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POWER GENERATING USING HUMAN FOOT STEP WITH PIZEO ELECTRIC SENSOR AND TREADMILL

Gopinath.R[1] , M.Lavanya[2],M.Arivalagan[3]

[1]UG Student,Electrical and Electronics Engineering, Saveetha School of Engineering, Saveetha Institute of Medical and Technical Sciences, Chennai.

[2] Assistant Professor, Electrical and Electronics Engineering, Saveetha School of Engineering, Saveetha Institute of Medical and Technical Sciences, Chennai

[3] Assistant Professor, Electronics and InstrumentationEngineering, Saveetha Engineering College, Chennai

vr.gopi86@gmail.com[1],laviraju88@gamil.com[2],arivu.mit@gmail.com[3]

ABSTRACT

The Footstep Power Generation, here we proposed a power generation technique through piezo sense and treadmill stride control generator framework that uses the piezo electricsensors to produce control through strides as a wellspring of sustainable power source that we can get while strolling on a specific course of action like venturing foot on a piezo tiles. This venture portrays the utilization of piezoelectric materials keeping in mind the end goal to collect vitality from individuals strolling vibration for producing and amassing the vitality. The essential working standard isbased on piezo electric sensors. At the point when the ground surface is designed with piezo electric innovation, the electrical vitality created by the weight is caught by floor sensors and changed over to an electricalcharge by piezo-electric transducer. These sensors are put such that it creates greatest yield voltage. This yield is given to our checking hardware which is microcontroller based circuit that enables the boost converter firingangel and charges a battery, and this power source has numerous applications. Our task to applythis type of power generation in highly populated area and gym.

Keywords: piezoelectric sensor, treadmill,Boost converter, LED Light, dc generator.

INTRODUCTION

The conversion of energy that exhausted and wasted while walking or running. This energy is converted in to electrical energy. This is the latest trend in electrical power generation and it is achieved by converting human's kinetic energy.

However there are a unit different physical Phenomena as well as piezo effect which will conjointly convert mechanical movements into electricity.The piezoelectricity exists in 2 domains, the primary is that the direct piezo electricity that describes the material's ability to remodel mechanical strain into electrical charge, the second kind is that the converse impact, that is that the ability toconvert associate applied electrical potential into mechanical strain electricity ceramics belong to the cluster

of ferroelectric materials. Ferroelectric materials area unit crystals that area unit polar while not an electrical field being applied. At this point of time, power has turned into a life saver for human populace. Vitality is only the capacity to take every necessary step. In our life, Electricity is most generated voltage in usually utilized resource. Piezoelectricity impact alludes to the capacity of a few materials to create an electric potential. A treadmill is a device basically used for running and to loss calories.in our project we are converting that energy into electrical energy.

Voltage generation can furnish a handy substitute to natural vigour sources used to function certain Types of sensors/actuators, telemetry, and MEMS contraptionsthe advances have allowed infinite doorways to open for energy harvesting strategies in realistic actual-world applications. Plenty of the look at into energy harvesting has all in favour of techniques of amassing the power except an enough quantity is praise, permitting the intended electronics to be powered. With the introduction of the countless handheld movable digital items, energy gather has grown to be one in every of the exciting topics of curiosity to furnish movable electrical power. The most often used sources are: solar voltage, wind power and electrical energy. This achieve skills of is curious about electrical energy considering that the truth that it depends on the mechanical stress or traces to get vigor, whereas the reverse sources don't appear to be reliable in the least instances

Using a treadmill with no incline makes walking or running even easier than running outside on level surface. This can be as a result of there's no wind resistance and a motorized treadmill assists with movement versus your own body pushing and pull itself. Mistreatment incline could be a good way to extend calorie burning and muscle building throughout every exercising on the treadmill. Most treadmills have incline settings anyplace from. 5% to fifteen and a hundred and twenty fifth is taken into account to be constant resistance level as an outside surface with no incline.so we are using an incline treadmill and coupling generator to that and converting that rotating energy in electrical energy.

