CHARGING SYSTEM POWERED BY SOLAR PIEZO ENERGY

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Abstract

This project speaks to an sun based and piezo energy to produce an power for streetlights.This extend exemplify how to to utilize the solar-energy and the locomotion from human strides of individual walking on piezo tile. The sun powered is used to grab the light energy and convert it into electrical energy. Which is more than the voltage at a point battery will be charge. The power produced through an sun based is sensed by Arduino microcontroller is shows on LCD. Similarly, the power produced through an footstep on piezo tile is shown on LCD. By this way piezo and solar can be able to charge the battery and monitor the generated voltage shows on LCD display.

A person usually burn energy in the form of calories when the person walks, wherever in the dedicated network of footboards a person goes or moves energy from footsteps can be generated for using resources operating on power by accumulating each and every footstep's energy. By this methodology as energy generation and conversion is the most vital for all well beings for sustenance of their livelihood.

Key Words- Solar, Piezo, Arduino, LCD

I. INTRODUCTION

In this project, we produce electric energy in a unique way by walking and running with our footsteps. Non-conventional energy system is very necessary for our country today. The non- conventional energy is used to convert the mechanical energy into electrical energy.

Now a days, it has become necessary for the people work at night and return home late at night. So safety parameters need to be implemented widely on highways. This is best way to achieve by implementing proper lighting system on highways. There is need to consider the effective monitoring

of this lighting system. The existing system is like, the high way lights will be monitored manually which wastes a lot of human energy as well as valuable time, apart from wasting energy when the appropriate monitoring fails.

This drawback can be overcome by implementing a sophisticated automatic monitoring system through which

high way lighting can be monitored automatically before the sun sets and they are switched off the next day morning after there is sufficient light on the roads. But the actual timings for these high way lights to be switched on are when there is absolute darkness. This project gives the best solution for electrical power wastage protection. the manual operation of the lighting system is completely eliminated devices and promoting environmental sustainability.

II. LITERATURE SURVEY

Mohd Rizwan (2017) In this paper titled "A review paper on electricity generation from solar energy," the authors examined solar energy production from sunlight, highlighting its trends and future prospects. They also discussed how solar panels work, their types, and emphasized various applications and methods to maximize the advantages of solar energy. The authors concluded that solar energy offers more benefits compared to traditional energy sources like fossil fuels and petroleum. It is seen as a reliable and promising alternative to meet growing energy demands. The study suggests that solar energy and solar cell research hold significant potential for the future globally.

Govind et al. (2015) In this paper titled" A Hybrid Piezoelectric-Solar Based Power Generation System" A hybrid energy system combining solar panels and piezoelectric materials has been successfully used to power both DC and AC loads to suggest that this approach enables consistent energy production from renewable sources, adapting to weather conditions. Combining solar panels with piezoelectric tiles could produce enough electricity to power a sports stadium, a street, or even a nearby community, making it a promising area for future research.

Avatar (2019) In this paper titled "Hybrid electricity generation using solar energy and kinetic energy of player's footstep". It combines solar panels and special tiles to generate energy. The solar panels collect energy from sunlight, while the tiles turn footsteps into power. In this system can generate energy from players on the field and spectators entering the stadium. The tiles alone can produce 27 MWh of energy from players and 210 kWh from 10,000 spectators. Solar panels add 13.26 kWh. Using both technologies together greatly increases energy savings compared to solar panels alone. This system is perfect for crowded areas, helping to save energy and fight climate change.

Zhao et al. (2020) developed a solar-piezoelectric hybrid system for mobile phone charging applications. Their approach combined solar energy collected by flexible panels and piezoelectric energy from mechanical vibrations. They demonstrated how the system could charge mobile phones even in environments with intermittent sunlight.

Liu et al. (2017) explored a solar-piezoelectric hybrid system to enhance energy harvesting for low-power electronics. They focused on energy storage and management techniques to optimize the energy produced by both solar and piezoelectric generators. Their study demonstrated the feasibility of using this hybrid system for remote sensing applications.

Bansal and Kothari (2021) focused on optimizing the performance of solar-piezo hybrid systems through the use of an adaptive control system. The study explored the benefits of dynamic energy management strategies for applications requiring continuous power, such as in electric vehicles.

III. WORKING METHODOLOGY

An charging system powered by solar and piezo energy employs an Arduino utilizes the piezo tile that produced energy is converted into electrical energy. An Arduino Microcontroller processes the generated electrical signals, implementing control logic for optimal power management, storage.

The LCD display shows generated voltage from piezo and solar. The system devices such as rechargeable battery to store and release power as needed. This technology presents a sustainable and innovative approach to harnessing human motion for practical applications, offering a potential solution for powering low-energy.

Project consist of solar and piezo tile which act as input device. Which produce an electrical energy. These both input devices are connected to PN junction diodes which act as a unidirectional to charge the battery. LCD display is connected to I2C module for showing the generated voltage and it act as a output.

Mainly output deviecs are street lights. In the proposed work the two led lights are the output devices where the piezo energy and solar energy is stored in the battery and used for later use.

