

# SOLAR PIEZO HYBRID POWER CHARGING SYSYEM

<sup>1</sup>Bhujade Prashant Laxman  
<sup>2</sup>Korde Amol Dnyaneshwar  
<sup>3</sup>Pathak Gaurav Umesh  
<sup>4</sup>Prof. Hatkar Archana Arvind

<sup>1</sup> Bhujade Prashant Laxman, Student, Electronics & Telecommunication, SIR VISVESVARAYA INSTITUTE OF TECHNOLOGY, Maharashtra, INDIA

<sup>2</sup>Korde Amol Dnyaneshwar, Student, Electronics & Telecommunication, SIR VISVESVARAYA INSTITUTE OF TECHNOLOGY, Maharashtra, INDIA

<sup>3</sup> Pathak Gaurav Umesh, Student, Electronics & Telecommunication, SIR VISVESVARAYA INSTITUTE OF TECHNOLOGY, Maharashtra, INDIA

<sup>4</sup> Hatkar Archana Arvind, Assistant Professor, Electronics & Telecommunication, SIR VISVESVARAYA INSTITUTE OF TECHNOLOGY, Maharashtra, INDIA

## ABSTRACT

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 project 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 significant advancement toward greater efficiency and cleaner energy production. The goal of this project 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. An efficient way to electrify or generate electricity using solar power and piezoelectric energy.

