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SOUND CHARGEABLE POWER BANK

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Abstract: Sound is what we hear and is pleasant to our ears whereas noise is any unwanted or unpleasant sound. The sound energy associated with the vibration of matter is an abundant source of noise pollution. Noise is the least of all types of pollution which most people ignore to recycle and turn into any useful source.

This project endeavors a device that can make use of the unwanted sound and convert it into electricity. The efficiency of the device in terms of charging the power bank by utilizing noise is proven effective. Especially in places with high levels of noise the rate of charging is fast. On comparing this device with commercial power banks, the noise pollution based power bank is effective and efficient. This can be done by using a transducer by converting vibrations caused by noise into electrical energy. The already proposed application consists of a speaker and a transformer that are used to convert noise produced by car horn into electrical energy. The principle of electromagnetic induction is used to convert the vibrations created by noise into electrical energy and a transformer is used to step up the received signal. The aim of this project is to design and develop a system that can make useful energy from noise known as noise pollution based power banks with suitable architectural design, component design, code generation, and integration system.

Keywords - Electromagnetic induction, Electromotive Force, Renewable Energy, Piezoelectric, Sound Energy, Transducers

I. INTRODUCTION

Sound is a form of energy that is caused by the back and forth motion of molecules. Sound is what we hear and is pleasant to our ears, whereas noise is any unwanted or unpleasant sound. The major source of noise worldwide is mainly due to machines, loud music, construction, electrical generators, vehicles and more.

One of the most serious global challenges is environmental pollution. It is the unfavorable alteration of our surroundings, largely as a byproduct of our actions, through direct or indirect effects of the changes in the energy pattern, radiation levels and more. One of the major contributors is noise pollution. The least of all types of pollution which most people ignore to recycle and turn into any useful source is noise. This project is a way to produce electrical energy from sound vibrations.

There are many ways of generating alternative energy coming from sound energy wherein, a primary source of electrical energy of the Noise pollution based power bank is through a transducer called the piezoelectric crystal. This crystal generates electric charges on its surface when mechanical strain is applied to it and the pressure and sound is transformed in the same manner, as the sound is in a form of vibrations that will be harvested on the piezoelectric material that will be converted into electricity. Piezoelectric materials strengthen the urge for the proponent to think of a way to make use of noise pollution wherein as an environmental hazard and how this type of waste needed recycling to be a useful material for it is available in most of the areas such as spots near public places, factories, and industries, where the sound is clamoring.

II. LITERATURE SURVEY

The use of sound to produce electricity is not a new concept. One of the first to achieve this feat was the researchers from Los Alamos National Laboratory in collaboration with the Northrop Grumman Space Technology, USA[3]. They built a compact generator which used the movement of helium gas to generate sound waves that drove a piston to move a coiled copper wire. However, as the sound in this case was artificially created to generate electricity, it does not transform naturally available or already available sounds and noises present in the environment into electricity. Also the use of a non-renewable source of energy to create a comparatively less efficient energy source is not a feasible output.

Another technique was the use of piezoelectric transducers to convert sound into electrical energy[4]. In this case, the sound generated by various sources was converted into electrical energy and stored in a 9V DC battery. However, the use of piezoelectric material is costly and economically unviable for the purposes of generation. The technique used was noise filtering, and therefore there were excessive losses as the sound was not completely channelized through the piezoelectric material

A method which has taps mechanical energy from the vibration of vehicular movement and converted it into electric energy by piezoelectric effect[5]. However, this technique does not foresee all possibilities, including that the piezoelectric material may be destabilized due to overload.

