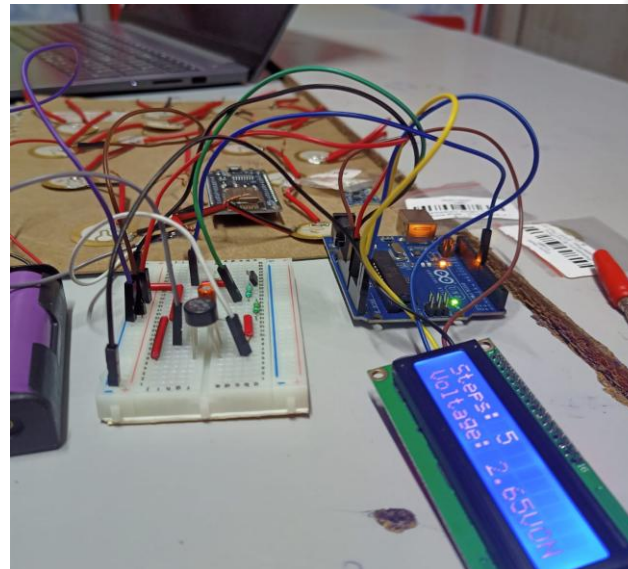


# SMART INDIA HACKATHON 2025



## TITLE PAGE

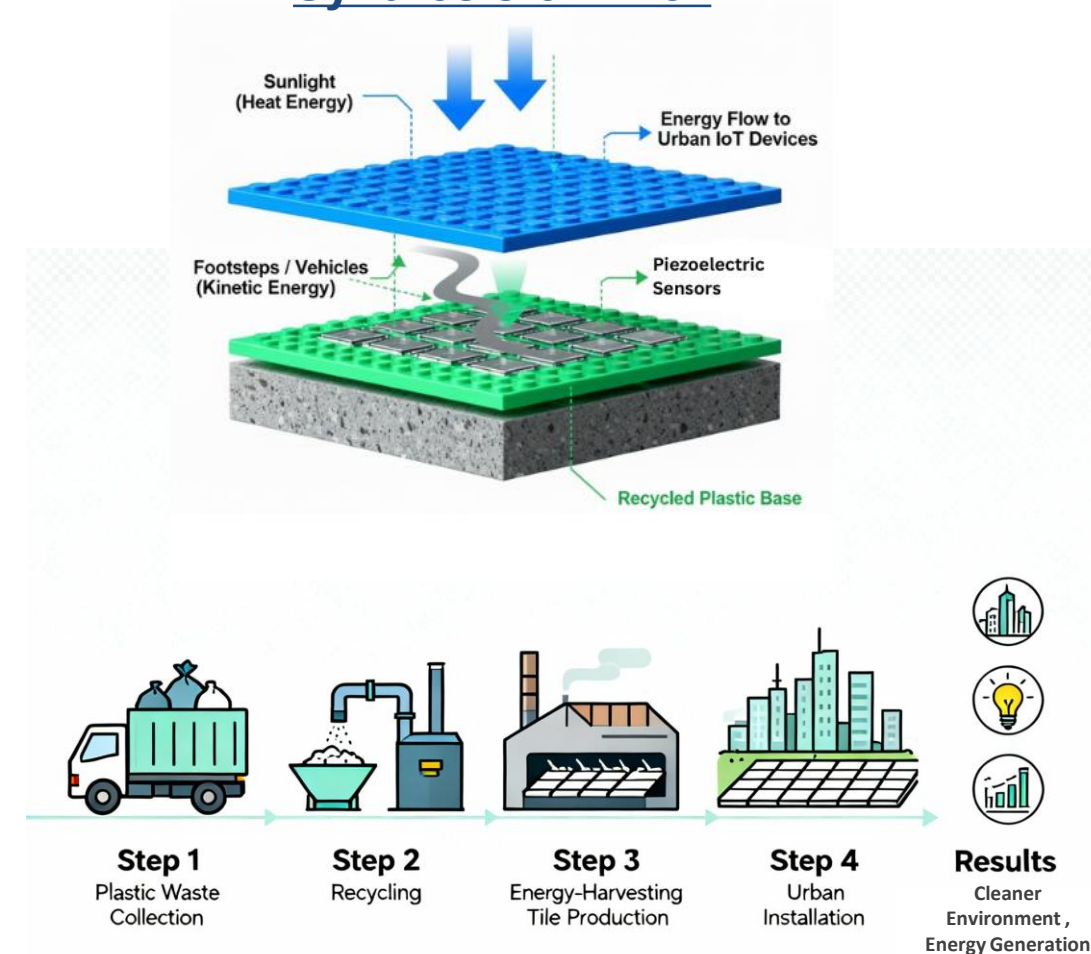
- **Problem Statement ID – SIH25116**
- **Problem Statement Title - Student Innovation**
- **Theme- Renewable/Sustainable Energy**
- **PS Category- Hardware**
- **Team ID- 59365**
- **Team Name - Elite Squad**



