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Footstep Power Generation using Piezo Electric Sensor

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Abstract: An improved footstep power producing system is here offered as a source of renewable energy that we may obtain while walking on a certain arrangement, such as stepping foot on a piezo tile. The piezoelectric sensors are used to produce power from foot traffic. The main operational principle of the "footstep power generation systems" is based on piezoelectric sensors, and this study demonstrates how to employ piezoelectric materials to create and store energy by leveraging the vibration caused by people walking. When flooring is made utilising this technique, the electrical energy produced by the pressure is captured by floor sensors and converted into an electrical charge by a piezoelectric transducer. These sensors are placed to generate the greatest voltage output feasible. This outcome is forwarded to our monitoring This is a microcontroller-based circuit that recharges batteries and allows users to check the voltage. This power supply serves our monitoring circuitry as well as other purposes. Our project methodology is inexpensive and easy to utilise. Keywords--piezoelectricity, footsteps, power-generation, energy conservation, force or pressure,

I.INTRODUCTION

At It is clear that power has evolved into a tool for the general public. Its request is gradually getting larger. For its various functions, modern invention requires a huge amount of electrical power. The single largest source of pollution in the world is power generating, On the one hand, research into alternative energy sources and their practical use has been prompted by growing concern over the gap between the demand and supply of power for the general populace. On the other hand, The need for energy is continually increasing as more people than ever before inhabit the earth. Similar to that, one objective of present research is to create a way to generate electrical power from this steadily expanding human population without harming the environment. This idea is based on the piezoelectric impact theory, which states that some materials have the ability to produce an electrical charge in response to weight and pressure. Piezoelectricity is a material's ability to generate an electric potential in response to a weighted force. Inserted piezoelectric material has the magical ability to transform the weight of moving people into an electric current. Since the beginning of time, people have been moving around via walking, running, and swimming. However, technological advancement has compelled machines to increase the effectiveness of how they employ human control. Pedal power, which uses the body's strongest muscles, has been employed since the nineteenth century and is an incredible source of energy in this scenario. 95 percent of the energy used to pedal is transformed into energy. Pedal power is a straightforward, affordable, and practical source of energy that may be attached to a wide range of occupations. However, human dynamic energy can also be used to generate electricity using a variety of approaches, and many organisations are now putting into practise human controlled technologies to generate power for controlling electronic equipment.

IL LITERATURE SURVEY

Man has needed energy for subsistence and growth from the beginning of time, and he has been utilising it at an increasing rate. Resources have been depleted and wasted as a result of these immense levels of life. For high-density nations like India, where train stations, temples, and other locations are packed day and night, the concept of employing stream energy for foot quality and human development is particularly applicable and crucial. When a deck is constructed utilising piezoelectric technology, electrical energy produced by the weight is gathered by ground sensors, converted into an electrical charge by piezo transformers, and then stored and used as an energy source. Agriculture, home usage, and road remote illumination as a vitality hotspot are just a few possibilities for this power source for physical sensors.

In order to ensure that contact between the patient and the medical institution continues even in the case of an energy outage or system malfunction, monitoring technology that accepts responsibility is deployed. The urge for control grows with time growing. The growth in population has resulted in a portion of the electricity being turned off. We generate electricity using power generators that burn fuel, which is bad for the environment. AS a result, it'S imperative to take control using a renewable energy source that doesn't harm the environment. The development of more economical, environmentally responsible methods of regulating ageing, which will lessen global warming and energy shortages, is one of the main objectives of this project.