III. PROPOSED SYSTEM

The proposed technique uses transducers to harness vibrations caused by sound and convert it into electrical energy. The circuit was installed at the source of the noise. In this circuit, sound waves fall on a diaphragm, which is connected to an induction coil placed in front of a permanent magnet. As the sound waves reach the diaphragm, it starts to vibrate. When the diaphragm vibrates, the coil moves along with it. The movement of coil creates a varying magnetic field around it. This varying magnetic field induces a current into the coil. As per Faradays law of Electromagnetic Induction, a varying magnetic field produces electromotive force(emf) across a conductor, if the conductor circuit is in a closed loop then an induced current will also circulate through it[8-9]. The voltage drop across the coil is measured using a digital multimeter in volts (V). The sound is measured through

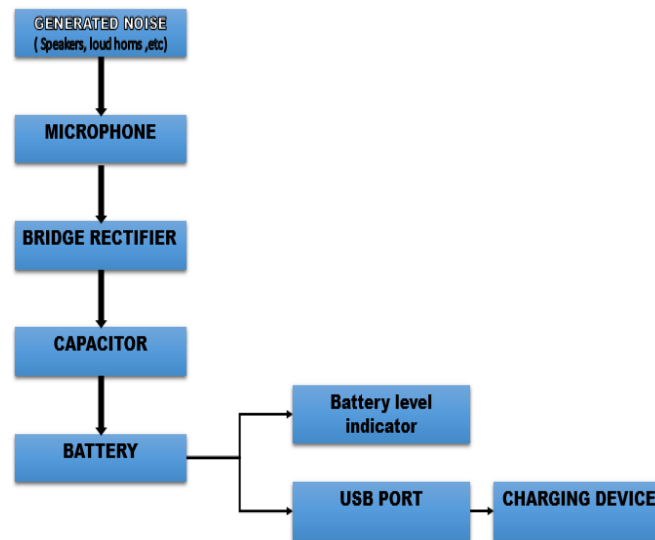
This study used the experimental method to clarify the mechanisms by which these factors contribute to the design and developing a noise pollution based power bank and also utilized Design Science research methods that involve the creation of new knowledge through design of novel or innovative artifacts such algorithms, human/computer interfaces, and system design methodologies or language [16]. The researcher chooses V Model procedure to make sure of the efficiency of the project. The appropriate model for this project is the V model.

The proponent listed down the materials to be used in the development of the project, then the first thing the proponent did was the study and the gathering of data regarding the project. Furthermore, gathered data and information from different sources and the proponent gather the above components to start with the fabrication and finally, the software design which contains the details for the software side of the project such as a data flow diagram (DFD) illustrates how data is processed by a system in terms of inputs and outputs.



IV. IMPLEMENTATION OF THE PROPOSED SYSTEM

The process flow of the noise pollution based power bank. Noise is harvested by microphone in the form of sound wave or signals. The diaphragm of the microphone moves up and down that makes converts the signal to electrical current. The converted current in alternating form will pass through the bridge rectifier to make it into direct current and store it to the capacitor before transferring it to the battery. The current from the battery is supplied to the USB port.



Microphone is a type of transducer that converts one form of energy to another. Inside this device is the diaphragm which is commonly made up of plastic, paper or aluminum. Attached to it is a magnet enclosed in a coil that produces the energy. As the microphone catches sound (acoustic energy) that is in the form of vibration that travels through air or other medium, the diaphragm moves and the electrons flow through the copper coil.

Thus, this process creates electrical signal or current that is passed to the desired output, and in this research case, the battery. But since the current from the microphone is alternating, the proponent made a bridge rectifier to convert the current to direct before storing it to the capacitor and to the battery

V. MODULE DESCRIPTION

MICROPHONE:

A microphone is a device that captures audio by converting sound waves into an electrical signal. This signal can be amplified as an analog signal or may be converted to a digital signal, which can be processed by a computer or other digital audio device. This device plays an important role in observing the sound from the surroundings.

BRIDGE RECTIFIER:

Bridge Rectifiers are the circuits which convert alternating current (AC) into direct current (DC) using the diodes arranged in the bridge circuit configuration. They usually comprise of four or more number of diodes which cause the output generated to be of the same polarity irrespective of the polarity at the input

CAPACITOR:

A capacitor (originally known as a condenser) is a passive two-terminal electrical component used to store energy electrostatically in an electric field. The forms of practical capacitors vary widely, but all contain at least two electrical conductors (plates) separated by a dielectric (i.e., insulator). The conductors can be thin films of metal, aluminum foil or disks, etc. The 'non conducting' dielectric acts to increase the capacitor's charge capacity. A dielectric can be glass, ceramic, plastic film, air, paper, mica, etc. Capacitors are widely used as parts of electrical circuits in many common electrical devices. Unlike a resistor, a capacitor does not dissipate energy. Instead, a capacitor stores energy in the form of an electrostatic field between its plates.

