INVENTION REPORT

SMART FOOTSTEP POWER GENERATOR

GROUP MEMBERS :

COL/ME/2025/F/012 - Y.H.I.U.PREMARATHNE

COL/ME/2025/F/042 - S.M.S.A.SENEVIRATHNE

COL/EE/2025/F/071 - S.M.L.D.THILAKARATHNE

COL/BSE/2025/F/005 - W.G.M.N.M.GUNATHILAKA

COL/BSE/2025/F/006 - P.D.S.DEWMINI

DESIGNING AND HANDLE BY : S.M.S.A.SENIVIRATHNE

REGISTRATION NO : COL/ME/2025/F/042

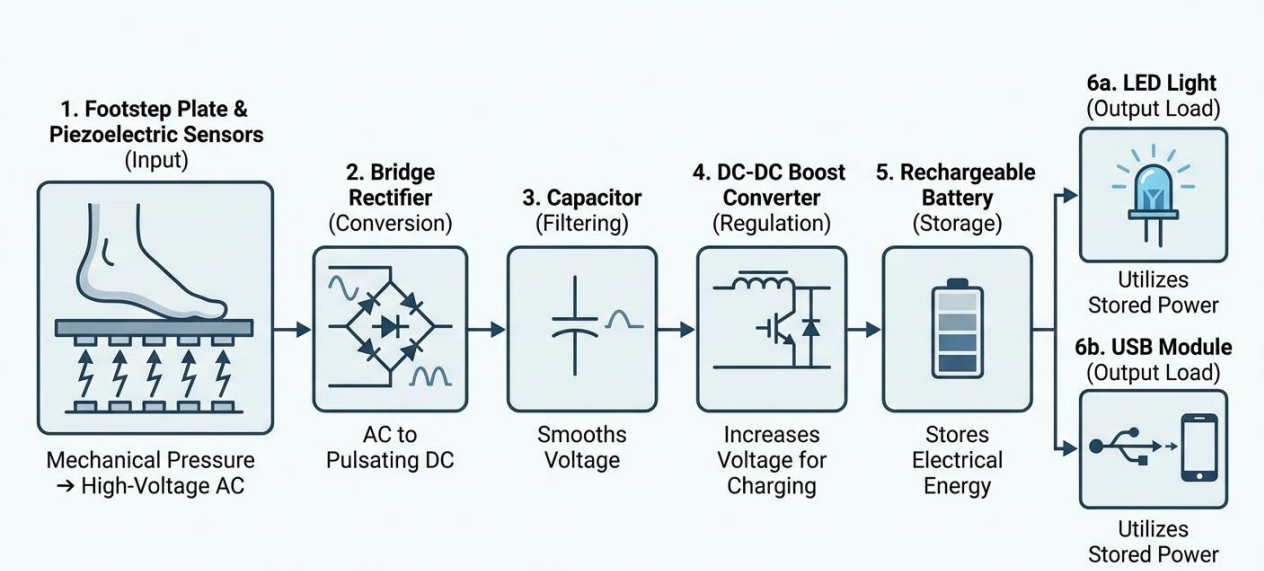
SUPERVISED BY : Eng.H.D.A.GUNASEKARA

INTRODUCTION

In the present world, the demand for electrical energy is increasing rapidly, while conventional energy resources are gradually depleting. At the same time, a large amount of human energy is wasted during daily activities such as walking.

A **Smart Footstep Power Generator** is an innovative system that converts the mechanical energy produced by human footsteps into electrical energy using piezoelectric sensors. This system works on the principle of the **piezoelectric effect**, where mechanical pressure applied on certain materials generates an electrical voltage.

When a person steps on the footstep plate, pressure is applied to the piezo sensors, producing electrical energy. The generated energy is then collected, stored, and used for low-power applications such as LED lighting or mobile charging. It is an eco-friendly, renewable, and low-cost solution that can be effectively implemented in public places such as railway stations, bus stands, schools, and shopping malls.



Smart Footstep Power Generator: System Block Diagram & Energy Flow Principle

AIM

To design and develop a smart footstep power generator that converts mechanical energy from human footsteps into electrical energy using piezoelectric sensors, and to utilize the generated power for low-power applications such as LED lighting.