## ❖ Proposed Solution:

- ✓ Existing energy harvesting solutions in India are expensive, complex, and heavy, hindering mass adoption.
- ✓ Our panels use a durable composite of **recycled plastic and robust materials**, balancing strength and sustainability for long-lasting infrastructure.
- ✓ Piezoelectric sensors transform everyday pressure from footsteps and vehicles into powerful, clean energy powering smart cities.
- ✓ Modular, lightweight, and interlocking design reduces panel weight by ~20%, facilitating easy transport, rapid installation, and cutting installation steps by over 60%.
- ✓ Real-time IoT integration empowers smart urban infrastructure including lighting, signage, and intelligent devices, enabling smarter cities.
- ✓ Our solution achieves up to 85% cost savings compared to traditional systems, making clean energy harvesting affordable and scalable for India.
- ✓ It cuts local carbon emissions by approximately 12%, supporting India's green initiatives, while scalable from sidewalks to highways and engaging public awareness and sustainability efforts.

## ❖ Synthesis of Brick

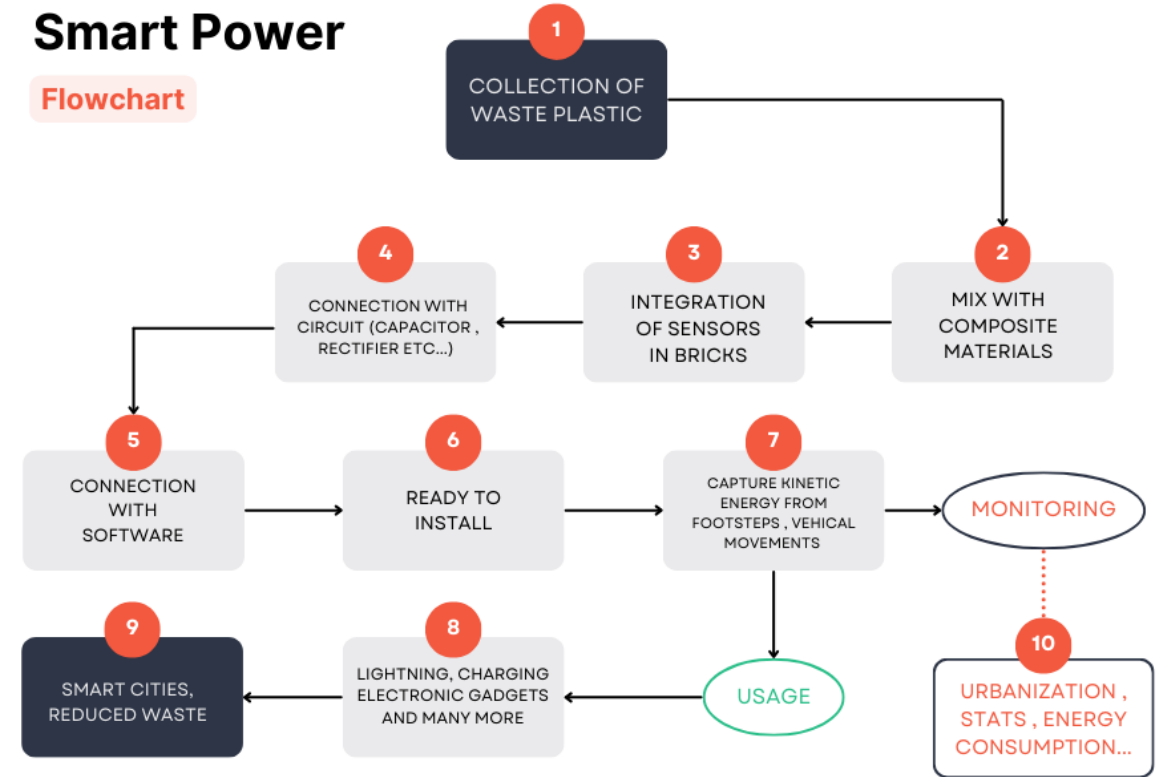


- **Microcontrollers & Communication:** ESP8266, Arduino Uno — Low-cost, power-efficient boards for sensor control and IoT networking.
- **Power Management:** TP4056 charger, Rechargeable batteries — Efficient energy storage and charging for continuous operation.
- **Sensors & Circuits:** Piezoelectric sensors, Rectifier circuits — Harvest mechanical energy from footsteps and convert to usable electricity.
