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Approach Towards Generating Electricity Using Vibration And Noise.

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ABSTRACT:
Recently scientists and researchers are trying to seek new source of energy because energy is needed everywhere and every time. Vibration and sound are on kind of unconventional mechanical energy source which is lost everywhere. Our main goal is to utilize this lost energy. In this industrialization, every heavy machines and industrial appliances produce sound and vibration at a time. This paper shows the process of harvesting from this lost energy by using piezoelectric material. Piezoelectric material have a crystalline structure that provides them the ability to transform mechanical strain energy into electrical charge and vice versa, to convert an applied electrical potential into mechanical strain. This property provide these material with the ability to absorb mechanical energy from their surroundings, usually ambient vibration, and transform it into electrical energy that can be used into power other devices as well as shoring in battery.
KEYWORDS: *Vibration, Sound, Piezoelectric material, Harvesting energy, Electrical energy.*

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I. INTRODUCTION:

The increasing desire for completely self-powered electronics has caused the amount of research into power harvesting devices to become progressively larger over the last decade. One early study into power harvesting was investigated the ability to generate energy from the expansion and contraction of the rib cage during breathing. A prototype of the power harvesting system was constructed using polyvinylidene fluoride (PVDF) film and was implemented in vivo on mongrel dog. The prototype was demonstrated to produce a peak voltage of 18V , which corresponded to a power of about 17 W . The discovery of a strong piezoelectric effect in polyvinylidene fluoride polymer, by KAWAI in 1969, further added many application where properties such as mechanical flexibility are desired. With the research into power harvesting devices growing it was determined that the power found from this system is not so high that is why its power is basically used for recent advances in wireless and MEMS technology, sensors can be placed in exotic and remote locations. Since these devices are wireless it becomes necessary that they have their own power supply. The power supply in most cases is conventional battery: however problems can occur when using batteries because of their finite life span. Furthermore, in the case of sensors located on civil structures it is often advantageous to embed them, making access impossible.

II. LITERATURE REVIEW:

Referencing to the law of conservation of energy which states that "Energy cannot be created nor be destroyed", sound waves as a form of mechanical energy can be converted to the other forms such as heat energy or electric energy through choosing the suitable approach of conversion. Noise can be described as unwanted sound waves are originated from human activities, especially urbanization and the development of transport systems. Though the urban population is much more affected by such pollution, small towns along side roads or industrial areas are also affected by this pollution. The source of most outdoor noise worldwide is transportation systems including roads, flyways, and rail traffic which are called traffic noise where people living in urban city complained about the noise from buses, trains, heavy trucks, motor-cycles, airplanes and pneumatic drills. These sources produced noise ranged from 85 to 120 Db.

When these structures move as fast as they make sound, they can be seen over many categories of sensors. The most active sound sensors are piezoelectric objects. In response to mechanical pressure, piezoelectricity is the amount that accumulates in solid materials, certain clay materials and especially crystals. With respect to the mechanical pressure applied, the effect of piezoelectric is the ability of certain substances to generate electricity. Direct electromechanical contact between the electrical and mechanical state is well known as a piezoelectric effect. In crystalline materials it is subjected to the possibility of unstable production of electrical energy emerges. One of the recurring features of the piezoelectric effect is that it indicators of

piezoelectric effect when applied to stress. In electrical production shows the piezoelectric negotiating effect. Sound is defined as the vibration of a piezoelectric transducer and the wind that contains vibrations and pitching devices that are found to be suitable for application for sound acquisition and production.

In the external electrical sector under pressure equipment where piezoelectric devices are installed, transfer negative and constructive billing facilities to what is happening. The external electric field expands the piping material during conversion. The piezoelectric effect works on a wide range of application including sound detection and production, microbalances, ultra-fine focus generation of high-speed telephones and visual cues. The most common sensor emissions used in piezoelectric images and in piezoelectric micoustic-electric guitar microphones are used to detect pressure differences in sound.

In current scenario electricity is generating from various non-renewable source. Solar is the biggest source of electricity in upcoming days. Conversion of sound to electric energy is less popular and very effective in major cities and most noisy areas . This process consumes more power in our day to day life . This can use implemented in many noisy areas like railway station, markets, industries etc. In our daily life we are alternate power problem. Since most of th electronic devices consume more power, we require an alternate power system. The rapidly enlarge demand of high restrictions and electrical energy on pollution levels have led to interest in large to interest in large scale utilization renewable energy.

The intermittent sound like water, solid and air like pressing waves is like a shear wave, Sound waves are generated by the sensation by the sensation of sound like a vibrating diaphragm. Sound source creates tremors in the sensation of sound in embedded channels. The sources start carries with the vibration and in the middle of the vibration and separates from the point detection by the speed of the sound, by creating a sound wave. Vitality and removal of medium area with varying pressures at a time will not change from source. Movement, pressure and speed vary in space at a specific time.

III. OBJECTIVE:

1. Generation of electrical energy using sound and vibration energy.
2. To develop a piezoelectric energy harvesting system from sound and vibration using piezoelectric sensors.
3. Store and forwarding electrical energy for efficient usage of noise using storage batteries.
4. To perform the experiment for collecting data of vibrations produced at different places on road.
5. To collect data of electricity consumption by the street light per day.
6. To study the sources and amount of electricity used for street lights and traffic signals.
7. To work on making the piezoelectric model economical than that of the solar model.

