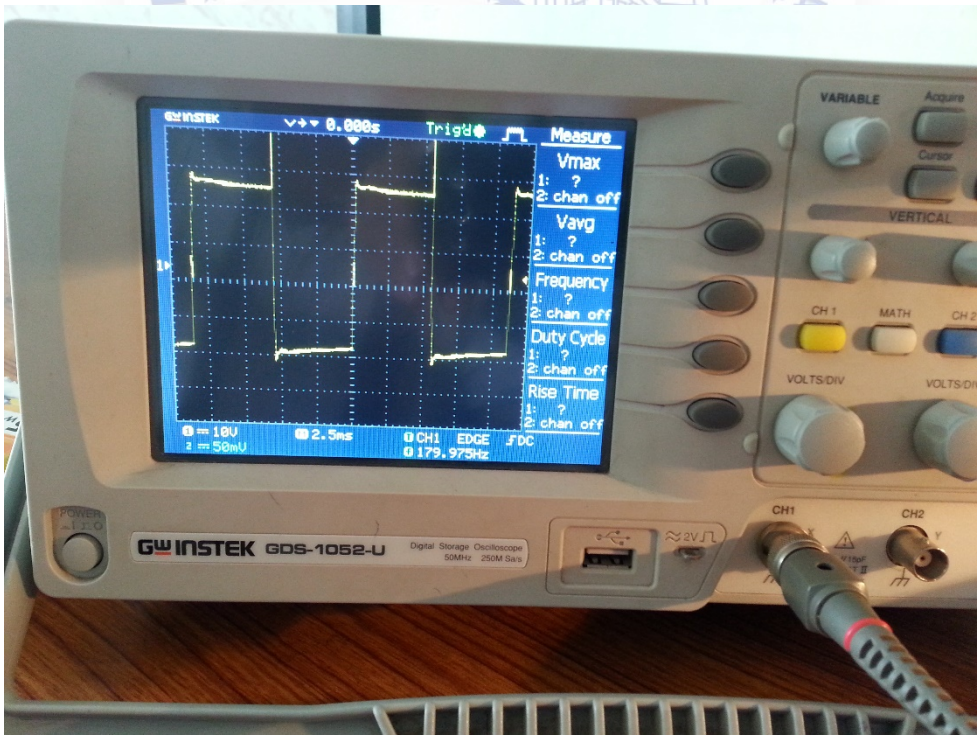
Sr No.	Component Name
1	Resister
2	Capacitor
3	PIR SENSOR
4	Relay
5	MOSFET
6	IC 4047
7	Diode
8	L.E.D
9	Transformer
10	Battery
11	Bulb
12	Switch

APPENDICES

TRAIN POWER GENERATION (IMPLEMENTED) CIRCUIT



SQUARE WAVE OUTPUT



CIRCIUIT WITH LOAD (LAMP) CONNECTED