**Keyword:** - Piezoelectric energy , ARDUINO Board.

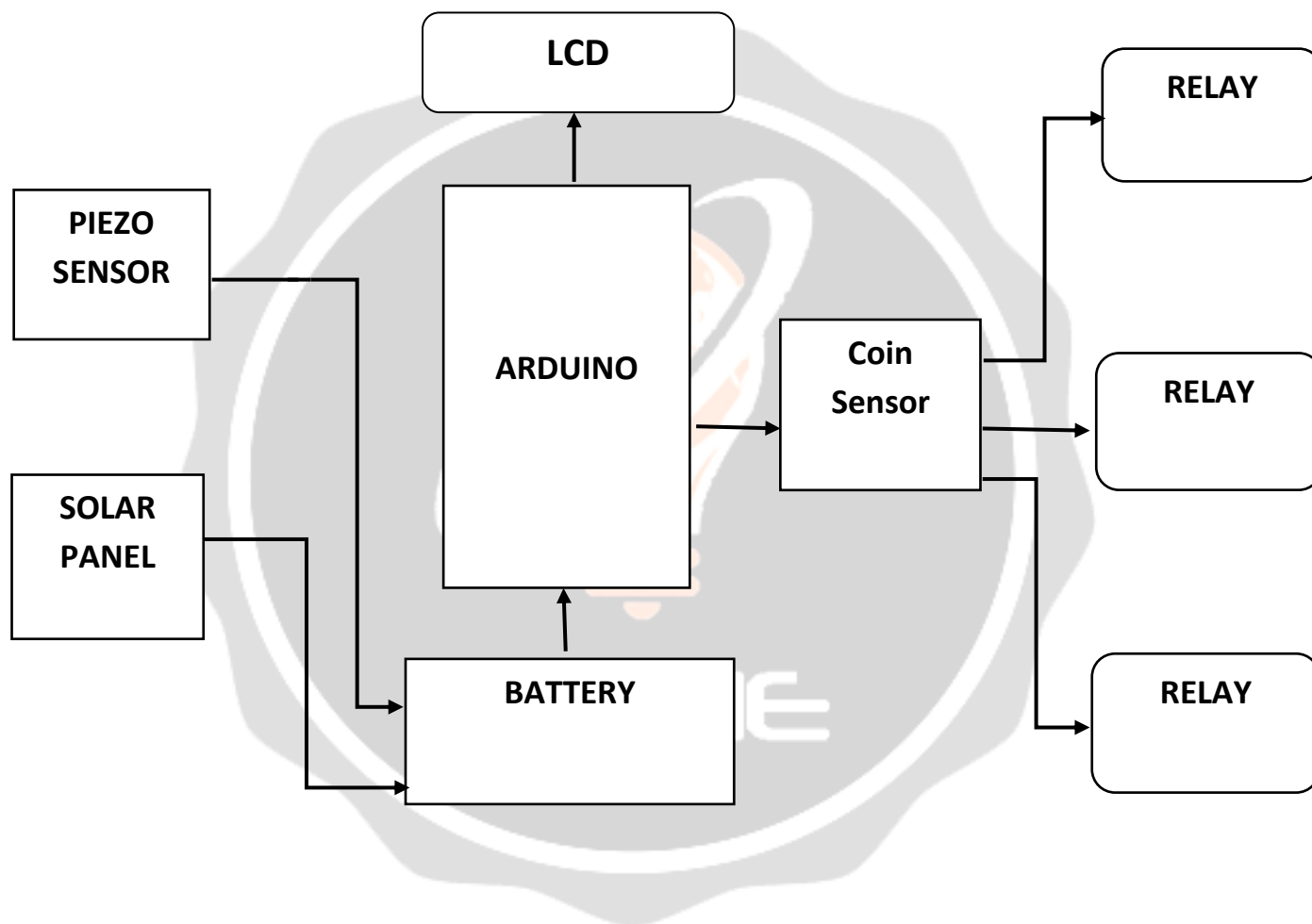
## 1. INTRODUCTION

Now a day's energy is one of the most important issues around the world. Especially in Bangladesh energy crisis is a big problem. Renewable energy sources can be a great media to solve this energy crisis problem in Bangladesh. As we know natural resources will finish one day. That's why researchers are trying to introduce substitute energy sources from nature. That must be green and not harmful for the environment. Energy harvesting is defined as capturing minute amounts of energy from one or more of the surrounding energy sources. Human beings have already started to use energy harvesting technology in the form of windmill, geothermal and solar energy. The energy came from natural sources, termed as renewable energy. Renewable energy harvesting plants generate kW or MW level power; it is called macro energy harvesting technology. Moreover, micro energy also can produce from those natural sources that are called micro energy harvesting. Micro energy harvesting technology 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  $\mu$ 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[3].

### 1.1 Objective and Aim of Work

The main objective of this work 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.

## 2. BLOCK DIAGRAM



**Fig -1:** Block Diagram

### 2.1 Rechargeable Battery

Battery is used for storing the energy come from solar panel and piezoelectric sensor.

### 2.2 Relay

Relay is electrically operated switch. Relay is used to isolate electrical load. Relay have coil which is energized by 12V when coil energized switching action takes place.

### 3. PIEZOELECTRIC SENSOR

This day most of the research in the energy field is to develop sources of energy for future. It is time to find renewable sources of energy for the future. Piezoelectric materials are being more and more studied as they turn out to be very unusual materials with very specific and interesting properties. In fact, these materials have the ability to produce electrical energy from mechanical energy for example they can convert mechanical behavior like vibrations into electricity. Such devices are commonly referred to as energy harvesters and can be used in applications where outside power is unavailable and batteries are not feasible option. While recent experiments have shown that these materials could be used as power generators, the amount of energy produced is still very low, hence the necessity to optimize them. Piezoelectric materials have two properties that are define as direct and converse effect. Direct effect is the property of some materials to develop electric change on their surface when mechanical stress is exerted on them, while converse effect is the property of some materials to develop mechanical stress when an electric charge is induced[2].

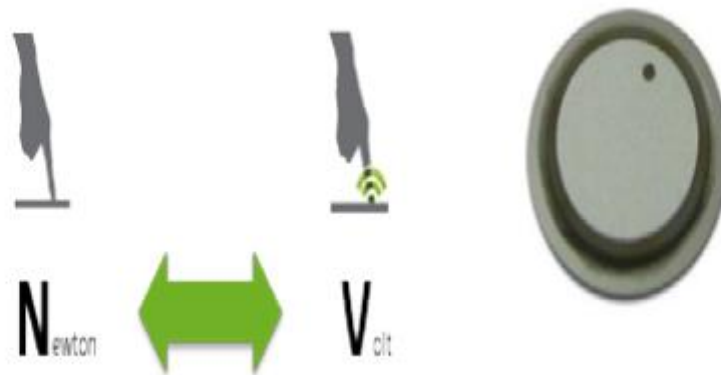


Fig -2: Working of piezoelectric sensor.

### 4 ARDUINO

Overview 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. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the ATmega8U2 programmed as a USB-to-serial converter. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions[1].



**Fig -3:** Arduino Board

#### 4. CONCLUSION





The purpose of this project was to establish the feasibility of a roadside hybrid energy collection/recovery system that can then be used for running nearby street utilities such as lights/signals. The hybrid sources are solar energy (harvested by a commercially available solar cell located next to roadway) and piezoelectric energy (harvested by an array of piezoelectric elements next to the roadway). Each of these systems had its own component level controller. A practical ratio of cost-effective energy recovery from these two sources had been sought in the design of the supervisor controller. It should be possible to monitor system performance via a wireless display located a safe distance from the energy harvesting equipment.

#### 5. ACKNOWLEDGEMENT

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	<p><b>Mr. Bhujade Prashant Laxman</b></p> <p>Author is Pursuing Bachelor in E&amp;TC Engg. from SVIT Chincholi., Dist. Nashik, Maharashtra.</p>
	<p><b>Mr. Korde Amol Dnyaneshwar</b></p> <p>Author is Pursuing Bachelor in E&amp;TC Engg. from SVIT Chincholi., Dist. Nashik, Maharashtra.</p>
	<p><b>Mr. Pathak Gaurav Umesh</b></p> <p>Author is Pursuing Bachelor in E&amp;TC Engg. from SVIT Chincholi., Dist. Nashik, Maharashtra.</p>
	<p><b>Prof. Hatkar Archana Arvind</b></p> <p>Author is working as an assistant professor in E&amp;TC Department at SVIT Chincholi, Nashik. She has completed post Graduation in DIGITAL SYSTEMS.</p>