Ill, COMPONENTS USED

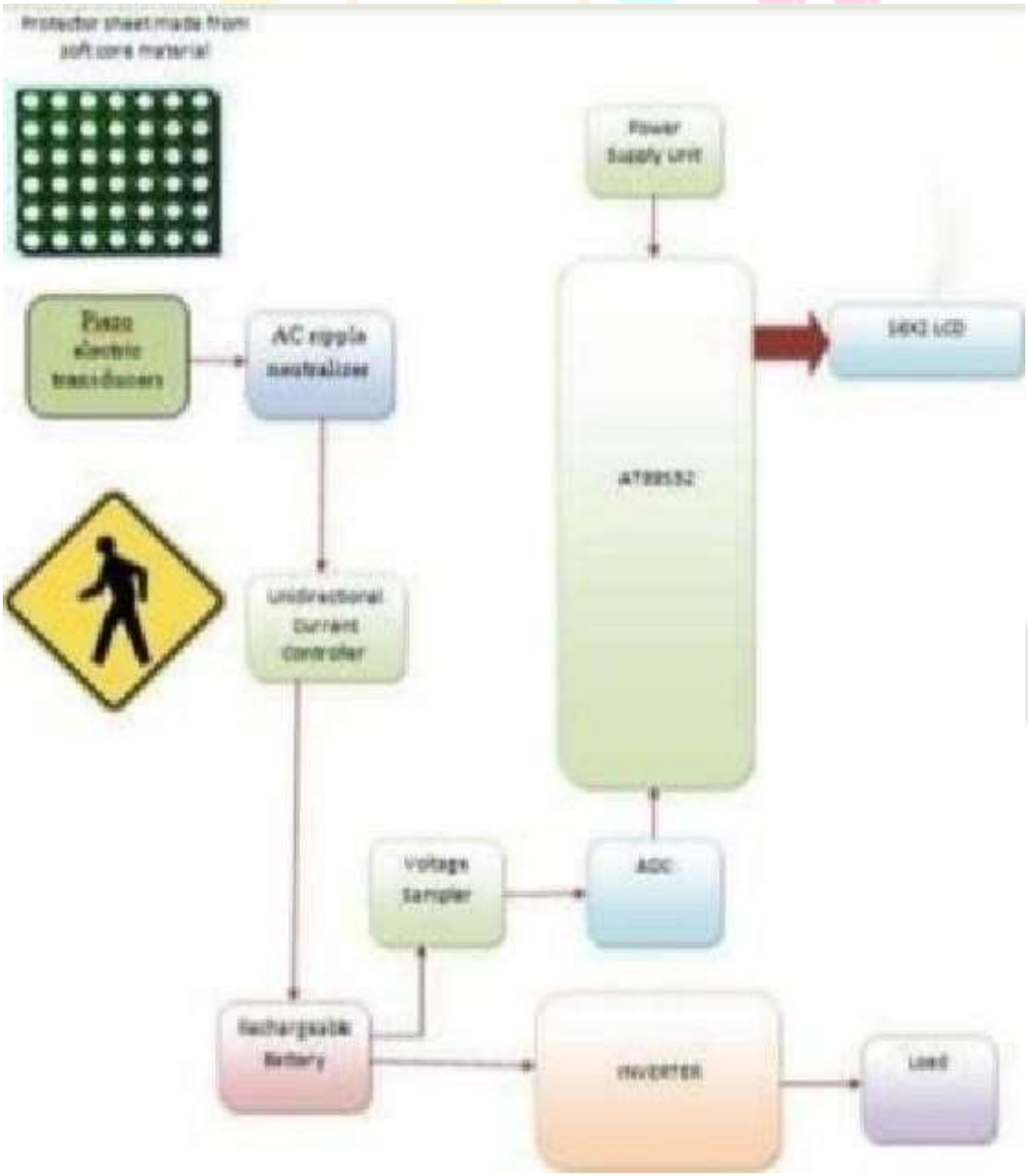

Figure l: Block Diagram

A. Piezoelectric Sensor: A piezoelectric sensor can gauge weight, speed, strain, or power. using an apparatus that converts the piezoelectric action into an electrical signal A material's ability to generate an electric charge in response to equivalent mechanical pressure is referred to as piezoelectric impact. The movement of the positive and negative charge centres within a piezoelectric material as a result' of' mechanical pressure causes the material to generate an external electrical field Real sugar, quartz, Rochelle salt, topaz, tourmaline and Berlinite are a few examples Of materials that naturally generate piezoelectricity, two examples of artificial materials used in piezoelectric devices are lead zirconate titanate and barium titanate.