- **Materials:** HDPE recycled plastic (~35%), Sand (~55%), Glass powder (~5%), Kaolin clay (~3%), Bitumen (~2%) — Composite ensures strength, durability, and weather resistance.
- **Software:** Embedded C++ firmware, WiFi protocols, Cloud platform, Blockchain integration for secure data transmission, Mobile app for real-time user data access and analytics, IoT device management tools.



## Smart Power

### Flowchart



### ❖ Some Key Concepts:

- ✓ **Certified durable bricks** with interlocking system.
- ✓ Completed test under **industry level mentors**.
- ✓ Panel durability is up to **20-25 years**.



## Feasibility:

- Uses low-cost, readily available waste plastic for tile production.
- Modular, interlocking design simplifies installation and maintenance.
- Proven piezoelectric and thermal sensors reliably generate power from movement and heat.
- Suitable for sidewalks, parking areas, and high-traffic venues



## Viability:

- **IoT Integration** – Real-time monitoring & urban analytics
- **Hybrid energy** capture (kinetic + solar + thermal) increases power output by up to **30%**.
- **Scalable Infra** – Expand to highways & large venues
- Interactive **reward systems** drive 40% higher public engagement in sustainability efforts



## Key Features:

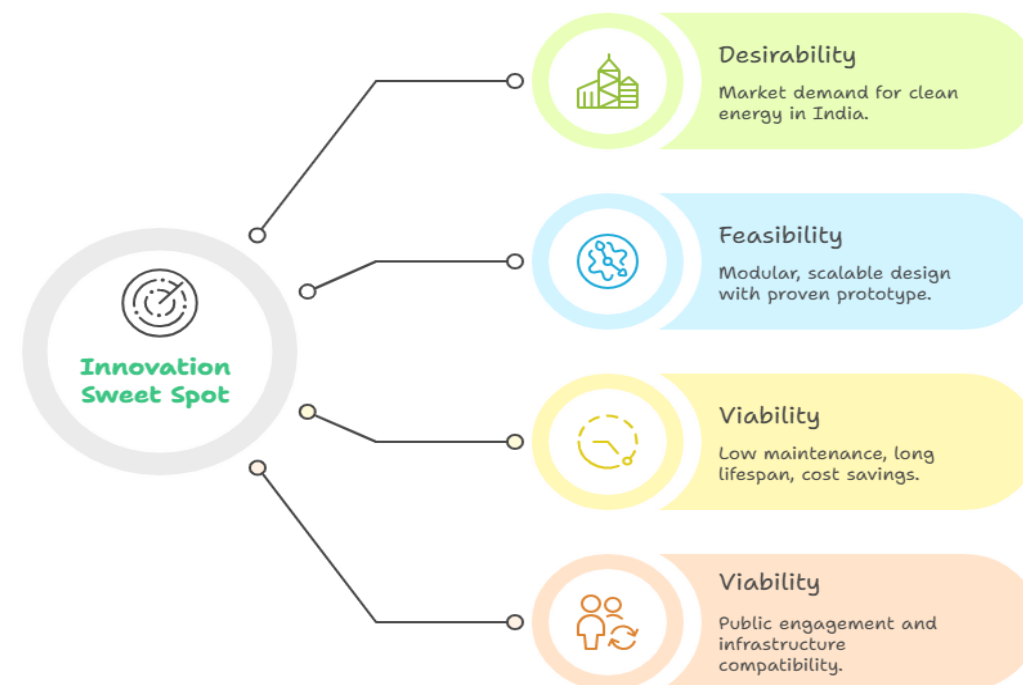
- More than 70% of plastic waste is not used well; recycled plastic bricks are cheap and durable or the environment.
- Using recycled plastic in buildings helps reduce bad gases and piles of trash.
- Plastic bricks made with recycled plastic are 30% stronger and cost 20% less to make.



