# An Approach Towards Footstep Power Generating System for Mobile Application System

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***Abstract***— *When a person walks, the force generated on the piezoelectric sensor pushes the piezoelectric sensor and generates kinetic energy, which is converted into electrical energy. The energy generated is stored in a battery. The energy of the battery is used to turn on the street lights using LDR sensors when the sun's rays become dull, and when the soil moisture becomes weak, he uses the soil moisture sensor to turn on the street lights. Uses a motor to deliver water to the lawn. will also be used to charge mobile phones through the charging port installed at the Park and will be used for other purposes within the Park. All data is tracked and stored in IOT for continuous monitoring and future use.*

***Keywords***— *Piezoelectric Sensor, IOT, LDR sensor, oil/moisture sensor***.**

## I. INTRODUCTION

India is a developing country and ranks as the second largest energy consumer in Asia as of 2008. India's energy demand will continue to increase as the country develops, but the country's power generation capacity will be insufficient.Walking is the most popular human activity. Every day, people walk for short periods.

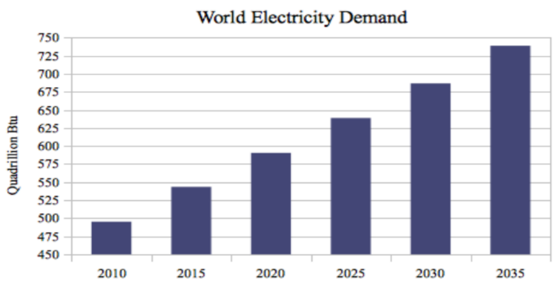


**Figure 1. World Electricity Demand**

Walking is the most popular human activity. People walk 4,444 times every day, and the energy lost during walking is used and converted into electrical energy. In a densely populated country like India, the introduction of waste energy is generated by Presidency University, Bangalore.

Human movement is important. Many villages in India also lack access to electricity. Rather than focusing on conventional oil, we are now focusing on unconventional energy. Conventional energy consumption roughly corresponds to non-conventional energy consumption.

In this way, he reduces waste, which harms the climate, and at the same time, he saves 4,444 money. This is highly recommended as it is a one-time investment. This project mainly uses piezoelectric sensors to capture the energy generated by human movements and transmit that energy to a battery, which in turn transmits it to street lights and motors. As a result, the power generation system will contribute to the country's economic development.

## II. RELATED STUDY

The sensor-driven Internet of Things for smart cities [1, 2] reflects the fact that the world's population is growing by 4,444 people, putting pressure on cities. Therefore, many government and private organizations are working to find long-term solutions to these complex problems. In recent years, the Internet of Things has received more attention than ever before. This article explores the concept of a sensor-enabled Internet of Things that connects billions of sensors and discusses its potential in building smart cities. The main purpose of this document is to troubleshoot bugs, review the latest trends in current systems, and identify some of the major issues in sensor-based IoT. [3]

The authors provided an overview of the growth of IoT, including policies, R&D plans, applications, and standardization. To address architectural challenges, this report presents specific challenges from a technology, application, and standardization perspective and proposes an open and generic IoT architecture consisting of three platforms [3]. The main goal of [4] is to create a renewable electrical energy source that can be used to charge mobile phones. This document was created in his year to generate renewable electricity and reduce energy waste. As more than 4,444 pedestrians use subways, stairs, and highways, underfloor vibrations occur. The IoT connected to the piezoelectric material monitors power generation and is connected to a multi-control device for wireless network communication with a computer or mobile phone. The system proposed by [5] describes the electrical energy produced when walking on a treadmill rotating in a circular motion. This generates electricity and this energy is stored in a battery and used for future purposes. This system, described in [6], uses piezoelectric sensors to convert mechanical energy into electrical energy, which is stored in a battery. RFID is a sensor used to charge the phone. RFID cards are used to charge mobile phones.