B. Rectifier : The stride body's give continues to the rectifier. Alternating current produces pulsing direct current. Either a full-wave or a half-wave rectifier can be used. In this project, an extension rectifier is ideal since it provides benefits like tremendous strength and complete wave correction. By using both half cycles of the information air conditioning voltage, the bridge rectifier is a circuit that converts ac voltage to dc voltage.

C. Unidirectional Current Controller: A diode serves as o unidirectional current controller in this project. Considering what we already know, a diode's most well-known function is to let just one direction of electric current flow (the diode's forward direction). White impeding flow in the turnaround heading, which is the opposite way. In this sense, the diode may be thought of as an electrical check valve. The model number for the o diode used in this project is D:1N4007.

D. Microcontroller AT89S52 : we ore using on AT89S52 microcontroller to display both the battery voltage os well os the amount of voltage generated when our foot is placed on the step body. A low control, The AT89S52 is a superb CMOS 8-bit microcontroller with 8K bytes of internal programmable Flash memory. The apparatus is in compliance with the 80C51 guideline set, which is the industrial standard, and it sticks out and uses At me Cs high-thickness non-unstable memory technology.

E. Analog to Digital Converter (ADC): An ADC is a piece of electronic gear that transforms a voltage or current from being a basic informative value to a numerical value dependent on the magnitude of the voltage or current. With regard to ADC0804, commonly used 8-bit simple to advanced converter, for this operation. It is on IC with o single channel. F. Liquid Crystal Display (LCD): The device uses a 16x2 LCD to display estimated values for both body temperature and pulse simultaneously. The microcontroller and LCD are connected, and this article just needs one line of the LCD to display the results are displayed in ASCII characters.

G. Light Dependent Resistor (LDR): Photograph resistors, often referred to as light dependent resistors (LDR), are lightsensitive tools typically used to show if light is present or absent or to estimate how much light is there. Unaware, their degree of protection is great, occasionally reaching IMO, but when the LDR sensor is exposed to light, the protection dramatically decreases, sometimes even to a few ohms, depending on the light intensity. LDRs are nonlinear devices having an affectability that varies depending on the wavelength of the light connected.

IV. IMPLEMENTATION

A platform for feet can be placed thanks to technology. The piezo sensors are positioned underneath the platform to generate electricity from foot traffic. In order to obtain the greatest output voltage feasible, the sensors are set up in this fashion. This is then given to our monitoring circuitry. The microcontroller-based monitoring circuit enables the user to keep track of the voltage created, which is then supplied to a rechargeable battery. On an LCD screen, it also shows the charge that was produced. Working Moder of Foot Step.