PIEZOELECTRIC SENSOR

The most of the analysis at intervals the energy field is to develop sources of energy for future. It is time to hunt out renewable surceases of energy for the long term. Electricity materials area unit being loads of and loads of studied as they find yourself to be very uncommon materials with very specific and interesting properties. In fact, there materials have the flexibleness to supply electricity from energy as associate degree example they'll convert mechanical behaviour like vibrations in to electricity. Such devices area unit usually named as energy harvesters and can be utilized in applications where outside power is untouchable and batteries aren't a doable alternative. Whereas recent experiments have shown that these materials is also used as power generators, the amount of energy created continues to be very low, so the need to optimize them.

Electricity materials have a pair of properties that area unit define as direct and converse result. Direct result's that the property of some materials to develop electrical change on their surface once mechanical stress is In previous number of years low power electronic devices.
Unit increased quickly. The devices area unit utilised in associate degree outsized range to comfort our daily lives.

With the increase in energy consumption of these transferable electronic device. Completely different renewable energy in human surroundings arise a replacement interest among during this project I plan to develop an electricity generator.

Which will end up energy from vibration and pressure on the market on another term (like people walking). This project describes the use of electricity materialstherefore on reap energy from people walking vibration for generating and accumulating the energy. This concept is in addition applicable to some large vibration sourceswhich could notice from nature. This project in addition represents a footstep Electricityenergy gathering model that's worth effective and easy to implement. Exerted on them, whereas converse result's that the property of some materials to enhance and develop mechanical stress once associate degree electrical charge is induced

POWER GENERATION METHODS

One of the foremost effective ways of implementing an influenceharvesting system is to use mechanical vibration to usestrain energy to the electricity material or displace associate degree magnetismcoil. Power generation from mechanical vibrationusually use close vibration round the power gatherdevice as associate degree energy supply, then converts it into helpfulelectrical energy, so as to power alternative devices. The analysisin the following 3 sections has created use of mechanicalvibration so as to quantify the potency andamount of power capable of being generated, additionally onpower varied electronic systems.

DESIGN OF PIEZOELECTRIC MAT

For electricity mat, a mat of dimension 30cm x 30cm is taken. The thickness of the mat is two millimetre. To implement and shield the piezo-electric sensors a plutonium (i.e. poly urethien) sheet is placed on a mat. This plutonium sheet is of 0.3mm. On this sheet sixteen piezo-electric sensors area unit placed. Because the power output from one piezo-film was very low,

Two doable connections were tested - parallel and series connections. The parallel association failed to show important increase within the voltage output. Here utilized for manufacturing voltage output with high current density. An additional tile of same dimension is taken to position on the primary tile, in order that it is ironed by the foot. Between these a tile springs area unit placed at the corners and nails area unit placed on the second tile such as the sensors at the middle of mat

in 4 x 4 arrangement. And thus, the piezo-electric tile is prepared for stepping. The model of piezo electrical mat is shown in fig 1

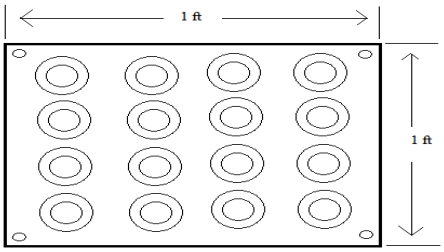


Figure 1 Piezo arrangement in mat

DESIGN OF TREADMILL POWERGENERATION

A treadmill is amachine to get work, and also the ideal physical exertion machine for beginners since it's straightforward to create up your endurance in a very style of ways in which. Treadmills square measure ideal for users of all shapes, sizes, ages and ability levels as a result of you'll do such a big amount of various things on a treadmill. Most treadmills additionally escort some type of a deck network to form understanding straightforward on the joints.