A prototype design and test of a hybrid power management system for wireless sensor motes was designed by [7]. The sensor body, mounted on the outside of the high-voltage transformer, uses piezoelectric cantilevers to generate power from the vibrations of the transformer tank. The authors in [8] proposed a decision-making process to assist municipal energy managers in evaluating the most cost-effective energy retrofit plans for existing public street lighting systems in metropolitan areas. The proposed decision-making model aims to maximize the reduction in energy consumption while efficiently using the available budget and achieving an optimal allocation of retrofitting activities among street lighting subsystems. That's what I mean. A quadratic knapsack problem is used to represent the resulting optimization problem.

## III. EXISTING SYSTEM

The current system requires human labor to maintain the parking zone for irrigation purposes. Explore new technologies to provide effective and automated processes.

## IV. PROPOSED SYSTEM

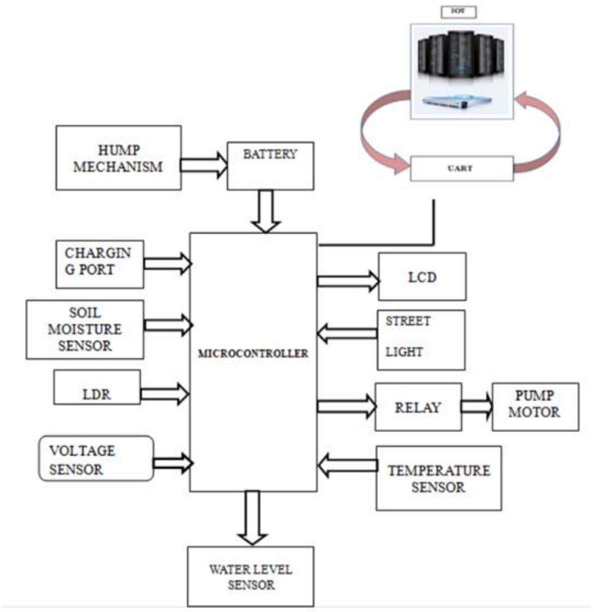


**Figure 2. Block Diagram for Footstep Power Generating System**

In the block diagram, electrical energy is generated by people walking on the earth's surface. Using a special arrangement, the so-called hump mechanism (Fig. 3), this electrical energy can be used to generate electricity. When a person walks on a piezoelectric sensor, a certain amount of pressure is applied to the sensor, which stores electrical energy in a battery, converting kinetic energy into electrical energy.

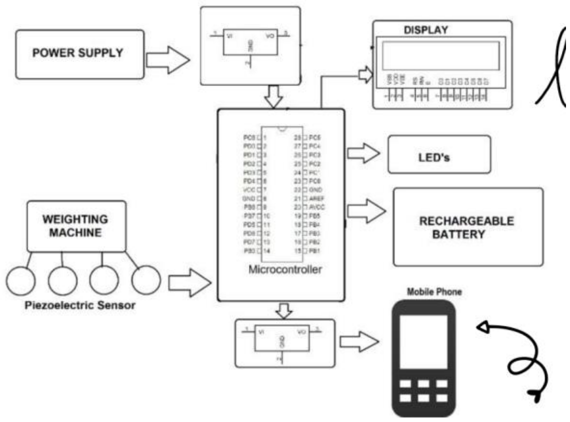


**Figure 2.1. Block diagram for Mobile Application**

The energy generated is stored in a battery and used in various ways using an Arm microcontroller as shown in Figure 2. We also use the Internet of Things (IoT) to constantly monitor soil moisture in park zones. It can automatically power the pump motor via IOT and supply water into the park whenever the soil moisture is dry for park zone irrigation purposes.

