

## Piezo Solar Hybrid Technique

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*Abstract*— Sun has been providing heat and lightweight to earth from centuries and its intensity is all a similar. Electrical phenomenon cells will be used to collect the rays of sun so to transform them into electricity. Solar power is captured through the solar panels so it's born-again into solar electricity using electrical phenomenon (PV) technology. Piezoelectric Energy harvest is finished by the piezoelectricity. The essence of the piezoelectricity works as follows: By applying a mechanical stress to a crystal, one will generate a voltage or mechanical energy difference, and so a current. This project is to implement hybrid piezo system for generation of voltage. Vibration/Mechanical force and solar are the two differing kinds of renewable energy sources. The aim of this project is charging a 12VDC Battery with the help of a solar panel and few piezoelectric sensing element. With the assistance of solar power and vibration/mechanical force on the sensing element energy will be generated to charge the battery. The system neatly switches between these 2 energy supplies and lets the battery to charge through the source which might give adequate quantity of power to charge the battery at any instant. A relay is employed for the change purpose.

**Key words:** Arduino Uno, LCD, Solar Panel, Battery

### I. INTRODUCTION

Solar panels are devices that convert light into electricity. They're called "solar" panels as a result of most of the time, the foremost powerful supply of light available is that the Sun, referred to as Sol by astronomers. Some scientists call them photovoltaics which implies, basically, "light-electricity." A solar panel could be a collection of solar cells. Countless little solar cells spread over an oversized space will work along to supply enough power to be helpful. The a lot of light-weight that hits a cell, the a lot of electricity it produces, thus spacecraft are typically designed with star panels that may invariably be pointed at the Sun as the remainder of the body of the craft moves around, very much like a tank turret may be aimed independently of wherever the tank goes. A piezoelectric sensing element could be a device that uses the piezo effect, to live changes in pressure, acceleration, temperature, strain, or force by changing them to an electrical charge. The prefix piezo- is Greek for 'press' or 'squeeze'.

#### A. What is piezoelectric Effect?

There are sure materials that generate potential drop or voltage once mechanical strain is applied to them or conversely once the voltage is applied to them, they have an inclination to vary the scale on sure plane. This impact is termed because the piezo effect. This impact was discovered within the year 1880 by Pierre and Jacques Curie. a number of the materials that exhibit piezo effect are quartz, double salt, polarized metal titanate, ammonia dihydrogen, normal sugar etc. However, by combining these 2 intermittent sources and incorporating most power point trailing system,

the system's power transfer potency and dependableness may be improved considerably. Once a supply is short, the load demands another energy sources to catch up on the difference. Many hybrid vibration power systems with most power point tracking control are proposed and mentioned in works.

### II. LITERATURE REVIEW

#### A. Hybrid Vibration and Solar Power Generation System using Piezoelectric Sensors and Fuzzy Logic based Sun Tracking Solar Panels

1) Authors: Laukik Sanghavi, Prajakta Panwal, Paridhi Bajaj, Hemant Chaudhari.

Now a day, with increasing concern of depletion of fossil fuel reserves and global warming, there is a great demand of using sustainable energy as alternative to preserve and save the earth for future generations. Hydro and wind power are some alternative power source which have a great potential to meet our energy demands, but they need a lot of space and a huge initial investment, whereas vibration and solar power can also meet our energy demands and also needs less space and initial investment is also low. We will be generating power from vibration energy by using piezoelectric sensors and from solar energy by using solar panels. To get maximum efficiency we have designed 1-D fuzzy logic based sun tracking solar panels.

#### B. Self-Electricity Generation and Energy Saving By Solar Using Programmable System on Chip (PSOC)"

1) Authors: Mr. Deshmukh P. R., Mr. Kolkure V.S.

New technological development efficiency of solar cell is increasing everyday and it is becoming cheap also for use in regular day today production of energy. Along with this government is also providing help and subsidies in set up of new solar power plant. This all things together provide a great new platform for setup and generation of new solar power plant for individual customer. This paper will try to bring all component and aspects of generating energy from solar cell easy, convenient and in user friendly way for non technical person, by using latest development in the field of electrical and electronics.

