General Guidelines for Round 1

- Teams need to submit a PowerPoint presentation outlining the proposed solution, implementation workflow, technology stack , expected impact, challenges, business model, etc.
- Judges will review the ppts and shortlist the top 30 teams, 25 of them proceed to round 2, with 5 teams in waitlist.
- You need to choose one PS to proceed through the competition.
- If you choose the open track, you need to adhere to the guidelines mentioned in the open track section below.
- All the features mentioned in a particular Problem Statement (PS) are not mandatory requirements; instead, they are intended to clarify and provide guidance. You can add or modify technical features based on your approach and needs. However, the core functionality of your solution should align with the PS.
- Solutions can encompass hardware , software or combination of both.
- Maximum Slides: 10 (Title , Team and Thank you slide not included). Exceeding the maximum slide limit will result in point deductions. Each ppt must contain a Title and Team slide. PPTs without them will be disqualified.
- Title slide should have Theme , Problem statement ,Team Name & Team Lead name. Teams choosing the Open Track need to mention the theme as 'Open' and provide a problem statement they are solving

Green Energy - The Grid Is Struggling

Software Challenge: Neighbourhood Power Sharing

Think about this:
Your neighbour has solar power and a full battery. You have none.
A storm knocks out the main grid. Your neighbour has power. Your home does not.
But the current systems will not allow the sharing of power between homes. So the question is simple: Can a block of homes act like a mini power grid?
Build the logic that will allow homes to share power in the case of a grid failure. But the difficult part is the fairness issue: Who gets the power first? A home with a car plugged in, or a home with a medical device plugged in?
Solve these issues through your ideas. Discuss the feasibility of the solution in practical human neighbourhoods across a wide spectrum.

Hardware Challenge: Capturing Wasted Heat

It is getting hotter, and we're doing nothing. Ice caps are melting, and your favourite polar bears and penguins have nowhere to go. Maybe we won't have our favourite vacation spots either after a few years.
Look around the city: Factories, data centres and apartment buildings with boilers.
All of these buildings are dumping warm air into the sky. It is not hot enough to power a turbine, and we waste it.
But it is still power, and it is still energy.
Your challenge is to design a device that will attach to a warm pipe or vent and create power. It needs to be:

- Inexpensive
- Durable
- Easy to install

If it works, thousands of buildings could generate small amounts of free energy every day.
If we can't stop the heat production, then we can use it!

EdTech — Stop Grading, Start Coaching

Software Challenge: Reading the Digital Classroom

Every teacher has seen this moment:
A student stops understanding, but the system keeps moving forward.
Most EdTech systems track clicks and quiz scores. They don't see the real signal: the student is confused.
Your challenge is to detect when a student has hit a mental wall. Analyse signals like:

- mouse hesitation
- time spent reading a sentence
- small facial reactions

Then change the lesson in real time:
Not by answering, but by adjusting the explanation. The goal is simple: Make the system behave like a good tutor. Can you use this in your current classroom? If you can, you and your friends won't get bored with your favourite subjects!

Hardware Challenge: Recording Real Skill

A wise man once said, "Learning things practically is better than learning things theoretically." Can you prove him right?
Some skills cannot be learned by watching.
Consider:

- surgery
- electrical work
- mechanical assembly

Experts learn these skills by muscle memory. Your challenge is to create wearable hardware that records the movement and pressure used by an expert. Imagine a glove that records how a professional does a task. Then a student uses the same glove.
And it guides the student's hand through the same motion. The goal is not to teach information.
It is to record a skill: a skill that a student can learn. It is teaching a physical skill. How can you extend this to other professions (give a brief explanation)? Now, with this new little device, you can ace your practical exams.

Athletic Tech - The Hidden Injury

The Software Problem: Detecting the Precursor to Injury

Do you get annoyed when your favourite athlete gets injured? Isn't it irritating? Well, you can help them now.

The athlete may not see trouble coming. He or she may feel fine, until... snap! But the athlete's movements are changing, even if unconsciously, before the injury occurs.

The athlete's legs may shift slightly to one side. The athlete's knee may twist slightly more than usual. Subtle and barely perceptible movements which might lead to disaster.

