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Electronic Chair (E-Chair) Using Piezo Energy Harvesting

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ABSTRACT: Man has wished and used electricity at a growing charge for the sustenance and well-being in view that time immemorial. Due to this a lot of electricity sources had been exhausted and wasted. Proposal for the usage of waste electricity of strength with human locomotion could be very a lot applicable and crucial for noticeably populated nations like India wherein the railway station, temples etc., are overcrowded all spherical the clock. When the floors are engineered with piezo electric powered technology, the electric electricity produced through the pressure is captured through ground sensors and transformed to an electrical rate through piezo transducers, then saved and used as a strength supply and this strength supply has many packages as in agriculture, domestic software and road lighting fixtures and as electricity supply for sensors in faraway locations.

This paper is all approximately producing strength while human beings stroll at the chair. Think approximately the forces you exert that's wasted while someone walks. The concept is to transform the weight electricity to electric electricity. The Power producing ground intends to transform the kinetic electricity to the electric strength. Energy Crisis is the primary problem of global wide in those days. The motto of these studies paintings is to stand this disaster somehow. Though it won't meet the requirement of strength however as a depend of truth if we're capable of layout a strength producing ground that may produce 100W on simply 12 seating's, then for a hundred and twenty steps we can produce one thousand Watt and if we set up such a form of a hundred flooring with this device then it can produce 1mw. Which itself is a success to make it significant.

KEYWORDS: Renewable Resource, Piezoelectric Transducer, Rack and Pinion Mechanism.

I. INTRODUCTION

In order to address the growing international Department of Energy consumption and consumers, we call for to increase and put in force green, easy and renewable electricity supply. This report 's goal is to introduce an opportunity generator of power via way of means of the usage of piezoelectric substances. A chair designed with embedded piezoelectric with rack and pinion under which will generate electric power from the anxiety implemented at the chair via way of means of the strain sensation of the stress over it.

This may be implemented to public vehicle seating, bus stands and public parks. It is simple the efficiency of piezoelectric substances as a power supply. Since 1880, that is a feasible way to the phenomenon of piezoelectric impact, determined via way of the Curie brother. Piezo electric powered substances body transducer which might be successful to trade electric power and mechanical power or pressure. This transducer consequently can be used as mechanics to carry-over Ambient motion (usually vibration) into electric power which could exist saved and used to electricity different gadgets. By imposing an electricity harvesting tool we can modernize transportable structures that do not the conventional approach appearing for offering electricity, including a battery which has a determined running lifetime.

II. WORKING PRINCIPLE

The operating precept of the E-CHAIR (ELECTRONIC CHAIR) USING PIEZO ENERGY HARVESTING is as follows: When weight unit seated on the higher aspect shell of the association, the shell will dip down barely because of the load unit. The downward movement of the plate final results in the technology of electrical electricity.

The pinnacle shell reverts lower back to its authentic role because of negating the jump furnished with inside the tool. Such gadgets are embedded in seat wherein there is uninterrupted human dealings including in purchasing centre, railway structures etc. A battery is attached to the machine which shops this power for destiny purpose. In the project a LED show off is being to tune down the usage of this index.