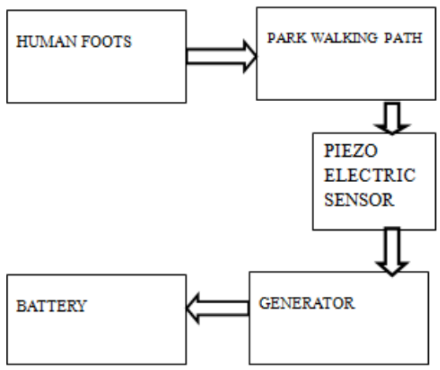


**Figure 3. Block diagram for Hump Mechanism**

Much of the electricity consumed is used to turn on street lights. When the sun's rays become dull, the streetlights are turned on. This improves battery life and uses renewable energy efficiently. IOT constantly tracks the temperature inside the park and the temperature degree is stored on his IOT server. You can also charge your cell phone using the charging ports in the park. If your cell phone runs out of charge in an emergency, you can charge it inside the park. Parks' water sources can be monitored with water level sensors. Information from the various sensors is displayed on the LCD and stored on a web server.

**Phase-1** Involves the initial setup of the project. This includes assembling the necessary parts such as piezoelectric sensors, an Arduino board, and diodes. Once assembled, the diodes must be correctly connected to the Arduino board, ensuring the flow of electricity aligns with the project's requirements. Writing the code for the Arduino board comes next, a crucial step that dictates how the sensors interact with the board and manage the charging process. Additionally, considering the use of an Ethernet cable suggests a need for data transfer or communication, requiring proper setup and integration within the project.

**Phase-2** The focus shifts to the functionality of the code and the piezoelectric sensors. Successfully uploading the code to the Arduino board is essential before testing. The sensors, designed to convert mechanical energy from footsteps into electrical energy, play a pivotal role. Validating that the code accurately detects footsteps via these sensors is crucial. Once confirmed, attention turns to ensuring the battery is effectively charged based on the footsteps detected, as outlined in the programmed instructions.

**Phase-3** Involves the practical application of the charged battery. This phase centres on confirming the battery's effectiveness in storing energy generated from the piezoelectric sensors. Connecting the charged battery to a mobile device allows for testing its functionality in charging the mobile device. This step verifies the overall success of the project in harnessing footsteps to charge a battery and subsequently powering a mobile device.

## V. RESULT AND ANALYSIS


**Figure 4. Hump Mechanism**

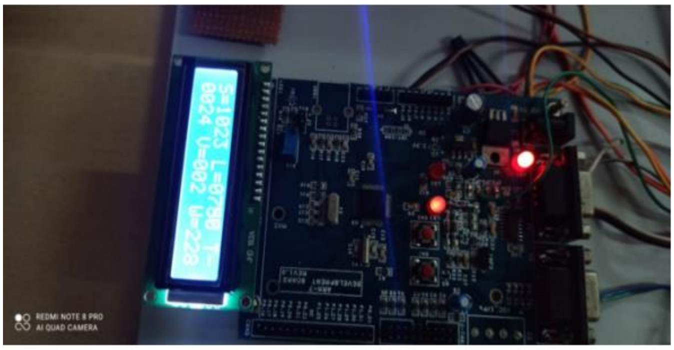

**Figure 5. Sensors Values**

We used a 22 Piezoelectric sensor in 1 Square ft.

Since the power generation of the piezoelectric sensor varies from step to step,

Minimum voltage = 1 V per step

Maximum voltage = 5.2 V per step

We recorded an average weight pressure of 50 kg for one person. For an individual weighing 50 kg considering the steps, the average calculation would be: It takes 800 steps to increase the 1V charge on the battery. Therefore, the total number of steps required to increase the 12V battery is = (22 * 800) = 17600 steps. We implemented the project in a densely populated area where footsteps could be used as a source, taking an average of 2 steps per second. The time required for 17600 steps is

= 17600/(60*2)

= 17600/120

= 146.6 minutes (approximately).

## VI. Conclusions

The underfoot power generation system presented in this project overcomes the shortcomings of the current system. Each phase is automated, reducing human intervention. We have successfully introduced a new parking automation model based on renewable energy. In the future, the project can be improved by installing piezoelectric sensors in public areas such as roads while people are walking on the roads and energy is generated. This energy can be used to light street lights that serve the public. Additionally, if you place this piezoelectric sensor on tiles throughout your home, it will generate electrical energy every time someone steps on the tile. This energy can be used for various purposes, such as turning on fans and lights.


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