### III. SYSTEM DESCRIPTION

#### A. Block Diagram

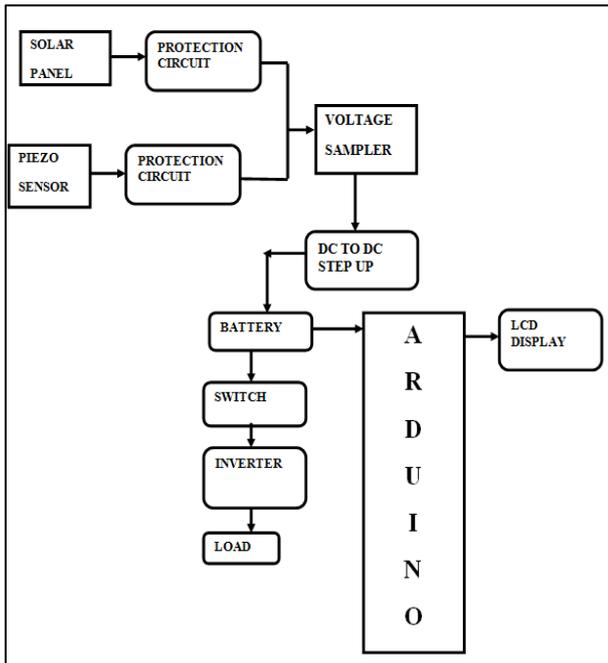


Fig. 1: Block Diagram

#### B. Circuit Diagram

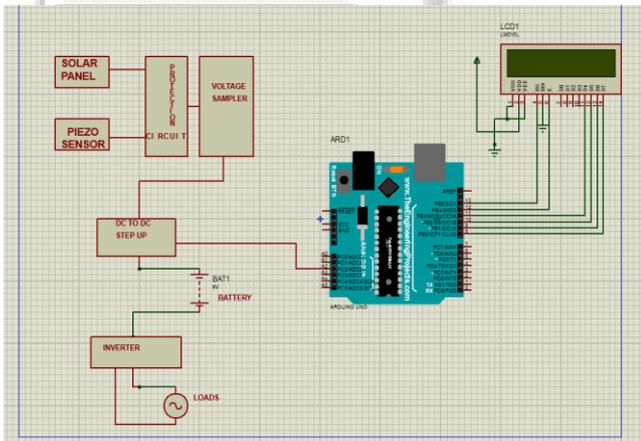


Fig. 2: Circuit Diagram

#### 1) Proposed system

- In above diagram we can see that the battery is used to give 12V DC power supply which is required to drive all other components.
- The 12V DC power supply needs to be converted into the 5Vdc supply, because our microcontroller, LCD, voltmeter etc. drive on 5V DC supply.
- Solar panel is used to take light energy from sun and converts that energy into the voltage form.
- Piezo sensor converts force energy into the voltage.
- So we getting output of solar panel and piezo sensor as voltage, by using voltmeter we find out exactly how much energy is actually being generated.
- LCD 16\*2 is used to display message from where is energy generating and LCD also display a message as we want.
- The charger circuit is used to the charge the battery.

#### C. Components Description

##### 1) Piezo Sensor

Piezoelectric Energy is based upon the piezoelectric effect. The essence of the piezoelectric effect works as follows: by applying a mechanical stress to a crystal, one can generate a voltage or potential energy difference, and thus a current.

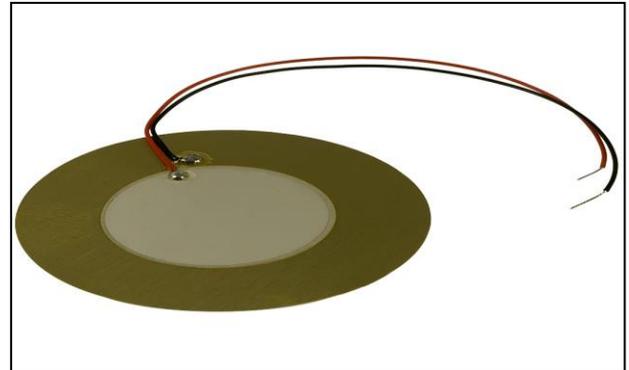


Fig. 3: Piezo Sensor.

##### 2) Solar Panel

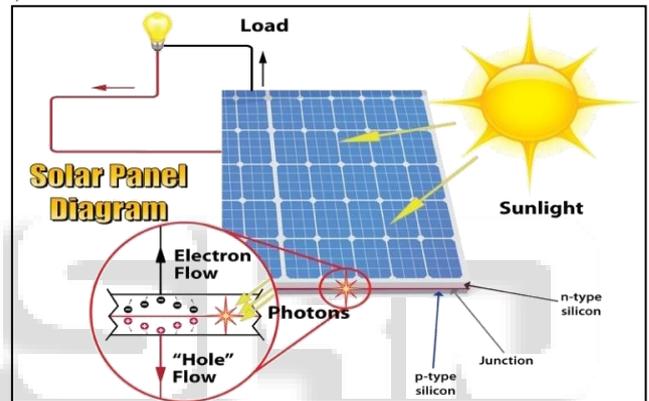


Fig. 4: Solar Panel

##### 3) Arduino

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 crystal oscillator, 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 a AC-to-DC adapter or battery to get started.