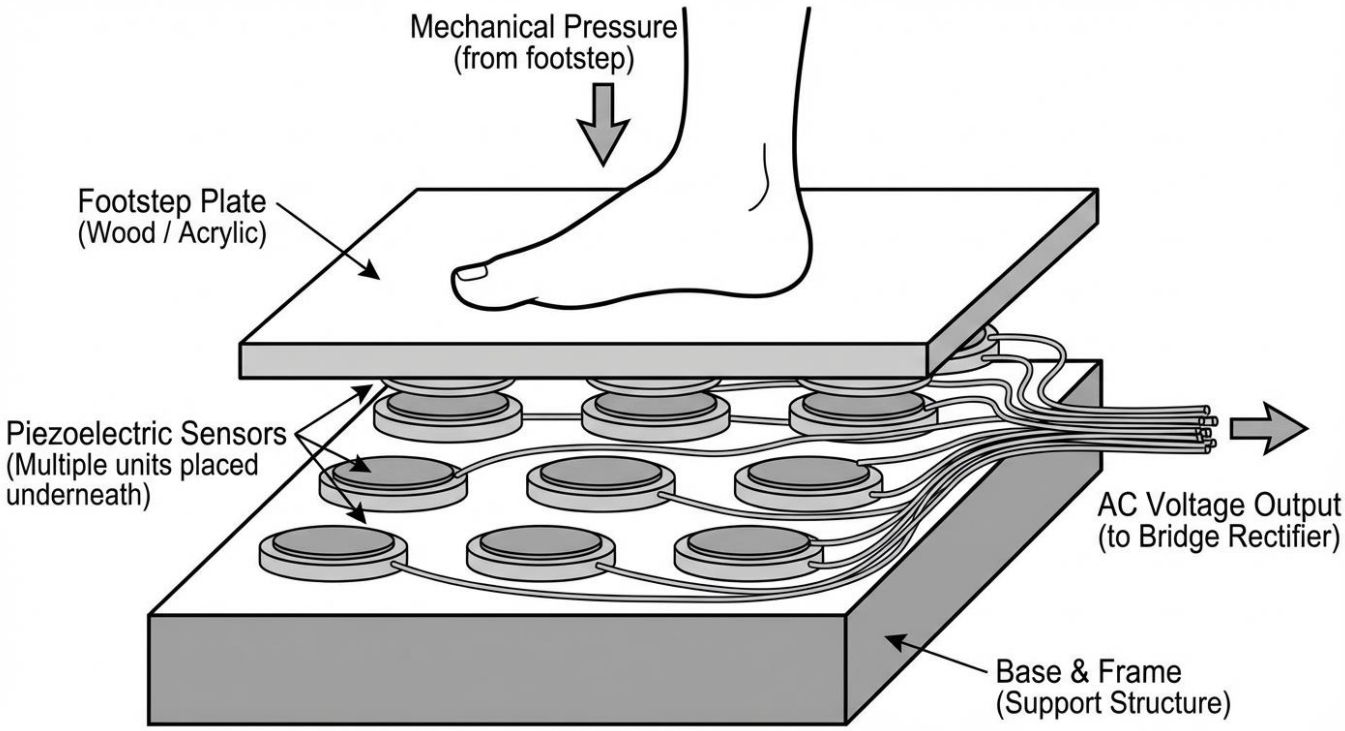
ADVANTAGES

- Uses human energy, requiring no fuel.
- No pollution or harmful emissions.
- Converts wasted mechanical energy into useful electricity.
- Minimal maintenance required after installation.
- Ideal for high-traffic areas like railway stations and malls.
- Educates the public on sustainable energy.
- Can be built with basic electronics knowledge.

OBJECTIVES

- Design a footstep platform that efficiently captures pressure from human walking and converts it into high-voltage AC electrical energy using a series of piezoelectric sensors.
- Construct a bridge rectifier circuit to convert the intermittent AC pulses generated by the sensors into a stable, pulsating DC current.
- Implement a filtration stage using capacitors to smooth the DC signal and eliminate voltage ripples.
- Interface the system with a 12V lead-acid battery to provide reliable, long-term storage of the harvested electrical energy.
- Utilize a system to monitor the battery health and efficiently retrieve the stored power for external loads.
- Demonstrate a practical, low-cost, and eco-friendly method of power generation that can be implemented in high-traffic public areas to create energy awareness.

DIAGREM


Mechanical Pressure
(from footstep)
Footstep Plate
(Wood / Acrylic)
Piezoelectric Sensors
(Multiple units placed
underneath)
AC Voltage Output
(to Bridge Rectifier)
Base & Frame
(Support Structure)

BUDGET REPORT

Component	Quantity	Approx. Cost (Rs.)
Piezoelectric Sensors	10	2,000
Bridge Rectifier	1	200
Capacitor (470µF / 1000µF)	2	200
Rechargeable Battery (3.7V / 12V)	1	1,500
DC-DC Boost Converter	1	600
LED Light / USB Module	1	500
Wires & Connectors	—	400
Footstep Plate (Wood / Acrylic)	1	1,000
Base & Frame	—	600
Total Estimated Cost		**Rs. 7,000 – 8,000**

Total Budget :-Rs.8000.00

Supervised by :- Eng.H.D.A.GUNASEKARA

20/01/2026 ……

Date Signature