The goal is to create a vision system to detect such movements. Study the athlete's movements over time. If a dangerous pattern begins to emerge, warn the coach.

Now, you or your favourite athlete can stay injury-free!

The Hardware Problem: Reactive Armour

Ever thought of bungee jumping but couldn't believe in the protective gear? Or are you afraid of a fast-moving cricket ball? The current safety gear is passive, providing protection only by absorbing impact. The gear does not respond or adapt to the impact.

The goal is to create safety gear that is flexible and responsive, changing from flexible to hard in the moment of impact.

The gear's response needs to be extremely quick, in mere milliseconds.

If you solve this problem, you may reduce the number of serious injuries in sports and other dangerous activities.

Now, you can go on and live your adventure sports dreams.

Healthcare – The Doctor Behind the Scenes

Software challenge: Learning without sharing data

MedAI has been progressing at a fascinating pace and is already used in many premier hospitals around the world to detect tumours, blood clots, analyse brain waves, etc. Have your doctors diagnosed you wrongly, as the test results came out erratically?

The data is sensitive, and the laws governing the sharing of this data with hospitals are strict, causing the progress of medical AI to slow down. Is there an alternative?

The goal is to design a system that learns but doesn't share the data. The data is kept within the patient's device or the hospital. The insights are sent out.

Basically, you need to design a system that is able to diagnose the world without ever having access to the raw patient data.

No more wrong treatments due to a lack of insight. Stay healthy and safe!

Hardware challenge: A skin lab on your body

You might have seen the evolution in the testing of blood sugar. Now, maybe, you can extend this to other illnesses as well.

The traditional way of health testing is to visit the lab, where you'll have to wait for days while your blood is drawn and needles are inserted into your veins.

The human body is constantly sending out chemical signals through the skin, and the challenge is to design a patch that is able to pick up this information.

The patch should be able to cling to the skin for days, picking up the chemicals that are sent out when the body is stressed, when the patient is taking medication, or when the patient is sick – a small lab attached to the skin.

Fast medical tests - right at the convenience of your living room. No more waiting for results.

Smart Cities – When Infrastructure Fails

Software Challenge: Cities Without Traffic Lights

The apocalypse might be near. Or, it might be a normal blackout.
Imagine a city in the wake of a disaster. The traffic lights do not work, the cellular network is down, and the intersections quickly turn into traffic jams. The ambulances and fire engines also come to a halt.
The challenge is to design a system where cars communicate with each other directly, without any central command system and without any infrastructure at the intersections. Just vehicles talking to each other at intersections.
The challenge is simple: get the traffic moving when the city is down. The city must never sleep, and the show must go on.

Hardware Challenge: Infrastructure That Maintains Itself

All of us hate garbage. All of us hate old infrastructure. It's time to change.
Cities struggle with the issue of keeping their infrastructure alive. The drains clog, the sensors fail, and the street equipment fails. This is a costly and time-consuming task.
The challenge is to design the street hardware that will power itself and clean itself using the energy available from the surroundings.
Some possible ideas:
- vibrations from the cars that pass over the drain
- wind effects from the subway tunnels
- pressure from the footsteps

The challenge is simple: design the infrastructure that will work for years with minimal maintenance.
The future is here, and it's beginning with SparkHack.

FinTech - Trust in a Synthetic World

Software Challenge: Detecting the Real Human

Ever got scammed? No? A lot of people might beg to differ. Voices and videos are becoming increasingly difficult to differentiate from those created by AI. Someone you trust could end up being presented to you in an incredibly realistic manner by a scammer. Your challenge: Design a system that verifies that the human is indeed real. Focus on features that AI systems find difficult to replicate. Examples: - Eyelid movements - Speech patterns - Biometric features The focus here is not identification; it is human verification. Do you know there's a social media site for AI agents? We won't divulge any information, but you can use the fact that it's a social media website. Humans can fool each other on normal social media, so you can use human behavioural patterns to check whether it's real or fake.