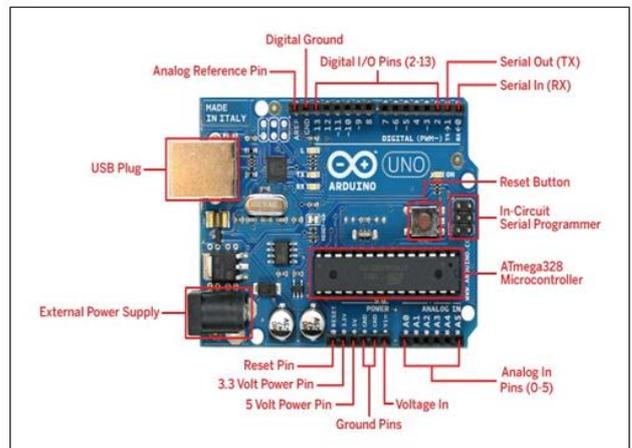


Fig. 5: Arduino Uno

#### 4) LCD DISPLAY (16\*2)

4-bit data interface for compatibility with ARM boards

LCD\_E, LCD\_RS, LCD\_RW

2 line x 16 character Display

Each character location consist of 5 dot x 8 bit display



Fig. 6: LCD Display

#### 5) Advantages and Application

##### a) Advantages

- Both solar as well as piezo power generating systems can be established at the same place.
- Both AC as well as DC loads can be run.
- Flexible to use.
- Low maintenance.
- More efficient than a traditional solar or piezo power project.
- As sources of energy are renewable, it is environment friendly. Thus our motto of protecting and retaining the environment is served.

##### b) Application

- Hotels
- Business (Institutions and Government)
- Large Estate Houses
- Factories and manufacturing facilities
- Commercial Power generation
- Street lighting

#### IV. RESULT AND CONCLUSION

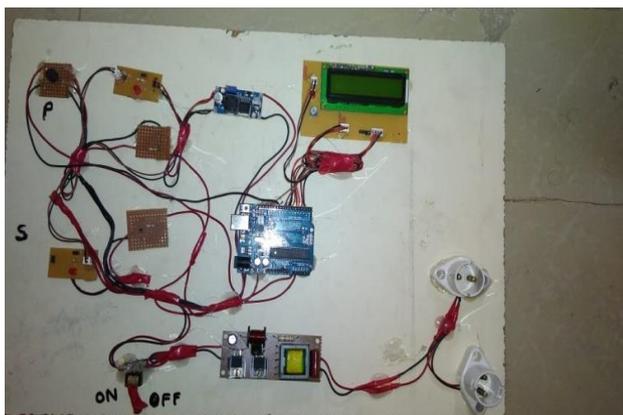


Fig. 7:

In this study, Investigation of practicability of applying piezo effect to convert the mechanical vibrations to helpful electricity. And conjointly investigation of the utility of using solar concentrators to enhance the output power of the solar panel to a considerable level. it's an economical way to manufacture electricity. Thus A hybrid power generation system which may drive a load using piezoelectric materials and PV panel as energy supply is developed during this project.



Fig. 8:

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#### REFERENCES

- [1] Yatin Sharma, Somi Chaurasia, Neha Chaudhary, Assoc. Prof.S. Nigade "Hybrid Power Generation using Solar Panel and Piezo sensor" "International Research Journal of Engineering and Technology (IRJET)" Volume :04 Issue :05 May 2017 PP. 1617-1621.
- [2] Ms. Bhusari Priya Govind , Ms. Chavan Deepika Limchan "A Hybrid Piezoelectric-Solar Based Power Generation System" "International Journal of Advanced Research in Computer and Communication Engineering" volume:4 Issue :3 march 2015 PP. 226-229.
- [3] Reena Garasangi , Rashami Pawar " implementation OfHybrid solar and Sound Energy System" "International Research Journal of Engineering and Technology (IRJET)" volume:7 Issue1 May 2016 PP. 609-612.