

FOOTSTEP POWER GENERATION SYSTEM USING MICROCONTROLLER

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Abstract - Every day the population of the world grew and the paintings of enterprise accelerated. At the equal time, power losses have extended in lots of methods. So the principle answer is to transform that energy right into a usable form. As generation has stepped forward and using devices has multiplied, the range of electronic devices has also extended. Electricity era is rarely completed through conservative techniques. We want some other manner to generate power. At the same time, the energy of human movements is fed on in lots of methods. To overcome this problem, the lost electricity may be transformed right into a form the usage of a piezoelectric sensor. This sensor converts its impression into voltage. Using this power saving method, that is a power era machine, we generate strength

Keywords - *Atmega 328p, LCD Display, Rechargeable battery, Footsteps, Piezoelectric Sensor, Microcontroller*

1. Introduction

The use of traditional techniques of power era including coal, timber, diesel gasoline, etc., constantly help our herbal resources consisting of fossils, the demand for strength exceeds the supply because of population growth. In addition to this, it's also known as the populace of older human beings. It has the

shape of pulses, vibrations, sounds, etc., due to the transfer of his weight as much as the surface of the road, and his ft fall to the floor with each step. Which

capability to lessen urban space, adding a sense of fluidity and encouraging humans to spark off the distance with their motion. The truss vicinity is made of sealed components that are smooth to duplicate, but are expensive to provide in this nation. This technology will facilitate the future introduction of a new urban panorama of sports activities with spectator regions, song halls, theaters, nightclubs and massive venues for gatherings, demonstrations and celebrations. Applicable and crucial in extra populated countries which include India and China, in which roads, educate stations, stations, temples, and so forth. There are boats and thousands and thousands of human beings transferring around the clock. All this bio-manipulated human power, if it is able to be harnessed, can be a high-quality invention, and crowd power farms will be very useful assets of strength in overcrowded nations. A walk via the "Smart Farm", a ground, will then be catered for unemployed those who can improve their fitness by using working on such efficient farms. The electricity generated in such farms could be beneficial for close by desires.

Description of project

Step by step power era may be an efficient way to generate power. Walking is the maximum commonplace hobby in human existence. When someone walks, he gives a few energy to the surface of the road in

writer, 5,000 stages an afternoon can be seen on any floor location inside the excessive-site visitors region. Based on this records, only five layers of pavement may be sufficient to hold the station lighting on all night. [1]

This article become proposed by using (Shiraz Afzal, Farrukh Hafiz - 2014) and goals to generate electricity

ends up in a lack of electricity in movement. This power is captured with the aid of movement and may be transformed into a useful shape, such as energy. This system includes many straightforward shapes that are established underneath the transferring floor. When on foot in this platform, the load of the body compresses the piezoelectric transducers that generate the power. The cutting-edge generated is saved inside the battery. Greater stream of humans will generate extra anxiety. A piezoelectric transducer is an electrical generator that generates a direct current (voltage) whilst stress is carried out to it.

Problem Statement

In some growing and newly industrialized nations, almost all cities and villages enjoy electricity outages for several hours a day. People in those nations can use inverter strength (batteries) or a sun/electric energy generator in their homes to strength the automobile. The use of backup turbines is commonplace in commercial and IT centers. This eventually fails the strength. The reason of this work is to generate energy with steps as a source of renewable strength, which by using entering via positive gadgets along with tracks, ladders, pipes, and those structures may be mounted some place else, especially in greater frequented regions.

2. Literature survey

In this paper, the writer of the studies (Tom Josh W., Binoy Boban, 2013) made a model manufactured from stainless steel, recycled automobile tires and recycled aluminum, and consists of a integrated lamp that illuminates the steps every time. . Transformed into energy (using simplest 5 percentage of the energy generated). The average area of a sidewalk generates about 2.1 watts of energy. And, according to the

the AC output from the secondary winding of the 230/12V step-down transformer. A screw and pin is a sort of linear actuator that includes gears that convert rotational motion into linear movement. Motion The "kick" with the rack exercises the teeth. In this text, while power generation steps up to use its power from a non-renewable electricity supply. There is not any need for strength from external sources (grids) and less pollution on this source of strength, but it is beneficial

while humans stroll at the ground. Produce a thousand watts and if we installation this kind of one hundred panels with this system, then it can produce 1 megawatt, since only 11% of our renewable energy is number one strength. If this challenge is implemented, we will not best have the ability to overcome the hassle of the electricity crisis, however additionally make contributions to a wholesome international environmental trade. In this task, the fly is connected to a tools gadget that makes the dynamo rotate whilst the tiles are diminished at the boat, the generated power is stored in batteries, in addition we can be capable of monitor and manage the quantity of strength. Born . [2]