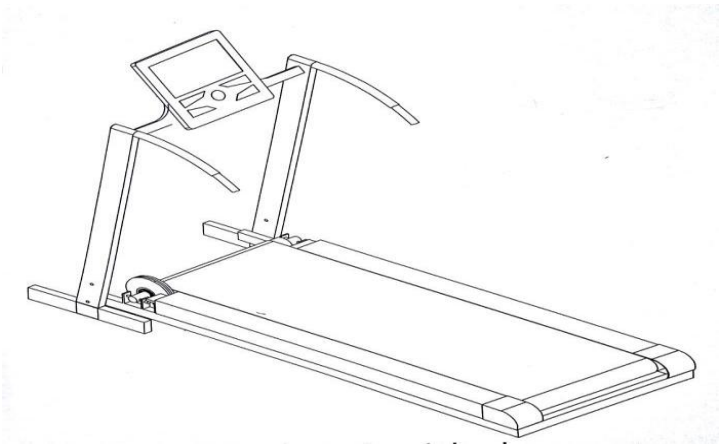


*Figure*2 Treadmill

DC GENERATOR

Generator is a gadget that converts mechanical power into electric energy. It works based on precept of faraday regulation of electromagnetic induction. The faradays law states that every time a conductor is placed in a various magnetic area, EMF is precipitated and this brought about EMF is same to the fee of exchange of flux linkages. This EMF may be generated while there is both relative area and relative time version among the conductor and magnetic field.in this project we couple a dc generator to treadmill to obtained dc voltage

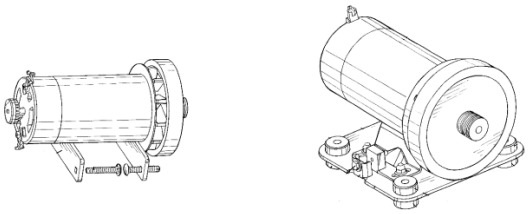


Figure 3 DC generator design with base plate

EXSISTING METHODS PIEZO ELECTRIC SENSOR POWER GENERATION

In this method of generating electrical the power they have used a running or jogging shoe as pressure and piezo electric sensor is placed in the bottom of the shoe .It converts the mechanical stress to electrical voltage. When the mechanical stress is applied to the sensor, electrical charge is accumulated on the crystal surface that can be extracted using a wire. In order to get maximum output from the sensor, it has to be set in its self-resonant frequency range. Piezoelectric sensor can be considered as an electrical equivalent of combination of resistance R, capacitance C and an alternating current source I connected in parallel

The output current that is generated from the piezoelectric sensor may be less, which may increase the time taken for charging a battery. But it can be used for charging an electronic device battery for emergency purpose where there is no direct source of electricity

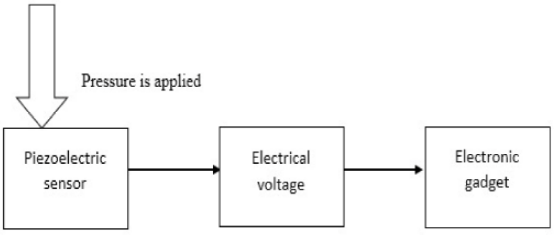


*Figure*4. Block diagram

The load that is used for storing the harvested electrical energy is mobile phone battery. Many mobile phones use a battery which is made of the combination of chemicals Lithium-ion "Li-ion" that needs a DC voltage of 3.6V for charging. For power storage it is better to use rechargeable battery than a super capacitor as rechargeable battery has high energy stored per unit weight and a slower discharge response

PROPOSED SYSTEM

Treadmill arrangement

Treadmill is a mechanical device which is used in fattiness industries. It is a device which can stimulate walking or running motion in an indoor place.

This type of instrument which will rotate according to the force which we apply to the moving belt the moving belt is made up rubber which is kept between the two rotating ball Barings