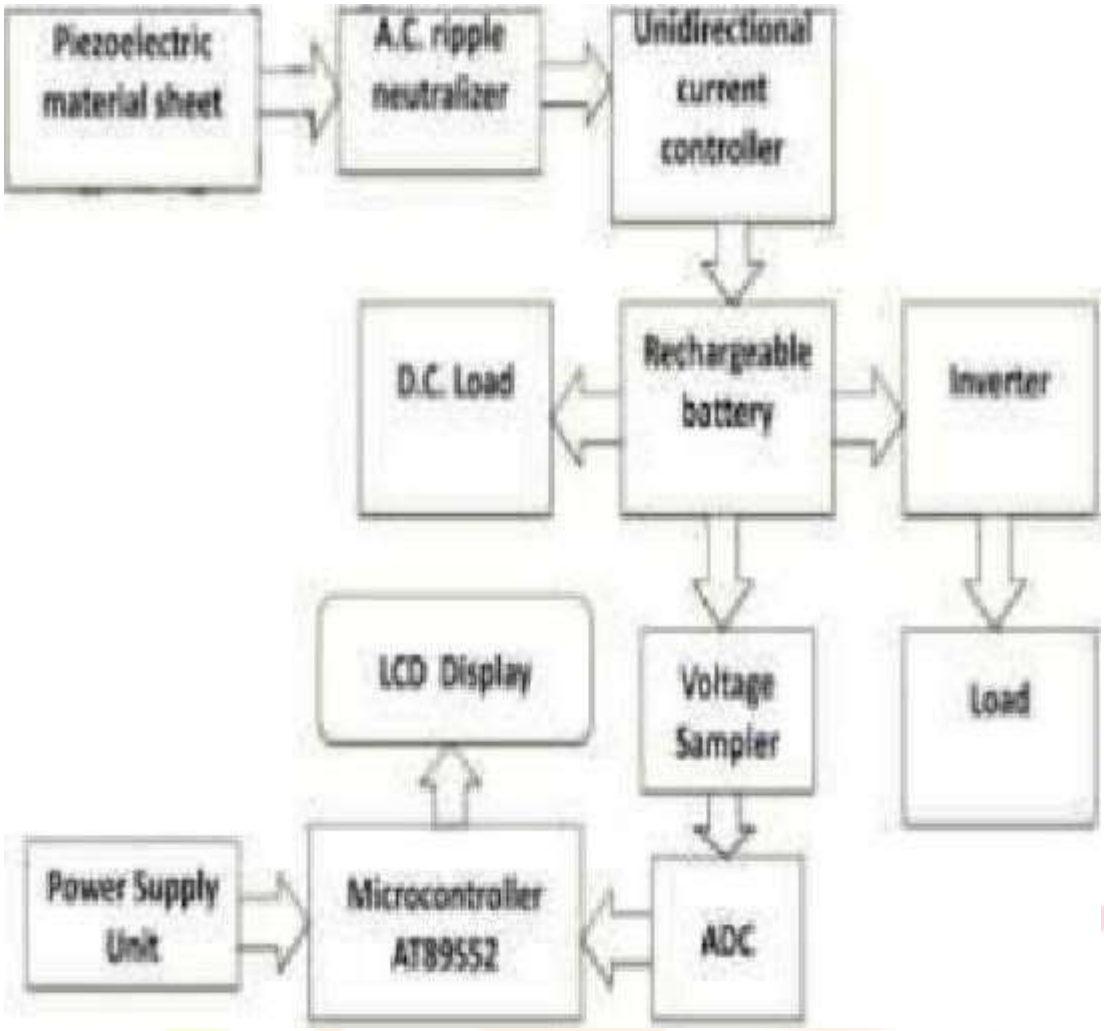

Figure 2: Implementation Of block diagram

V. WORKING PRINCIPLE

The piezoelectric effect serves as the foundational operational principle for our project. Walking converts mechanical energy into electrical energy through the utilisation of unconventional energy. The foot step board's 15 piezoelectric sensors are linked in parallel. When pressure is applied to the sensors, mechanical energy will be transformed into electrical energy. The linked 12V rechargeable battery will store this electrical energy. Additionally, we offer power to the circuits using a standard battery charger. Utilising an inverter is necessary to convert 12 V DC to 230 V AC. The loads are turned on using this 230 V AC electricity. We can operate AC loads with this AC voltage.

The functioning model of our research is depicted in figure 3 above, where A tile has 15 piezo discs linked in parallel. that is coated in a foam sheet and other parts are set up as indicated.

Figure 4: Working

AS seen in the image above, electricity is produced while the piezo tile is under pressure and is stored in the battery. In this case, an LDR is employed in place of a switch, and when the LDR is covered, the battery's energy is used to power an ac load-the light-to shine.

IX. CONCLUSION

The concept is successfully tried and implemented, making it the best conservative, practical energy solution for regular people. This can be used in some situations in rural areas when control accessibility is limited or non existent altogether. India is a developing nation where it is extremely difficult to manage the energy needs of a vast population. AC and DC loads are both under our control. using this task, depending on the power we provided to the piezoelectric sensor. In highly populated countries, this method provides efficient power generation because it decreases regulate demand without causing environmental damage. Only 11% of our energy is actually derived from renewable sources. Upon completion of this project, we will be able to address the energy crisis problem as well as bring about significant global ecological change.

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