In this studies paper, the authors used a tool with the following specifications: Motor voltage: 10 volts Type: DC generator, RPM: one thousand RPM, Mild metallic tools 1, wide variety of enamel: fifty nine (huge equipment), quantity of enamel: 36 (small gear) , Type: Cylindrical equipment, tools used No.: 2 Spring 1- Load capacity: 60-ninety kg, moderate steel, Total displacement: 5 inch, bearing N35, Shaft 1-Diameter: 15mm-Material: Mild metallic The writer concludes this enterprise that the conversion approach is easy, green, and does now not pollute the surroundings [3].

In this studies paintings, the authors studied the 3-stage energy generation technique, specifically the piezoelectric technique, the rack and pin method, the piston and fuel technique, and determined that the rack and pin mechanism is more green with low operation and maintenance charges. [4]

In this research paintings, the authors used a regulated deliver of 5V, 500mA. A full wave bridge rectifier kind is used to rectify therefore placed in public regions in which people stroll and need to travel through it to go into or exist.

Proposed System

These systems can then generate step of tension with every foot. For this, piezoelectric sensor is used that measures force, strain and acceleration, changing them into electric alerts. This device uses voltmeter to measure strength, LED indicators, system weight dimension, and battery for better system demonstration. When piezoelectric force is applied to sensor, that pressure is converted into electrical strength. In this motion, the output voltage is saved within the battery.

in areas together with all roads and all pedestrian steps that generally tend to generate non-traditional energy. Together with power.[5]

In this research work, the authors used eighty volts and forty mA from a unmarried circuit that become generated from a prototype as a first invention. The second invention presents ninety five volts and 50 mA from one circuit, and this generated power can be used to light the LED array and, after AC rectification, start the DC fan or rate the batteries. For excessive performance, a sturdy magnet is arranged vertically on the axis of the second gear, so that after the tools rotates underneath the strain of few weight, the magnet additionally rotates. The magnet is positioned in spherical brass loop. When the magnet begins to rotate in keeping with Faraday's regulation of electromagnetic induction, an EMF of induction will appear within the coil.[6]

3. Methodology

This layout is used with the goal of generating electricity gradually. The proposed system works as way to generate power by using the use of pressure. This layout could be very useful in public places like bus stations, theaters, railway stations, shopping shops, and many others. These systems are

At this stage of energy era, the goal is to transform the electricity of on foot, taking walks and jogging into electric electricity. He used to generate electricity whilst on foot or going for walks up stairs. The demand for electricity is increasing each day. However, the traditional sources of the electric industry are presently insufficient to meet the full energy demand. Therefore, many researchers and engineers are working on non-traditional approaches to generate energy. step-through-step electricity technology machine is likewise low-stage power er machine. Converts the mechanical energy of the stairs into electric power the use of transducers. This device of energy technology can end up very famous inside the maximum populated international locations, which include Pakistan, China, and India. It may be performed on the roads, stations and in lots of public locations. Although this gadget is little extr steeply-

The output voltage generated with the aid of the sensor is used for control DC loads.

Existing Methodology



Fig:1

The staging device is designed to capture typically wasted ambient systematic electricity and convert it into electrical energy. Piezoelectric fabric is used to generate strength. This technique uses piezoelectric additives, wherein deformations created by numerous way are at once converted into electric fee thru the piezoelectric effect. The electrical energy can then be controlled or stored for later use. In this undertaking we do not generate strength well, truly vi walking or strolling as an enter supply. The piezoelectric sensor will then ship the signal to the Arduino Uno and convert it into electrical electricity. Then the LCD will display the amount of voltage generated with the aid of the circuit. The maximum voltage generated on this challenge is 8.29V. The voltage saved within the battery can then be used to fee the mobile telephone.

Block diagram

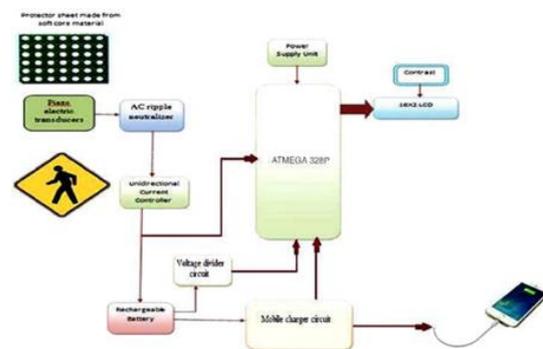


Fig:2

When pressure is carried out to piezoelectric transducer, it converts the force into electrical power. The converter controls the ripples generated in the voltage, and the unidirectional modern-day controller controls the device

priced, it may make huge difference in the energy generation.

