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ADVANCED FOOTSTEP POWER GENERATION SYSTEM USING RFID FOR CHARGING

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Abstract : As the population of the country increases day by day, the demand for electricity is also increasing in many ways. The request for power is additionally expanding in numerous ways. In this manner, changing over this vitality into a usable frame could be a incredible arrangement for future needs. In the Footprint design, electricity is generated by human steps and the generated electricity is stored to charge the battery using piezoelectric sensors. The vitality put away within the battery is utilized to charge portable phones utilizing RFID cards. The framework is fueled by At mega 328 microcontroller and incorporates Arduino-IDE, RFID sensor, USB cable and LCD. After the framework is fueled on the framework enters the title mode.

Our clients can enroll. After each client logs into the framework, the framework will need to examined the board and plug within the charger. At first, all clients are given 5 minutes of paid time by default. When the card is swiped and the client is authorized the framework charges the time from the phone.

IndexTerms : RFID Sensors, RFID cards, Arduino UNO

INTRODUCTION

Wastage of energy is increasing in many ways. Therefore, converting this energy into a reusable form is a great solution. In this footstep power project we use human footsteps to generate electricity that is used to charge batteries. Power is put away within the battery and can be utilized to charge your phone utilizing an RFID card. When we turn on the system the system enters the recording mode. Using RFID for payment, Advanced Footstep Power Generation is the latest technology using cutting-edge RFID technology. Thanks to this technology the system charges the phone for the specified time. Therefore, the new process here does not take much time.

The planning process is based on averaging to generate energy consumption. This product is valuable in open places such as transport stops, theaters, prepare Stations, shopping centers. So these frameworks are put in open places where individuals walk and individuals have to be ride this framework to induce in and out.

AIM AND OBJECTIVES

AIM: To generate electricity and store electricity from human footsteps through RFID for mobile charging.

OBJECTIVES

1.To Generate electricity with human footsteps.
2. To Charge your phone with RFID.
3.The feet are sensed and used to generate electricity using RFID.

METHODOLOGY

The framework created is more proficient and prudent. The advantage of our demonstrate is that the framework gives esteem to the client amid the restricted time apportioned to framework program. Our product:

1. Develop a strategy for the design and construction of a high-speed electronic device using RFID charging. Create block diagrams and schematic diagrams to understand where connections end/complete on equipment.
2. Meet the schematic and Arduino based on each circuit operation, and utilize the Arduino IDE to control the entire framework.
3. Combine all modules in the board and power up the target system and used for testing.
4. Atlas does things like charging the phone which is the main function/output of the system concept.

THEORETICAL FRAMEWORK

The advanced footstep power generation system utilizes Radio Frequency Identification (RFID) technology to harvest energy from footsteps and convert it into usable electrical power. This system is designed to capture the kinetic energy generated by human footstep movements and convert it into electrical energy for various applications. The following sections outline the key components and their functionality in this system.

Footstep Energy Harvesting: The system incorporates specially designed flooring or footstep modules that are installed in high-traffic areas such as hallways, entrances, or public spaces. These footstep modules consist of piezoelectric materials or electromagnetic generators that can convert mechanical stress or motion into electrical energy. As a person steps on these modules, the mechanical energy from the footstep is harnessed and converted into electrical energy.

RFID Technology: RFID tags are embedded within the footstep modules. The integrated circuit stores data and contains the necessary circuitry for communication with an RFID reader. The antenna allows the RFID tag to wirelessly communicate with the reader through radio waves.

RFID Reader**:** An RFID reader is installed near the footstep modules. The reader emits a radio signal that powers the RFID tags when they come within range. The reader also captures the data stored in the RFID tags. The energy required to power the reader is typically sourced from a separate power supply, such as a battery or a mains power connection.

Power Conversion and Storage**:** The electrical energy generated by the footstep modules is collected and sent to a power conversion circuit. This circuit converts the harvested energy into a usable form, typically direct current (DC) electricity. The converted energy is then stored in a rechargeable battery or capacitor bank for later use or immediate powering of devices.

Power Distribution and Usage: The stored electrical energy can be utilized to power various devices or systems. A power management system ensures efficient distribution of power based on demand. This may involve regulating the voltage or current output, as well as prioritizing power allocation to different devices or subsystems.

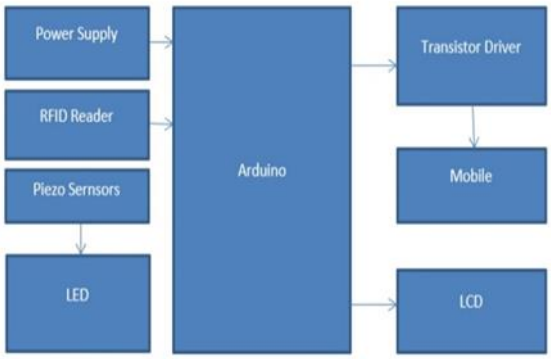
Monitoring and Control: The system may include monitoring and control mechanisms to optimize its performance and provide insights into energy generation and usage. This can be achieved through a centralized control unit that collects data from the RFID reader, power conversion circuit, and power management system. The control unit can adjust parameters, such as energy harvesting sensitivity or power distribution settings, based on real-time conditions or user-defined preferences.

Maintenance and Safety: Regular maintenance of the footstep modules, RFID tags, reader, power conversion circuit, and power storage components is crucial to ensure optimal system performance. Safety measures, such as insulation and protection against electrical hazards, should be incorporated in the design to prevent accidents and ensure user safety.

Scalability and Integration: The system design should consider scalability to accommodate varying foot traffic and power requirements. It should also allow for seamless integration with existing infrastructure, such as electrical grids or renewable energy systems, to maximize energy utilization and minimize dependence on external power sources.