## Business Potential:

- Rising market demand for eco-friendly infrastructure solutions
- Highly scalable design suits urban and highway deployments
- Cost-effective with materials sourced from recycled waste
- Potential partnerships with government and private sectors
- Strong alignment with sustainability and regulatory goals

### Unveiling the Innovation Sweet Spot





## Benefits

- Cuts carbon emissions by about 12% with clean power
- Lowers weight by about 20%, reducing transportation fuel and making installation easier.
- Supports sustainable building by conserving natural resources like sand and clay.
- Water-resistant bricks prevent moisture damage and increase longevity compared to clay bricks.



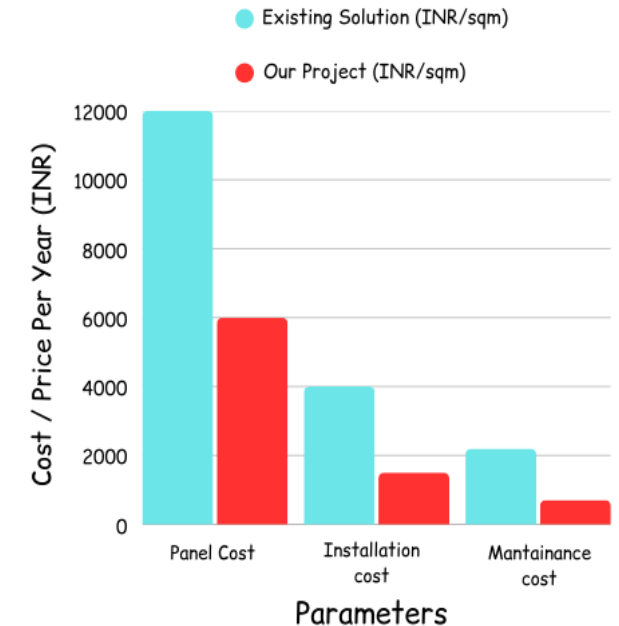
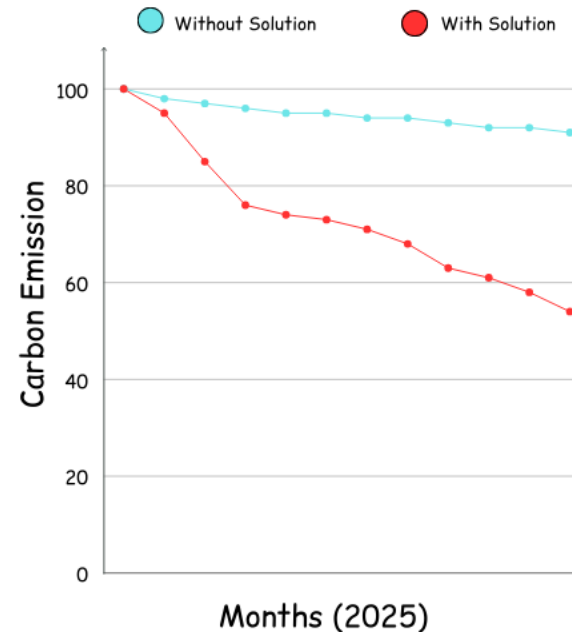
## USP