The step energy generation device essentially converts the energy of the foot into electricity using piezoelectric sensor. piezoelectric sensor is transducer that converts strength into electrical strength.

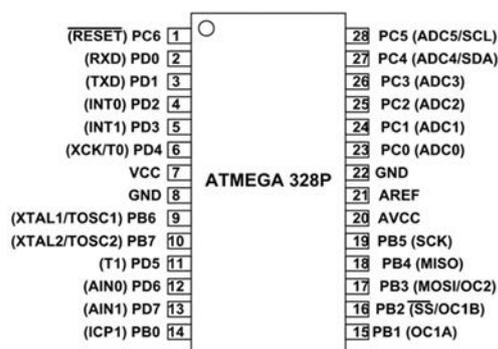
Step by step energy generation gadget

Operation:

Now the reason for the modern strength of the generative operation consists in these major places; piezoelectric sensor related to microcontroller and used as transducer to convert electrical energy into electric power. It consists of numerous piezoelectric sensors connected in series. The kinetic strength is transformed into electric electricity by using chain of linked converters. The voltages generated by means of the piezoelectric sensors are implemented to the circuit elements to achieve the proper output signal. The output energy is stored in the batteries. all AVR controllers as utilized in Arduino forums.

The ATMEGA328P-PN is famous microcontroller as it's far the main issue of Arduino forums. The ATMEGA328PPN is the heart of the Arduino Uno and Nano 8 bit RISC with most clock velocity of 20MHz, 32KB of flash software program and 2KB of RAM.

Fig:3



Piezoelectric Sensor

present day using microcontroller. The voltage generated from the series sensors is stored in lead acid battery. This voltage can pressure AC or DC hundreds. For AC loads, natural with out inverting wave is used. The inverter converts saved lead acid batteries into 220 volt AC voltage. They can power AC voltage to AC hundreds. User can use any sort of inverter according to their requirement such as pure sine wave inverter, rectangular wave inverter and changed sine wave inverter. The plate rating also depends on the quantity of energy this is generated from the step. The ATMEG 328P microcontroller presentations the amount of battery rate.

Microcontroller ATMEG 328P

The ATmega328 is unmarried-seat microcontroller created with the aid of Atmel within the megaAVR family (later Microchip Technologies Atmel in 2016). It has an 8-bit RISC processor centre with modified Harvard structure.

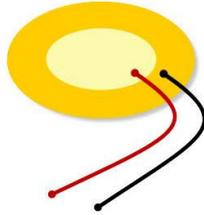
The ATMEGA328P is high overall performance low energy controller from Microchip. The ATMEGA328P is an 8-bit microcontroller based on the AVR RISC architecture. This is the most popular of generally do no longer bend. This is why piezoelectric sensors are so rugged, they have totally excessive herbal frequency, and top notch linearity over extensive range. In addition, piezoelectric er senses electromagnetic fields and radiation, permitting measurements to be made in harsh environments. Some materials (extensively gallium phosphate or tourmaline) are also extremely strong at high temperatures, allowing sensors to have an operational range up to 1000°C. Tourmaline reveals pyroelectricity in addition to the piezoelectric effect; is the capacity to generate an electrical signal while the temperature of the crystal changes.

A.C. Ripple Neutralizer

This challenge makes use of capacitive filter. Removes the ripple from the rectified output and raises the DC contemporary. The output sign obtained from this clear out remains regular till the maximum voltage and load are saved regular. However, if either parameter is changed, the DC voltage received at that moment is modified. Therefore, the controller is used within the output degree.

piezoelectric sensor is device that makes use of the piezoelectric effect to measure strain, acceleration, tension or pressure by converting them into an electrical signal.

Fig:4



Piezoelectric sensors have demonstrated to be flexible gear for measuring numerous strategies. The development of piezoelectric technology is at once associated with many inherent advantages. The high modulus of elasticity of many piezoelectric materials is similar to many metals and reaches 10^6 N/m². Although piezoelectric sensors are electromechanical structures that reply to compression, the sensing factors

price for in addition processing. The sample and protecting circuit are designed the usage of best one capacitor and one MOSFET. The operation of this circle is easy. When CK is high, it's going to switch on the MOS, which in flip permits the output voltage to observe the enter voltage. When CK is low, the MOS transfer might be off.

16X2 LCD



Fig:5

16X2 LCD show is used in the electricity er assignment to display the voltage fame. It additionally has pin to adjust the contrast.