Hardware Challenge: The Offline Identity Vault

Maybe not everything needs to be futuristic. We can also take some notes from the past. In today's world, our online identities are largely linked to our phones or online accounts. If these are compromised, everything linked to these will also be compromised. Your Task: Design a device that stores our identities offline. This device will not have Wi-Fi connectivity. In order to use this device, a person will have to physically interact with a terminal. Plain physical interaction. Does it sound simple? Then innovate your heart out.

Accessibility & Inclusivity – Breaking the Silent Barriers

Software Challenge: The ‘Context Translator’

Most software sees the world in terms of objects. It doesn’t really know what’s important. For example, an object detection neural network might say: “There is a chair.” What a disabled person really needs to know is: “The chair is low. It might be hard to stand up.” Or imagine a blind person using a GPS in a subway. The routing software says: “Turn left.” But it’s not enough. They also need to know whether the floor is wet or the train door is closing, a fast-moving bicycle is coming towards them or if a crowd of people is moving towards them. Now, what’s the problem? Context. AI needs to know what matters. Challenge: Design a software engine that knows what matters. Give it the power of context. What should the software do? - Know what matters - A speeding car is more important than a pedestrian. - The closing door is more important than the open door. - The wet floor is more important than the wall poster. - Filter what matters - The user shouldn’t know everything. - They should only know what matters. - Adapt to the user - The blind user needs to know where things are. - The user in a wheelchair needs to know the slope. - The neurodiverse user needs to know what people are feeling. What about social context? Examples: - “The person in front of you looks frustrated.” - “The cashier is waiting for your response.” - “The people are laughing at a joke.” So simply put, the goal is to design a software which not only sees the world, but also helps people move around the world.

Accessibility & Inclusivity – Breaking the Silent Barriers

Hardware Challenge: The "Haptic Environment" Translator

Imagine you are deaf or hard of hearing. You're walking down a street or sitting in your home. You can't hear the tea kettle whistling in the other room, a car honking behind you, or—most importantly—a smoke alarm going off. Currently, the only solution is expensive, specialised home systems that don't travel with you. The challenge is to design a wearable "Sound-to-Touch" translator. This isn't just a vibrating watch; it needs to be a piece of hardware that can "map" the 3D world of sound onto the user's skin. It needs to:

- Identify the "Signature": The hardware must distinguish between a "friendly" sound (a doorbell or a microwave beep) and a "danger" sound (a siren or a dog barking).
- Directional Feedback: Using multiple small vibration motors (haptics), the device must "point" to where the sound is coming from. If a car honks on the left, the user should feel it on their left wrist or shoulder.
- Passive but Alert: It needs to be low-power enough to be "always on" but smart enough to only vibrate when a meaningful sound occurs, so the user doesn't get "vibration fatigue."

The goal? Don't build a hearing aid. Build a new sense. If you can create a wearable that lets a deaf person "feel" the siren of an approaching ambulance before they see it, you've fundamentally changed their safety in the physical world. How would you make this discreet enough that it feels like a piece of jewellery rather than a "medical device"?

OPEN TRACKS

- Participants in the Open Track are encouraged to choose and develop a solution from the following predefined domains while addressing a real-world problem.
- Machine Learning Applications: This includes Natural Language Processing (NLP), Computer Vision & Image Processing, Reinforcement Learning, Recommendation Systems, Signal Processing, Generative AI (Gen AI) & Large Language Models (LLMs)
- IOT and Smart Systems: Projects must focus on real-time monitoring, automation, or energy optimisation using IoT devices.
- Robotics and Automation: Development of autonomous robotic systems that integrate IoT / AI to efficiently execute complex tasks in dynamic real-world environments.
- Web/App Development: Projects need to focus on the integration of frontend and backend systems using modern frameworks, APIs, and optimised database management. Includes server-side automation, development of browser-based tools such as Chrome extensions, and the creation of dynamic, scalable web or mobile applications .
- Cloud and DevOps Solutions: Projects may involve the integration of cloud services, containerization (e.g., Docker), or automation tools for continuous deployment and scaling.
- AR/VR Development: Projects may focus on creating immersive, interactive experiences using Augmented Reality (AR) or Virtual Reality (VR) for applications in education, training, gaming, healthcare, or retail.