VOLTAGE REGULATOR:

Voltage regulator, any electrical or electronic device that maintains the voltage of a power source within acceptable limits. The voltage regulator is needed to keep voltages within the prescribed range that can be tolerated by the electrical equipment using that voltage. Such a device is widely used in motor vehicles of all types to match the output voltage of the generator to the electrical load and to the charging requirements of the battery. Voltage regulators also are used in electronic equipment in which excessive variations in voltage would be detrimental.

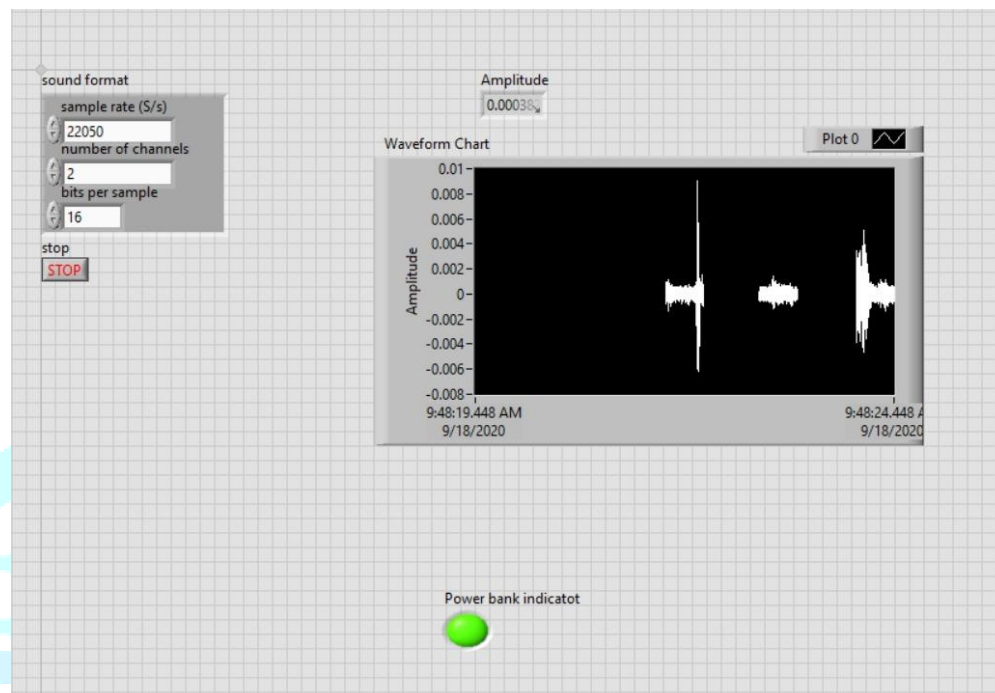
USB PORT:

A USB port is a standard cable connection interface for personal computers and consumer electronics devices. USB stands for Universal Serial Bus, an industry standard for short-distance digital data communications. USB ports allow USB devices to be connected to each other with and transfer digital data over USB

BATTERY:

Batteries are a collection of one or more cells whose chemical reactions create a flow of electrons in a circuit. All batteries are made up of three basic components: an anode (the '-' side), a cathode (the '+' side), and some kind of electrolyte (a substance that chemically reacts with the anode and cathode).

When the anode and cathode of a battery is connected to a circuit, a chemical reaction takes place between the anode and the electrolyte. This reaction causes electrons to flow through the circuit and back into the cathode where another chemical reaction takes place.

VI. RESULTS AND DISCUSSION**VII. CONCLUSION**

In this paper, the sound energy captured using microphones measured in decibels and harvest the electrical energy measured in Voltage, thus the noise pollution based power bank is an effective device to store electrical energy coming from sound energy. Therefore, sound energy is capable of being a source of electrical energy.

The effective locations for harvesting sound energy is at closed room entertainment places such as bars or other similar places reaching higher decibel levels of noise or sound with decibels of higher than 80. The louder the noise or the longer the exposure of the device to noise the faster it charges.

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