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FOOTSTEP POWER GENERATION

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Abstract: Nowadays, energy and power are one of necessities in this modern world. As the demand of energy is increasing, the ultimate solution is by implementing the renewable sources of energy by designing Footstep Power Generation. It is designed to be very useful at places such as universities, office and others. By using footstep power generation design, the project will be able to show how a simple mechanical motion could be converted into electrical power. When a person walks, energy is lost in the form of vibration. The pressure exerted can be converted from mechanical energy to electrical energy. This system could store the electrical energy in the 6V rechargeable battery and the display the voltage of the battery on LCD by using Arduino Uno. The power produced can be utilized by lighting up lights along the corridors or emergency power failure situations.

Keywords: Piezoelectric sensor, Arduino Uno, Energy Harvesting, Power generation, LCD display.

INTRODUCTION

Electricity has become a necessity for the human population as electric power are being used by various operation in modern technology. The need of power is increasing day by day. At the same time, the wastage of energy also increased in many ways and lead to a huge amount of pollution. There is a need for alternate power generation. Meanwhile, the footstep of pedestrians is receiving less attention in generating power to turn on electrical devices. The objective of this project is to generate electric power through footstep pattern. For this project, the energy will be generated through footsteps. The main principle of this power generation technology is the piezoelectric effect which is the pressure from footstep is converted to electrical energy. An array of 10 piezoelectric sensor is connected in series-parallel connections to generate the power. From the circuit, the battery will be supplied with the voltage generated for charging and supplying to the loads. Arduino Uno is programmed to display the status of the supplied voltage from the battery on the LCD. As walking is a common activity in our life so when a person is walking, they lose the energy in the form of vibration due to transfer of weight on to the surfaces. This energy can be converted into usable form such as electrical form and can be stored for later use to light up the lights along the corridor or during emergency situations.

METHODOLOGY

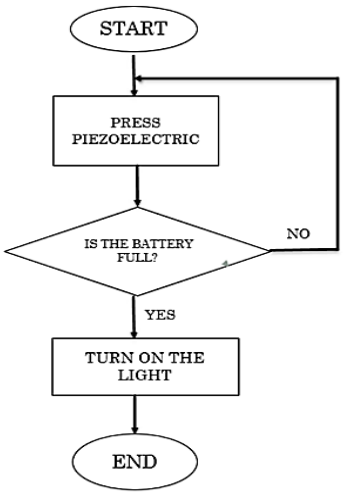

Figure 1. Flowchart of Footstep Power Generation

Based on Figure 1 above, an array of Piezoelectric sensor has been connected in series-parallel connections. When the sensors are pressed, the force applied will be converted into electrical energy that can be stored in the rechargeable battery for later use. Bridge Rectifier is used to convert AC to DC so that the generated voltage can be stored in the battery. If the battery is full, the relay will stop the Piezoelectric circuit from generating more energy to the battery and the stored charge can be used to light up the lights. But if the battery is not full, the Piezoelectric sensor must be pressed until the battery is full. Arduino Uno is interfaced with LCD to display the voltage stored in the battery.

RESULT AND DISCUSSION

Based on the analysis results from the experiments conducted, it can be observed that by applying various forces on the piezoelectric, different voltage readings are displayed. Weight varied from 40kg to 80kg were made to step on the piezoelectric to determine the voltage generated. The output from a single piezoelectric transducer was low. So, a total of 10 piezoelectric sensor are connected in series-parallel combination to get the output voltage.

Table 1. The results of applying various forces on the Piezoelectric sensor

No.	Weight (kg)	Voltage (V)	Current (μA)
1.	40	1.2	0.4
2.	50	1.9	0.9
3.	60	2.7	1.5
4.	70	3.1	2.5

CONCLUSION

As a conclusion, the Footstep Power Generation project could be implemented in crowded areas such as the walkway between buildings in the campus where a lot of students passes through every day. Footstep Power Generation is the best economical, affordable energy solution where the piezoelectric sensors require little maintenance. By using this project, the power generated can drive loads based on the forces that were applied on the piezoelectric transducer. Footstep Power Generation could also reduce the cost by using renewable energy and students will be exposed to a healthier life in the campus and could bring more benefits to the university.

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