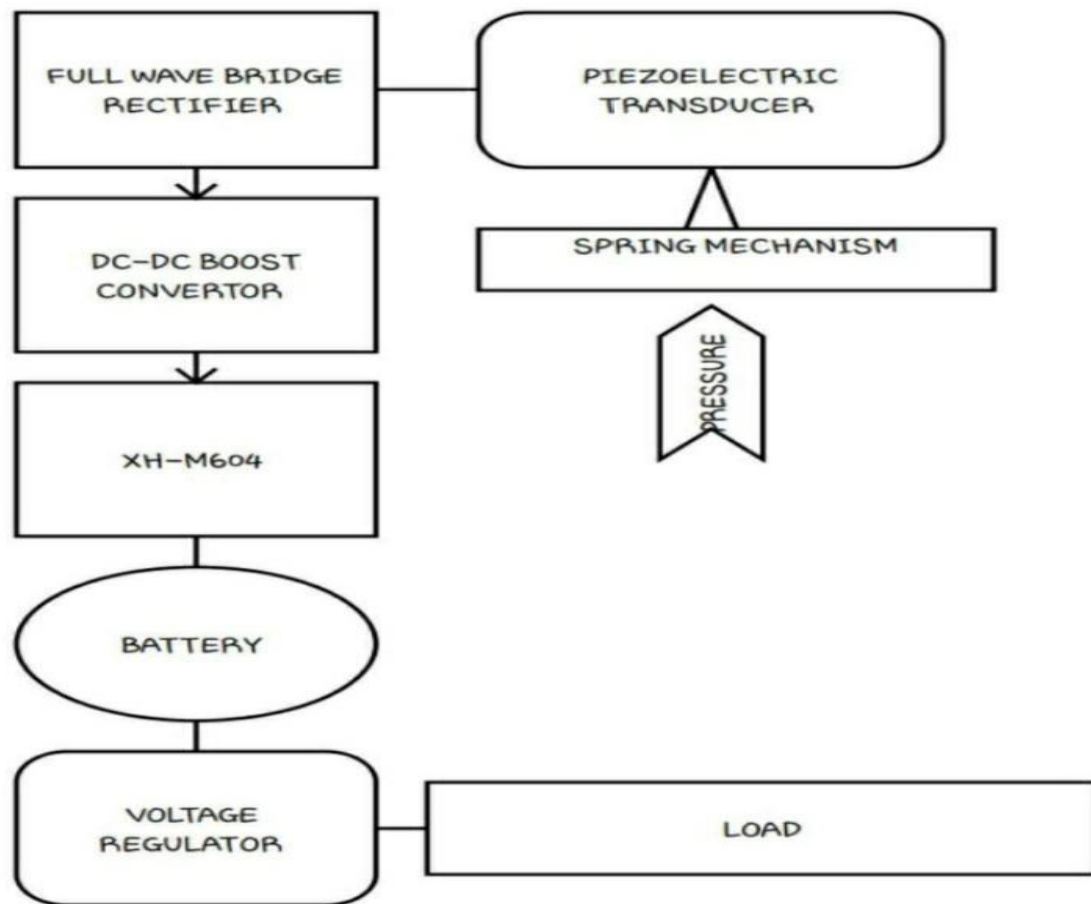


Figure 1. Proposed System

DESCRIPTION

The primary operating precept of our mission is primarily based totally on the piezoelectric sensor. To set up the electric constituent and system nicely to convert the mechanical power into electric power. After arranging the electric association in right mode so that it carry-over mechanical power into electric power the spring is connected to piezo with the assist of Sheet on this way spring association is done spring is used to vibrate the piezo via way of means of pressure then electricity might be generated. After that voltage that 's produced through the steps may be rectified and after battery charger circuit the DC voltage will be saved with inside the 3.6-volt battery of lead acid.

If we need greater electricity on this approach appearing then use greater steps for greater power additionally the capacity of battery and inverter need to be benefit, then yield will be increased.

MAIN COMPONENTS OF THE SYSTEM

(A). PIEZOELECTRIC CRYSTAL

A piezoelectric sensor is a tool that use the piezoelectric impact to measuring strain sensation, speedup, straining or power via way of means of changing them to an electrical sign. Piezoelectric sensing detail have validated to be flexible device for the dimension of numerous process. They are used for quality assurance; operation manage and for studies and evolution in many numerous industries it became the simplest with inside the Nineteen Fifties that the piezoelectric impact commenced for use for commercial sensing utility. Since then, this measuring rule has been more and more used and may be appeared as a mature implemented technology with an amazing inherent edibleness.

It has been efficiently utilized in diverse applications, including in clinical examination, aerospace, atomic instrumentation, and as a strain sensation detector with inside the touchpads of mobile phones. In the self-propelling industry, piezoelectric detail is used to tracking tool combustion whilst growing internal burning engine. The detector is

both without delay installed into extra holes into the cylinder heading or the spark/glow plug is geared up with a constructed in illumination piezoelectric sensing detail. The enhanced of piezoelectric era is without delay associated with a degree set of inherent reward . The excessive modulus of snap of many piezoelectric substances is similar to that of many metal details and goes as much as $10e6 \text{ N/m}^2$ [Even though piezoelectric sensors are electromechanical association that react to contraction, the sensing factor show nearly null deviation. This is the reason why piezoelectric sensing detail are so rugged, get an extremely excessive innate frequency and an exceptional one-dimensionality over a substantial amplitude reach. Additionally, piezoelectric engineering is insensitive to the electromagnetic subject of operation and radiation, allowing degree beneath

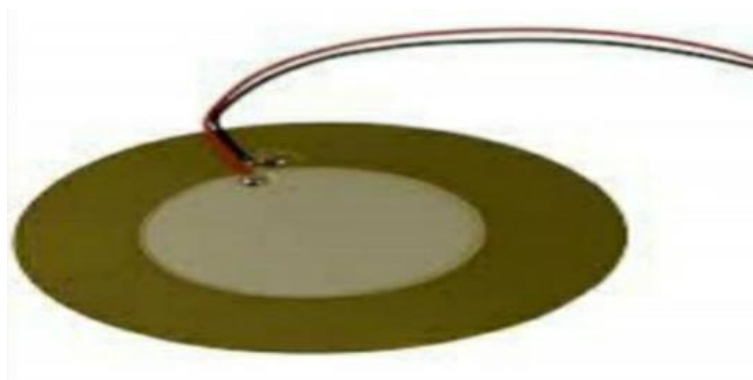


Figure 2. Piezo Electric Sensor

harshprecondition. Some stuff used (specifically gallium phosphate or tourmaline) set off an extreme fidelity even at excessive temperature, allowing the detector to preserve an operating variety of as much as $1000 \text{ }^\circ\text{C}$. Tourmaline indicates piezoelectric in benefit to the piezoelectric impact; that is the capacity to generate an electric sign whilst the temperature of the crystal alteration. This impact is likewise typical to piezoelectric ceramic substances.

