ADVANCED FOOTSTEP POWER GENERATION SYSTEM USING RFID FOR CHARGING

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Abstract:

Day by day, the population of the country is increasing and the requirement of the power is also increasing. At the same time the wastage of energy is also increasing in many ways. So, reforming this energy back to usable form is the major solution. So, in this footstep power generation project, we are generating power with the help of human's footsteps either by walking or running.
It uses the piezoelectric sensors. To generate a voltage from footstep the piezo sensors are mounted below the platform. Also, it consists of a USB mobile phone charging point where a user may it Connect cables to charge the mobile phone from the battery Charge. The current is distributed using (radio-frequency Identification) RFID cards so that only an authorized person can use the generator for charging. Thus we charge a Battery using power from footsteps, display it on LCD using a Microcontroller circuit and allow for mobile charging through the setup.
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Keywords:
Battery, ARDUINO UNO ATMEGA328 Micro controller, Piezo sensors, Charging circuit, LCD display, RFID reader and tags.

1. Introduction:

Our project model cost is effective and Easy to implement and also it is green and not harmful to the environment. This system can be installed at homes, schools, colleges, where the people move around the clock. It can be used for charging devices e.g. laptop, mobile, etc.

To generate maximum output voltage the sensors are placed in such an arrangement. This is then forwarded to our monitoring circuitry. The circuit is the microcontroller based monitoring circuit that allows users to monitor the charges and voltage a connected battery to it and this power source has many applications. It also displays the charge generated by our footstep and displays on an LCD.

The main aim of the project is to generate power from renewable energy sources; system makes use of Piezo. The system monitors the parameters coming from the piezo sensor, energy from piezo sensor values displayed on the LCD. The energy from the piezo sensors is used to charge the mobile. Using RFID technology to charge the mobile phone battery with the help of USB point. It is useful only authorized persons. The main controlling device of the project is Arduino UNO which interfaced with input and output modules.

A piezoelectric sensor is a device that uses the piezoelectric effect, to measure changes in pressure, acceleration, temperature, strain, or force by converting them to an electrical charge. The prefix piezo- is Greek for 'press' or 'squeeze'.

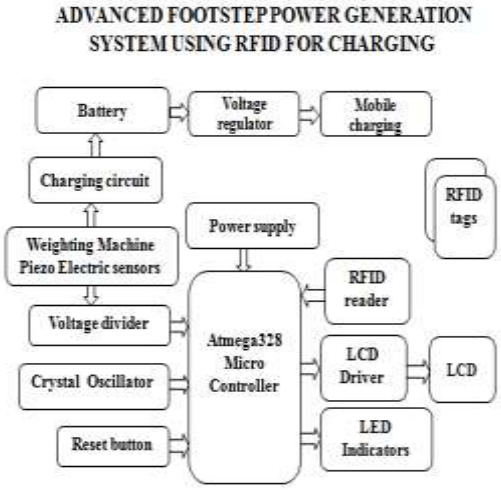
2. LITERATURE SURVEY:

1. Piezoelectricity, Discovered By Curie Brothers in 1880, Originated From the Greek Word "Piezenin", Meaning, To Press. The Original Meaning Of The Word "Piezoelectric" Implies "Pressure Electricity' –The Generation Of Electric Field From Applied Pressure. This Definition Ignores The Fact That The Process Is Reversible, Thus Allowing The Generation Of Mechanical Motion By Applying A Field. Piezoelectricity Is Observed If A Stress Is Applied To A Solid, For Example, By Bending Twisting Or Squeezing It. The Phenomenon Of Generation Of A Voltage Under Mechanical Stress Is Referred To As The Direct Piezoelectric Effect,

And The Mechanical Strain Produced In The Crystal Under Electric Stress Is Called The Converse Piezoelectric Effect.

2. Aganit Thakur, presented method to produce pollution free electricity by the technique i.e. piezoelectric effect. This is kind of green solution for power generation. Piezoelectric effect is the ability of a material to generate electric charge by applying mechanical stress. This report assess to commercial status of piezoelectric based techniques in roadway and railways. In this project we try to provide a sufficient energy as it can reduce the damage of pollution caused by power plants

3. Implementation:



3.1 Block Diagram of Advanced Footstep Power Generation System Using RFID for Charging

The design can be implemented with arduino microcontroller. The interfaced devices to the arduino microcontroller are RFID reader, LCD module, voltage divider with piezo electric sensor setup is interfaced to the Arduino atmega328 microcontroller. Microcontroller continuously reads the voltage from piezo electric sensors through voltage divider circuit and display the voltage on LCD module. To charge the mobile phone battery user need to shows the TAG in front of the RFID reader it is authorized the system allows the user mobile for charging with the help of USB otherwise not possible.

4. Related Work:

The brief introduction of different modules used in this project is discussed below:

4.1. ARDUINO UNO.

4.1.1 ARDUINO UNO

- The Arduino Uno is a microcontroller board which has ATmega328 from the AVR family. There are 14 digital input/output pins, 6 Analog pins and 16MHz ceramic resonator.
- USB connection, power jack and also a reset button is used. Its software is supported by a number of libraries that makes the programming easier.