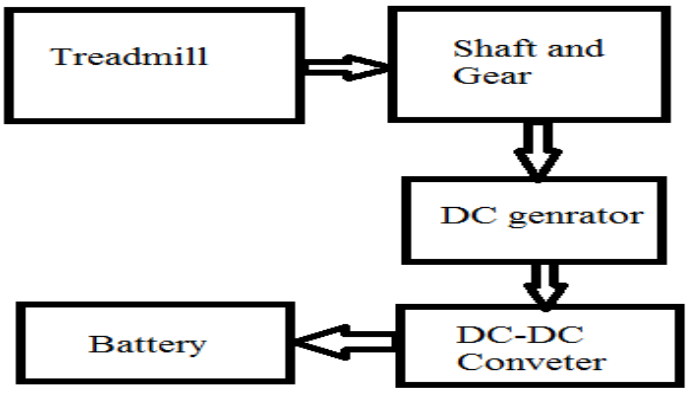


Figure 5. Block diagram of treadmill

Piezo electric sensor

From block diagram we can say that a stable output is possible by using boost converter and firing circuit. The boost is triggered by feedback signal from current and voltage sensor so the battery is charged at unstable output from piezo sensor.

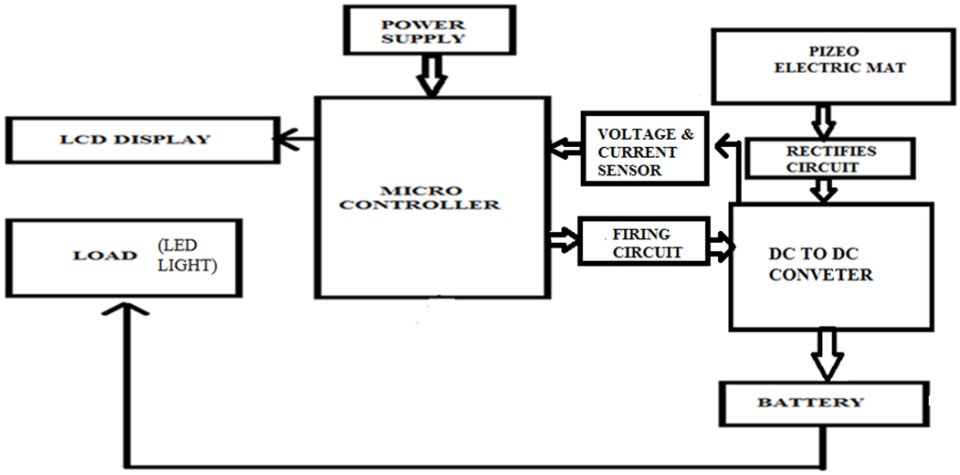
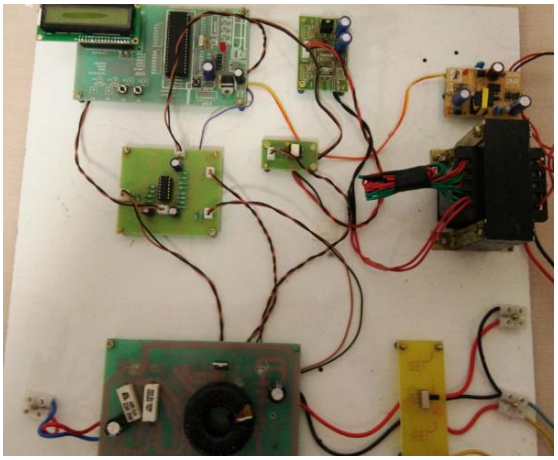
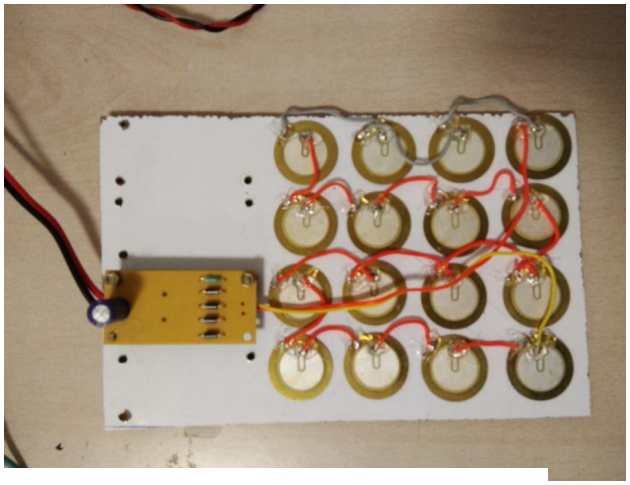
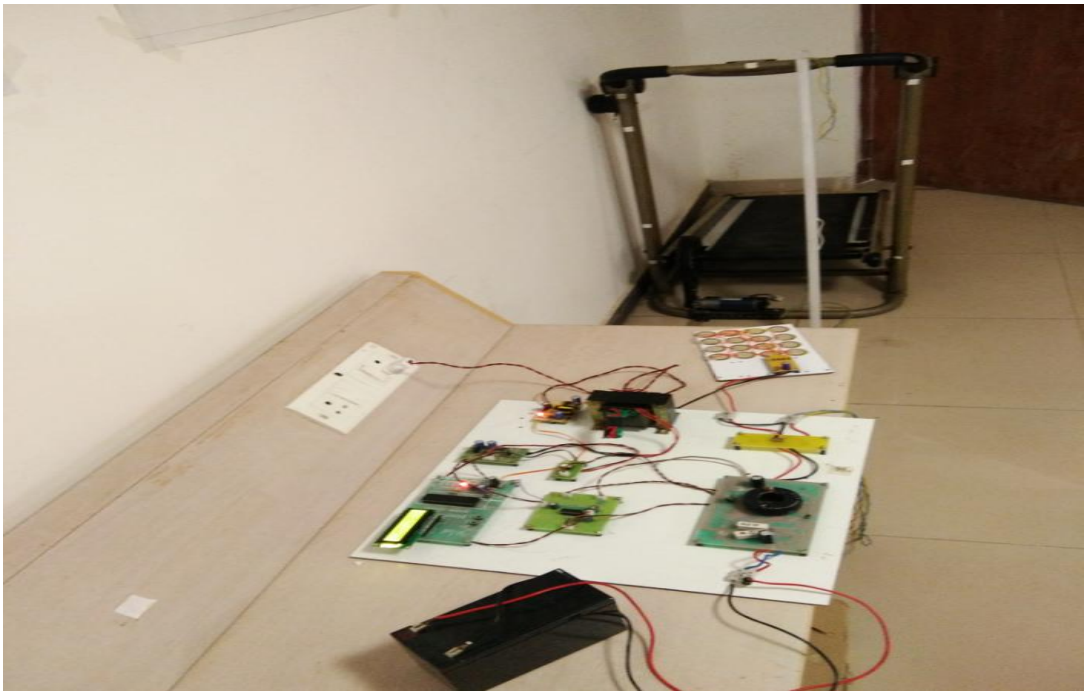