4. SYSTEM ARCHITECTURE

piezoelectric fabric converts implemented strain into electrical electricity. The source of pressure can be both the load of shifting cars or the burden of human beings taking walks on it.

Unidirectional Current Controller

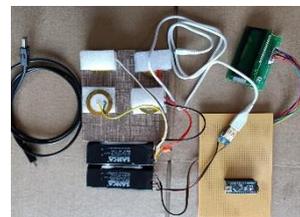
As said in the time period, this circuit most effective allows drift in single path. These are diodes and thyristors. In this task diode (D=1N4007) is used as unidirectional current controller. The fundamental characteristic of diode is that it permits cutting-edge to float in one direction only even as blocking off contemporary in the opposite direction.

Voltage Sampler

The voltage probe or commentary and shield circuit is an vital analog constructing block, and voltage fashions are used in capacitors and analog-to-digital converters. The foremost function of the pattern and preserve circuit is to sample the analog i/p signal and maintain hard and fast to obtain forty V output voltage with excessive cutting-edge density. From the battery, DC load connection is furnished. An inverter is hooked up to the system to permit the AC load to be related. The generated voltage tile can be seen at the LCD show. For this, ATMEG 328P microcontroller is used. The microcontroller uses crystal oscillator for its operation. The output of the microcontroller is then transferred to the LCD, which then displays the voltage degree.

STUDY OF CONNECTIONS

Next, to decide the connection ratio that produces the practical voltage and the specified present day, 2 PZTs are linked in series.



The output of the piezoelectric fabric isn't always steady. bridge circuit is then used to convert this AC voltage to linear. Again, the AC ripple filter filters out similarly fluctuations in the output signal. The output DC voltage is then stored in rechargeable battery. Since the output energy of unmarried piezofilm changed into very low, the aggregate of numerous piezofilms was investigated. Two viable connections have been examined, collection parallel connections. parallel connection indicates enormous growth in output voltage. When linked in collection, the addition of piezo film will increase the output voltage, but now not in linear percentage. Therefore, parallel and collection connection is used right here current from it is horrific, even as right here in parallel it is right, however the voltage is horrific. But this hassle is solved with chain current from it is horrific, even as right here in parallel it is right, however the voltage is horrific. But this hassle is solved with chain parallel parallel connection, wherein you may get great voltage with cutting-edge.

Advantages

- Renewable power source
- It is safe to domesticate
- Does no longer damage the atmosphere
- No smoke,ash or any poisonous chemicals are generated.
- Changes energy into electrical energy

Unique Features

- Reduce Environmental pollutants
- Use of renewable energy source
- Easy installation and cost efficient

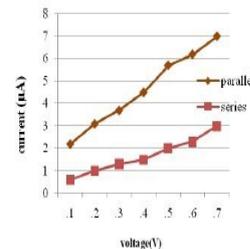
Applications

- Opreation of road lighting
- Can be used in agriculture
- Parks and Public places
- Home utility
- Railroad station

force sensor and voltmeter are related to this collection connection. When exceptional forces are applied to this connection, the corresponding stresses are mentioned. In addition, the voltage generated from the collection connection and the modern are measured. Similarly, parallel and collection-parallel connections are made, in addition to graphs, as proven inside the figures beneath, respectively.

V-I graph for parallel and series combination

From the graph it may be seen that the voltage in series



is ideal, but the

ACKNOWLEDGEMENT

We are pleased to acknowledge our sincere thanks to Board of Management of **SATHYABAM** for their kind encouragement in doing this project and for completing it successfully. We are grateful to them.

We convey our thanks to **Dr. N.M. NANDHITHA, M.E., Ph.D** Dean, School of Electronics and Communication Engineering and **Dr. T. RAVI, M.E., Ph.D** Head of the Department, Dept. of Electronics and communication engineering for providing me necessary support and details at the right time during the progressive reviews.

We would like to express my sincere and deep sense of gratitude to our Project guide **Dr.R Pandian M.E.,Ph.D** for his valuable guidance, suggestions and constant encouragement paved way for the successful completion of our project work.

We wish to express my thanks to all Teaching and Non-Teaching staff members of the Department of Electronics and Communication Engineering who were helpful in many ways for the completion of the project.

5. Summary

These steps are the principle supply of energy era. This sort of strength er has zero percent pollution. This method of electricity technology can be used where the available strength is much less or extraordinarily low. India is growing united states with huge population, which makes power management prime challenge. Using this scheme, we will get each AC and DC depending at the implemented pressure. To get extra energy, we will typically growth the variety of sensors. Our in addition research is to increase the quantity of energy without increasing the piezoelectric sensors.

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