4.2. Piezo electric plates:

Piezoelectric technology is in sensitive to electromagnetic fields and radiation, enabling measurements under harsh conditions. Some materials used (especially gallium phosphate or tourmaline) are extremely stable at high temperatures, enabling sensors to have a working range of up to 1000°C. The rise of piezoelectric technology is directly related to a set of inherent advantages. The high modulus of elasticity of many piezoelectric materials is comparable to that of many metals and goes up to 106 N/m².Even though piezoelectric sensors are electro mechanical systems that react to compression, the sensing elements show almost zero deflection

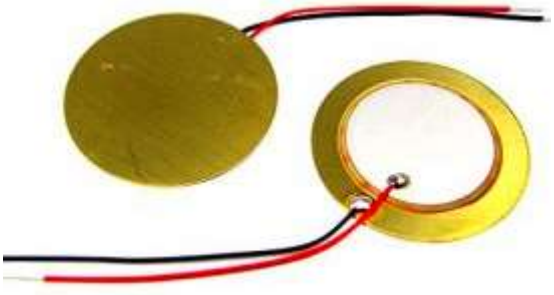


Fig: piezo electric sensors

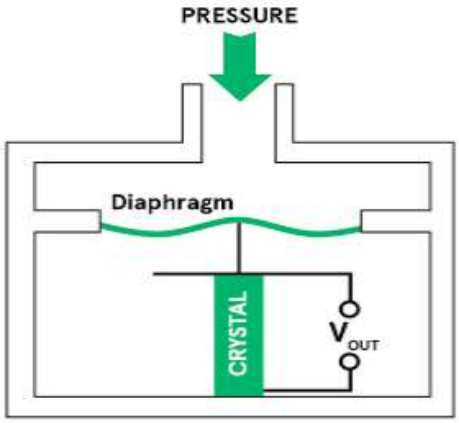


Fig: piezo electric sensors working

When a force is applied to a piezoelectric material, an electric charge is generated across the faces of the crystal. This can be measured as a voltage proportional to the pressure (see diagram to the right).

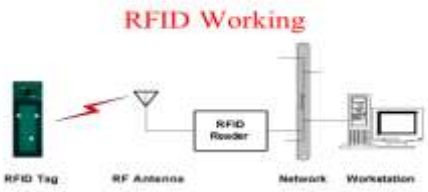
There is also an inverse piezoelectric effect where applying a voltage to the material will cause it to change shape.

A given static force results in a corresponding charge across the sensor. However, this will leak away over time due to imperfect insulation, the internal sensor resistance, the attached electronics, etc.

As a result, piezoelectric sensors are not normally suitable for measuring static pressure. The output signal will gradually drop to zero, even in the presence of constant pressure. They are, however, sensitive to dynamic changes in pressure across a wide range of frequencies and pressures.

This dynamic sensitivity means they are good at measuring small changes in pressure, even in a very high-pressure environment.

4.3. RFID reader:



- An RFID system consists of two separate components: a tag and a reader.
- The tag contains an antenna connected to a small microchip containing up to two kilobytes of data.
- Reader always transmit electromagnetic waves, communicating with tag antenna.
- Host manages Reader and issues Commands
- Reader and tag communicate via RF signal
- Carrier signal generated by the reader
- Carrier signal sent out through the antennas
- Carrier signal hits tag.
- Tag receives and modifies carrier signal
- "sends back" modulated signal (Passive Backscatter – also referred to as "field disturbance device")
- Antennas receive the modulated signal and send them to the Reader
- Reader decodes the data
- Results returned to the host application

In this project we are using EM-18 RFID reader and tags for authentication to charge the mobile.

4.4 LCD display:

Fig: LCD display

An LCD is an electronic display module that uses liquid crystal to produce a visible image. The 16×2 means it can display 16 characters per 2 such lines. In this project LCD display is interfaced to the ATMEGA328 Microcontroller

.It display the voltage which is coming from the piezo electric sensor.

5. CONCLUSION:

The existing model presents an Integrating feature of all the hardware components which has been used and developed in it with Arduino. The Presence of each and every module has been reasoned out and placed very carefully. Hence the contributing to the best working unit for "**Advanced Footstep Power Generation System Using RFID for Charging**" has been designed perfectly. Secondly, using RFID technology to charge the mobile only for authorized persons. This system able to displays the charge generated by our footstep on LCD. Thus the project has been successfully designed and tested.

6. ACKNOWLEDGEMENT

We would like to thank all the authors of different research papers referred during writing this paper. It was very knowledge gaining and helpful for the further research to be done in future.

7. RESULTS:

Fig: 7.1 voltage display on LCD module

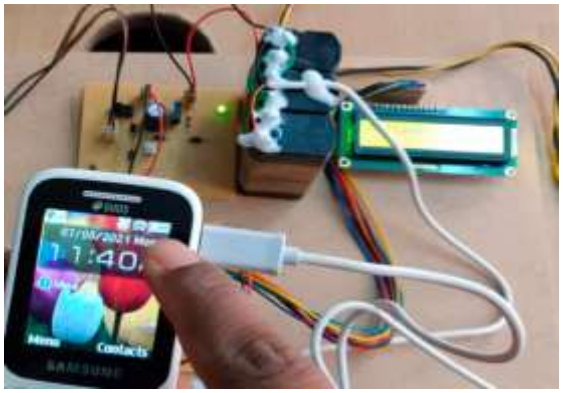


Fig: Mobile phone charging

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