



## IEEE IASxPES ENSIT STUDENT BRANCH JOINT CHAPTER

### POWERNEX 1.0 Technical Challenge

#### Smart Microgrid for Remote Communities with Autonomous Maintenance Robots

Welcome to **POWERNEX 1.0**, where innovation drives sustainable energy solutions. This challenge focuses on developing **smart microgrids with autonomous maintenance robots** to deliver reliable energy to remote communities. Additionally, participants must integrate Axe Medical to enhance remote healthcare, creating a dual-purpose energy and medical support system.

#### SCOPE & TOPIC:

At IEEE, our mission is to advance technology for the benefit of humanity. Millions of people in remote communities still lack reliable electricity, limiting their access to economic development, education, and healthcare. Addressing this critical issue requires innovative, sustainable, and scalable solutions.

The POWERNEX 1.0 Challenge invites participants to design a **smart microgrid system integrated with autonomous maintenance robots**. This system will enhance energy distribution efficiency, minimize downtime, and **ensure sustainable power access** for remote communities. Additionally, **teams must incorporate Axe Medical** to support remote healthcare, bridging the gap between energy accessibility and essential medical services.

#### PROBLEM:

Remote communities often face significant challenges in accessing reliable and sustainable energy. Traditional energy grids are either unavailable or too expensive to deploy in these areas. Additionally, maintaining these systems in remote locations is difficult due to the lack of skilled personnel and the high cost of manual maintenance.

The challenge is to create a smart microgrid system that autonomously generates, distributes, and maintains energy in remote communities, powered by renewable sources and supported by autonomous robots for efficient maintenance and repair with minimal human intervention.

#### GOALS:

Our goals are:

- **Develop a Smart Microgrid System:** Integrate renewable energy sources (solar, wind, etc.) into a microgrid system for efficient energy generation and distribution.

- **Design Autonomous Maintenance**

**Robots:** Build robots that autonomously maintain and repair the microgrid infrastructure, minimizing human intervention in hard-to-reach locations.

- **Integrate Medical Axis for Remote Healthcare:**

Implement robotic systems that can identify, sort, and recycle waste materials generated during manufacturing processes.

- **Scalability and Adaptability:**

Ensure the solution is scalable and can be adapted to different industrial environments.

## RULES & CRITERIA:

Interested teams must complete the registration form by the specified deadlines. Late submissions will not be considered.

From each organisation (SB, Club or individual participants) **one team is allowed to participate.**

## INSTRUCTIONS & DELIVERABLES:

### Initial Selection Phase: Ideation Phase

**Project Submission:** Teams must submit a detailed project in PDF format, not exceeding 30 pages. It should include:

 • **Innovation:** Clearly explain the innovative aspects of your solution.

 • **Feasibility:** Provide a realistic plan for implementation, including timelines, resources, and potential challenges.

 • **Sustainability:** Demonstrate how your solution aligns with sustainability goals and contributes to reducing the environmental impact of industrial processes.

 • **Alignment with Competition Objectives:** Show how your project addresses the challenge of creating green robotics for sustainable manufacturing.

**Pre-selection:** Based on the submitted proposals, teams will be pre-selected to advance to the final phase.

### Final Phase: Let's Meet at PowerNex 1.0

**Final Project Submission:** Pre-selected teams must submit their final project for evaluation. This includes:

 • **Prototype:** A working prototype or proof of concept demonstrating the functionality of the green robotics system in an industrial setting.

 • **Additional Materials:** Teams can also submit supplementary materials such as a GitHub repository, research paper, or demo to further support their project.

**Pitching at the Event:** During the PowerNex 1.0 congress, teams will pitch their project in a 5-minute presentation followed by a 5-minute Q&A session with the judges.

**Winner Announcement:** Winners will be announced at the event based on the evaluation of the final project, pitch, and Q&A session.

## SCORING:

**TOTAL SCORE: 100 POINTS**

◊ **Initial Phase [30 pts]**

• **Quality of Proposal (10 points)**

- Report clarity and readability: *2 pts*
- Innovation and originality: *4 pts*
- Feasibility (timelines, risks, resources): *4 pts*

• **Technical Solution (20 points)**

- Microgrid design: *7 pts*
- Integration of renewable energy sources: *7 pts*
- Energy storage and management solutions: *6 pts*

## ◊ **Healthcare Integration [25 Points]**

### • **Medical System Integration (15 pts) :**

- Efficient power supply for medical equipment: *5 pts*
- Data security and connectivity for patient monitoring: *5 pts*
- Scalability and potential real-world implementation: *5 pts*

### • **Health & Safety Impact (10 pts) :**

- Improvement of healthcare accessibility in remote communities: *5 pts*
- Sustainability of the healthcare solution (long-term reliability): *5 pts*

## ◊ **Bonus [5 pts]:**

- IAS member participation: *1 pt*
- PES member participation: *1 pt*
- Female team member: *1 pt*
- Incorporation of additional humanitarian benefits (e.g., education, local development): *2 pts*

## ◊ **Final Phase [40 points]:**

### • **Pitching and Presentation (16 points):**

- Pitch clarity and delivery: *6 pts*
- Q&A handling: *5 pts*
- Creativity in approach: *5 pts*

### • **Prototype & Demonstration (14 pts):**

- Functionality and realism of the prototype: *8pts*
- Practical demonstration and proof of concept effectiveness: *6 pts*

### • **Environmental and Community Impact (10 points):**

- Environmental sustainability: *5pts*
- Long-term scalability and community impact: *5 pts*

## **WINNERS:**

-Number of Winners : 3 teams

-Prizes : Will be announced later

## **IMPORTANT DATES:**

-Infosession : 27 Feb 2025

-Submission deadline: **5 AVRIL 2025 23:59**



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