(B). RACK AND PINION ARRANGEMENT

A rack and pinion are a case of linear actuator that incorporates a throwaway gearing (thepinion) enticing a linear tool 's mechanism (therack), which perform to translate rotational motion into linear motion. Driving the pinion into revolution power the rack to be pushed linearly. A rack and pinion power can use each instantly and helical geared wheel. Helical tools mechanism isfavoured because of their quieter overall performance and better load bearing capability. The most pressure that may be transmitted in a rack and pinion mechanics is decided via way of means of the tooth pitch and the scale of the pinion.



Figure 3. Rack and Pinion

III.HARDWARE IMPLEMENTATION

Proposal for the usage of dissipation power of seated with human locomotion may be very almost applicable and good-sized for relatively populated kingdom like India and China wherein railway stations, bus stands, temples, etc. Are throughout crowded and hundreds of thousands of hundreds motion across the clock. This whole human/bio muscularity being wasted if it may be made ability for usage it'll be wonderful innovation and crowd power farm might be very beneficial power supply in crowded country. Seated above a chair, then might be a recreation for idle individuals who can enhance their fitness via way of means of workout in such chair with earning. The electric powered power generated at such farms might be beneficial for close by utility. The ultimate goal of this mission is to stand up an awful lot cleanser financial value green mode of electricity technology approach, which in twist enables to convey down the worldwide warming in addition to lessen the electricity shortages In this project we're producing electric electricity as non-traditional approach via way of means of without a doubt sitting or positioned at the chair. A non-traditional power scheme may be very vital presently to our kingdom. Non-traditional power the usage of foot stair is changing mechanical power into the electric power.

This mission uses electromagnetic induction precept. In this mission the strain sensation power is transformed into electric power. The manage situation mechanics includes the loading that's used to generate ability difference, a chargeable battery is used to shop this generated voltage. Batteries are to be had in each wet-cell (requires protection) and sealed no-protection adaptation. Lead acid batteries are dependable and value powerful with an incredibly lengthy life. The Lead acid batteries have excessive reliableness due to their capacity to face up to overcharge, over discharge vibe and electric powered shock the use of unique sealing strategies guarantees that our batteries are leak evidence and no spoilable. The batteries have incredible rate of acceptance, massive electrolyte extent and low self-discharge, which cause them to perfect as zero-protection batteries lead acid batteries are manufactured/examined in the usage of CAD (Computer Aided Design). These batteries are utilized in Inverter & UPS Systems and feature the validated capacity to carry out beneath extreme conditions. The batteries have electrolyte extent, use PE Separators and are sealed in robust containers, which generate them exceptional safety towards leakage and corrosion.

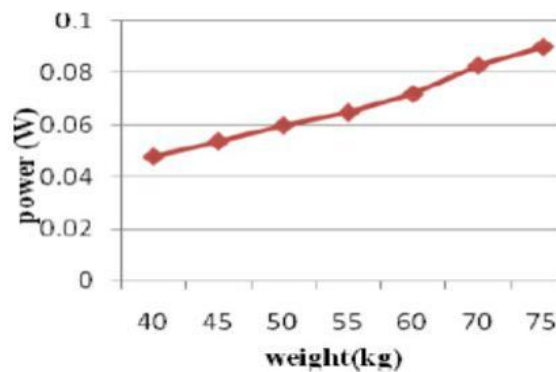


Figure 4. Graph

IV. ADVANTAGE

- No transferring section - lengthy carrier lifetime.
- Self-producing - no extraneous electricity required.
- Compact but relatively touchy Reliable, Economical, Eco-Friendly. Less intake of Non-renewable energies.
- Battery is used to store the generated electricity Extremely huge dynamic variety, nearly free from noise.

V. CONCLUSION

By applied this assemble that 's the powerful economic, less costly power end result to not unusual place citizenry. This may be used for many utilities in rural vicinity wherein electricity accessibility is much less or completely absence. Bangladesh is a growing kingdom wherein power control is a large project for titanic population. By the usage of this mission, we are able to power each A.C. in addition to D.C hundreds in accordance to the pressure we implemented at the piezoelectric sensing detail. comparison among diverse piezoelectric cloth appearance that PZT is advanced in tool characteristic. Also, via way of means of evaluation it became discovered that series-parallel mixture connector is greater acceptable. The weight unit implemented at the roofing tile and corresponding ability generated is studied and they 're discovered to have linear relation. It is specifically acceptable for implementation in crowded expanse. This may be utilized in road lights with out intake of lengthy electricity cable. It also can be used as charging interface, lights of paving material face construction.

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