PROPOSED METHODOLOGY :

1. Measurement of frequency of vibration produced in the road due to running vehicles.
2. Measurement of frequency produced by noise at different parts of the road.
3. Plans for sensors that should generate expected amount of energy.
4. Plans for maintenance that will be required for the model.
5. To make the model more workable and economical than other systems.
6. Calculation of amount of energy needed to be stored in the battery.
7. Plan for how many hours it requires to charge the battery.
8. Measurement for maximum voltage produced and how many sensor pads needed in the project.

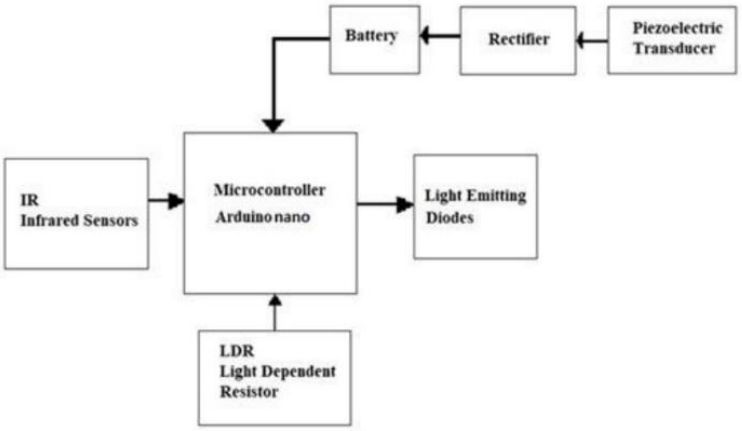


Figure1. Block Diagram

PROCEDURE OF MODEL :

- WORKING PRINCIPLE :

1. The basic principle is to convert the mechanical energy into electrical energy, through piezo sensors.

2. The piezo sensors are placed on the road. The energy is harvested from these piezo sensors and stored in the battery using the rectifier circuit.

3. This energy which is used in a battery using the rectifier circuit. This energy which is stored in a battery by the piezo process is used as the power supply for the circuit.

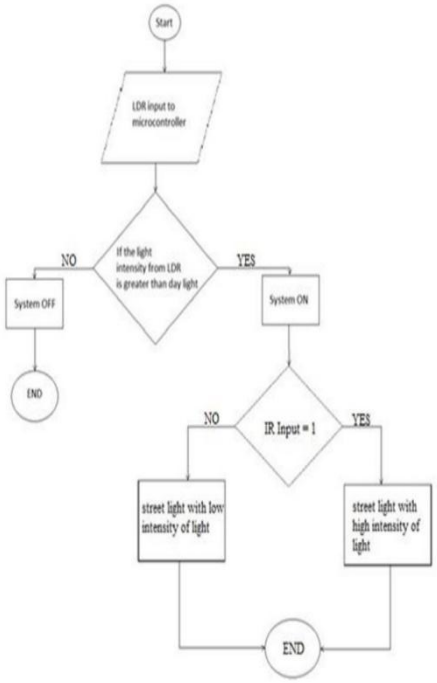
4. The system starts to works only at low or poor lighting conditions i.e. in evening and night time. Once the system starts working the light will be on and will be glow at low intensity.

5. The IR sensor will be monitored continuously and once the vehicle movement is sensed the lights will start glow at high intensity and lights will glow in low intensity when there is no movement.

6. The system starts working by making use of power supply which is store in the battery by the piezo process, the microcontroller will kept on monitoring the LDR once the resistance is high the streets will turn on, if the resistance of LDR is low the microcontroller will continue monitoring, once the lights are on the microcontroller will monitor IR sensor the lights will start glowing in high intensity.

7. When no vehicles are detected the lights will glow with low intensity, as soon as the LDR resistance is low the system stops working and microcontroller will continue to monitor LDR.

FLOW CHART OF METHODOLOGY :



SYSTEM DESIGN :

- **PIEZOELECTRIC SENSORS :**

Piezoelectric transducer consist of piezoelectric crystal which creates the piezoelectric energy when the external force or pressure is applied on its surface, the output voltage of the transducer will vary on the parameters like applied pressure, size of crystal used, type of crystal used and surface area of transducer.

- **BATTERY** :

It is a charge storing electrical device which is built with the electrochemical cells in the design make use of the battery which is of 6 cells, output voltage is 12 V.

- **LDR (Light dependent resistor)** :

It is similar to the resistor which is also known as photoresistor the value of resistor varies in accordance with the intensity of light, the resistance of LDR is very high in non-luminous place and low in luminous place.

- **LED (Light emitting diode**) :

It is similar as PN junction diode, it is made up of a thin layer of a heavily doped semiconductor, it emits light when LED forward biased, the led starts emitting light when it reaches the threshold voltage, this threshold voltage depending on the semiconductor material used.

EXPECTED OUTCOME :

1. The piezo electric model can replace solar model have some deficiency.
2. The model can be used for the upcoming road projects.
3. The model could be economical if successful.
4. The model should be of less Maintenance cost.

FUTURE SCOPE :

The whole equipment can be based on the project for activities like data collection from roads, monitoring traffic consequently and caution the specific vehicle if it is above speed limits or if it is using a forbidden road. This concept can be of much use if the model is properly used.

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