*Figure*5. Block diagram of Piezo electric sensor and boost converter





HARDWARE OUTPUT



RESULTS

Piezo electric sensor mat output

- In 1 square ft. we used 16 piezo sensor. As piezo sensors power generating varies with different steps.
- Minimum voltage=0.5 per step

- I took an average of 50 Kg weight pressure from single person. Considering the steps of a 50 Kg weighted single person, the average calculation is:
- It takes 1200 steps to increase 1 V charge in battery.
- So, to increase 12 V in battery total steps needed
- 12 × 1200 =14400 steps
- As we will implement our project in a populated area where foot step as source will available, we took an average of 2 steps in 1 second.
- For 14400 steps time needed
- =14400/(60 × 2)
- =480 minutes. (Approximately)

Treadmill output

- If the walking speed of person is 10km/hr.
- So, The speed of the treadmill is 110 RPM
- So the dc generator is rotated at 110 rpm
- Since we have gear system in DC generator that 110 rpm is converted in 1500 rpm
- So we can produce 12 V

CONCLUSION

This technique produces electricity with the assistance of electricity components that create use of the energy of human footsteps. The converter employed in the circuit stores the charge for future applications. So as to extend. The potency of the total system if super capacitors and converter square measure employed in place of the standard ones then a lot of charge will be hold on than the standard ones. The super capacitors store and discharge energy while not intense abundant energy.

Thus, the need of constant increase of power will be met by putting in these systems in heavily packed places. This may doubtless not solely overcome the energy crises however conjointly build up a healthy encompassing.

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