Environmental Considerations: The advanced footstep power generation system promotes clean energy production by utilizing human motion as a renewable energy source. It reduces reliance on traditional fossil fuels and contributes to environmental sustainability.

BLOCK DIAGRAM OF THE SYSTEM AND ITS EXPLANATION



The image above shows a block diagram of a hi-tech electronic device that uses RFID for payment. When weight is applied to the piezoelectric plate an electric current is produced through the piezoelectric plate. This is then fed to our LCD voltage meter using a microcontroller interfaced with a piezo sensor that allows the user to monitor the voltage and charge the battery connected to it. In addition, RFID interacts with the microcontroller to identify users and authorized users. A USB phone charger is included, to which the user can connect a cable to charge the phone from the battery. Footstep generators work on the principle of piezo-effect shocks. In general, piezoelectric crystals are electrically neutral, and the arrangement of atoms in the piezoelectric plate may not be symmetrical, but their charge is perfectly balanced with a positive charge somewhere to remove negative charges nearby. Arduino development environment. Powered by the Atmel Mega 328 microcontroller, the system includes an RFID sensor, USB cable and LCD. When we turn on the computer, it goes into recording mode. We can add three users. After all users are logged into the system. You will be prompted to scan your card and connect the charger. All users are initially offered a charging time of 5 minutes. When we swipe the card, the system continues and if the user approves the phone charge is deducted. If the user is not authorized, the system will cause the user to be unauthorized, but if the user wants to stop the payment in the middle of the transaction. the user has to swipe the card again.
The balance time is displayed and payment stops when the card is swiped again. Click the button at the top of the system to get the card and the system will prompt the user to swipe the card; When the user takes a break, 5 more minutes are added to the user's card.

SOFTWARE REQUIREMENTS

The Arduino IDE computer programme is used to operate the suggested framework. The Arduino IDE is a cross-platform programme with C and C++ capabilities that runs on Windows, macOS, and Linux. It is used to create and upload programmes to Arduino compatible sheets as well as other seller advancement sheets with the help of third-party centres. This computer programme is used to provide guidance to the suggested framework, i.e., to identify the customer and provide professional charging to the client within the commands' allotted time limits.

The framework switches to registration mode when the system is in control mode. Three customers joined the framework. Once every client has been logged in, the framework then requests that the card be swiped and interface charger. The client initially receives 5 minutes of charging time by default. The framework activates for charging purposes when the card is swiped, the customer is authorised, and the framework charges the versatile phone within the allotted coding time.

RESEARCH METHODOLOGY

1. Requirement Analysis:
   - Identify and understand the needs of the users, including staff, faculty, and students and utilizing advanced footstep power generation using RFID.
   - Gather and analyze requirements for features.
   - Define hardware and software requirements and security considerations.

2. Planning:

- Create a detailed project plan outlining tasks, timelines, and resources required for each development phase.
- Identify the programming language and development platform to be used.

3. Design:
- Design the overall system architecture.

4. Implementation:
- Implement the various modules and functionalities identified during the design phase.

5. Testing:
- Conduct thorough testing of the project to identify and resolve errors, or issues.

6. Deployment:
- Ensuring compatibility with the hardware components.

7. Maintenance:
- Provide ongoing support and maintenance. Resolving any issues that arise.
- Update and enhance the project based on user feedback and evolving requirements.
- Regularly perform.

In summary, the advanced footstep power generation system uses RFID technology to capture footstep energy and convert it into electrical power. This sustainable energy solution offers potential applications in public spaces, commercial buildings, and other areas with high foot traffic, contributing to a greener and more efficient future.

RESULTS AND DISCUSSION

Result: The outcome of an advanced footfall power generation system using RFID for mobile charging, which used 10 piezo sensors to cover 1 square foot. Piezo-sensors govern shifting in a variety of ways, thus we get lowest IV voltage per step Most unusual voltage equals 10.5V per step We measured the average weight of a single person, which was 60 kg. Considering the motions of a single individual who weighs 60 kg. typically, the computation is To increase the IV charge inside the battery, it takes 800 steps. To grow 12V in the battery, multiply the number of steps needed by 10*800, which equals 8000 steps. We took an average of two steps per minute because we would be doing our walk through a populous area where sources of steps would be available. For. 8000 steps must be taken. 8000/ (60*2)= 66 min. (Approx.)

In conclusion, the greatest preservationist, acceptable imperativeness response for everyday citizens of our nation is the advanced footsteps power age, that may be recognised and realised with a reasonable amount of effort. This can be used in a variety of situations in popular areas when control supply is low or complete truancy. India may be a developing country at which essentialness organisation would likely be a big challenge for the enormous people. With the help of this task, we were able to drive both A.C. and loading other than D.C., as shown by the controls that we connected to the piezo sensing device. In countries that are particularly populated, this strategy provides a requiring in charge interval since it lowers control demands without lowering standards. In actuality, our primary imperativeness is included in about 12% of sources that regulate the climate. If this project is sent in an unfair manner, it may still be able to solve the urgent problem at hand and contribute to a significant global environmental change.

Discussion:

Technology that generates power through walking as a source of renewable energy that we can obtain by moving our feet across certain surfaces, such as piezoelectric panels. Piezoelectric sensors are used by the system to create a voltage from movement. The sensors are used in this activity to create the most astonishing electrical voltage. At this point, this will be forwarded to our system for checking.This circuit is a microcontroller based monitor that allows the user to see the voltage and charge status of the battery it is connected to, and this control has many users. Additionally, it displays on an LCD the charge generated by our stroll. Additionally, it includes a USB flexible phone charging station where a client can connect cables to recharge their smart phone. RFID (radio-frequency identification confirming) cards are used to disperse the current so that only those who have been granted access can use the generator to charge devices.

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