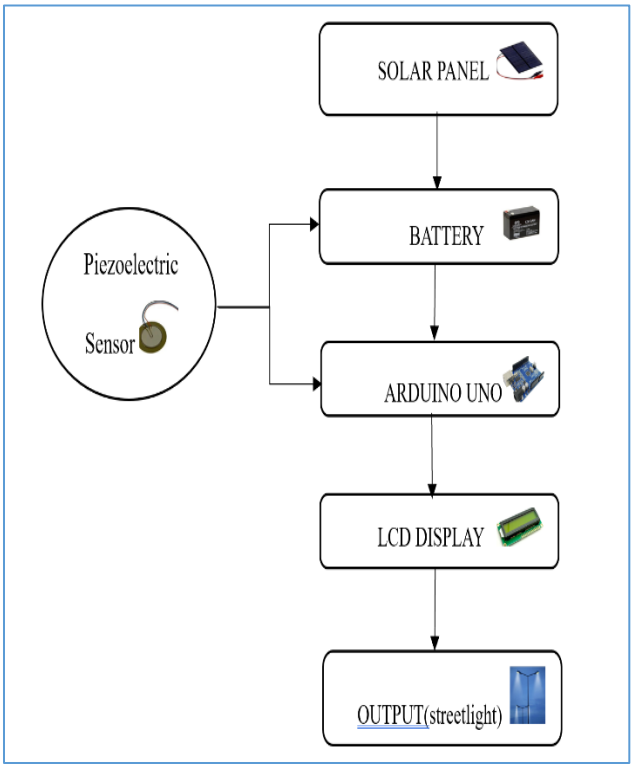

Fig 1: block diagram

Components List

- Arduino Uno
- Battery 12V
- Solar Panel
- Piezo Sensors
- LCD Display
- LED lights (street light)

These are the components which we used in our project.

.An Arduino Microcontroller Processes the generated electrical signals, implementing control logic for optimal power management storage.

Mainly Arduino Uno manages the data which will show the data on the LCD display. Where battery will charge via solar and piezo.

The charged battery is consumed by street lights (LED Lights).

The piezo tile and Solar panel generated voltage will be appear on the LCD display.

LCD display shows the accurate data which the solar and piezo were generated.

IV. RESULT

Our aim is to optimize the cost and efficient energy conversion.

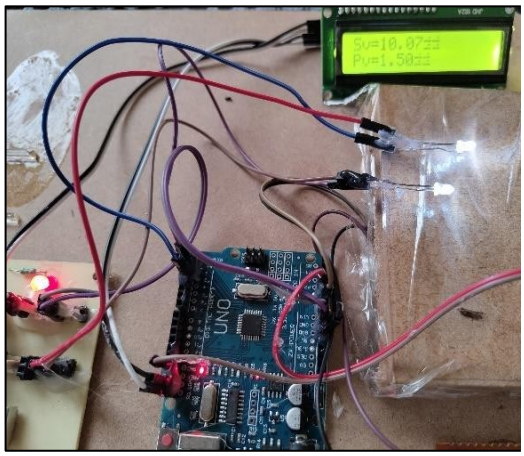

Fig 2 Proposed Work

Our project focus on sun energy from solar panel and locomotion using piezo tile. The piezoelectric sensor converts pressure from footsteps into electrical energy and solar panel converts light energy into electrical voltage which can be stored in a battery. Used for various applications like streetlights.

A. Figures and Tables

-Solar Panel Testing-

The solar panel is connected to the battery and positioned direct sunlight.

Time	Generated output Voltage
8:00AM	10.07V
11:00AM	10.07V
1:10 PM	10.07V
3:30 PM	10.07V
7:00PM	5.68V

Table1: solar generated voltage

Here we take some of the readings of our project from morning to evening timings where the solar is positioned to the sunlight.

-Piezoelectric Tile Testing

Pressure(kg)	Sensor reading(v)
0	0.0
10	0.11
15	0.59
20	1.32
30	1.78

Table 2: piezo tile generated voltage

People whose weight which is varying from 10kg to 30 kg were made to walk on the piezoelectric tile to test the voltage generating capacity of the Piezo tile. From the above, it can be seen that, the maximum voltage is generated when maximum weight/force is applied.

REFERENCES

The sites which were used while doing this project:

[1] https://en.wikipedia.org/wiki/ Arduino Uno

[2] https://www.electronicforu.com/

[3] https://www.allaboutcircuits.com/

[4] Piezoelectric crystals: Future source of electricity, international journal of scientific engineering and technology, volume 2 issue 4, April 2020 third year.

[5] Electricity from footsteps, S. S. Taniyan, B. B. Biswas, R. K. Patil and G. P. Srivastava reactor control division, electronics and instrumentation group and T. K. basu IPR, Gandhinagar.

[6] "Footstep Power Generation Using Piezoelectric Transducer" Kiran Bobby, Aleena Paul K, C. V Nimishak, International Journal of Engineering and Innovative Technology, vol.3, Issue 10, April 2021.

[7] Scott Meninger, Jose Oscar Mor-Miranda, Rajeevan Amirtharagah,anantha p. Chandrakasan, and Jeffrey

H.Lang,Fellow, "Vibration-to-electric energy conversion," IEEE Transactions on Very Large Scale"

[8] N. A. Ahmed, M. Miyatake, and A. K. Al-Othman "power flucations suppression of stand alone hybrid generaion combinining solar photovoltaic and fuel cell system," in Proc. Of energy conversion and Management, Vol. 49,pp.2711-2719, October 2008.