- **Govt. & Municipal Contracts** – Panels for smart infrastructure projects
- **Corporate & Commercial Partnerships** – Install in malls, stadiums, campuses (CSR/branding)
- **Advertising & Sponsorship** – Panels power smart displays & signage for ad revenue



## Facts

- According to **IITB research**, we have reduced about **85%** of the cost as usual.
- According to **MOZE SOLAR** research, this Project increases local electricity generation by **10% to 15%** compared to areas without such panels.





Features

## COMPANIES

	Our Project	Energy Floors	Student Club IIT Bombay	Pavegens	Innowattech
Durable Recycled Plastic Core	✓	✗	✓	✗	✗
Kinetic + Heat Energy Capture	✓	✗	✗	✗	✗
85% Lower Cost (Proven)	✓	✗	✗	✗	✗
12% Less Carbon Emissions	✓	✗	✓	✗	✗
20% Lighter for Easy Install	✓	✗	✗	✗	✗
Plug-and-Play Modular System	✓	✓	✓	✓	✗
City-Grade IoT Analytics	✓	✓	✓	✓	✗
Boosts Local Grid Output (10–15%)	✓	✗	✗	✗	✗
Work on any Urban Surface	✓	Limited	✗	Limited	Limited
Engages Public with Rewards	✓	✗	✓	✗	✗

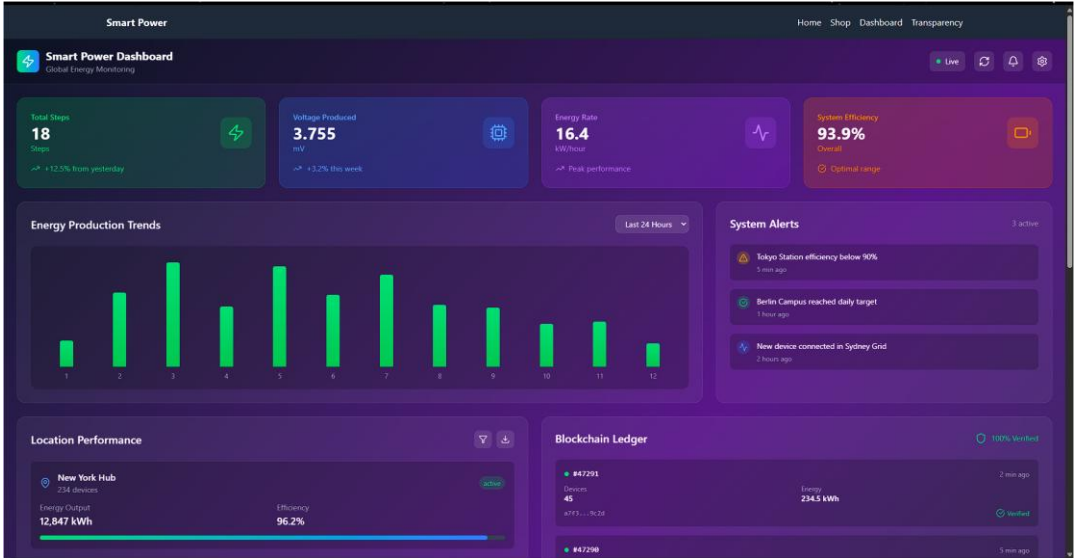
## Major Research DOI:

- Nadcab Labs:  
<https://www.nadcab.com/blog/smart-cities-with-blockchain-for-energy>
- Pentoz:  
<https://pentoz.com/piezoelectric-roads/>
- IIT Bombay:  
<https://www.ee.iitb.ac.in/>

## Our Project Delivers:

- ✓ Sustainable & Renewable Energy
- ✓ Reduces Plastic Waste
- ✓ Smart & Developed Cities
- ✓ Boosts Local Job Creation
- ✓ Supports India's Climate & Net-Zero Goals

## Interface:



Demo Link : [Click Here](#)