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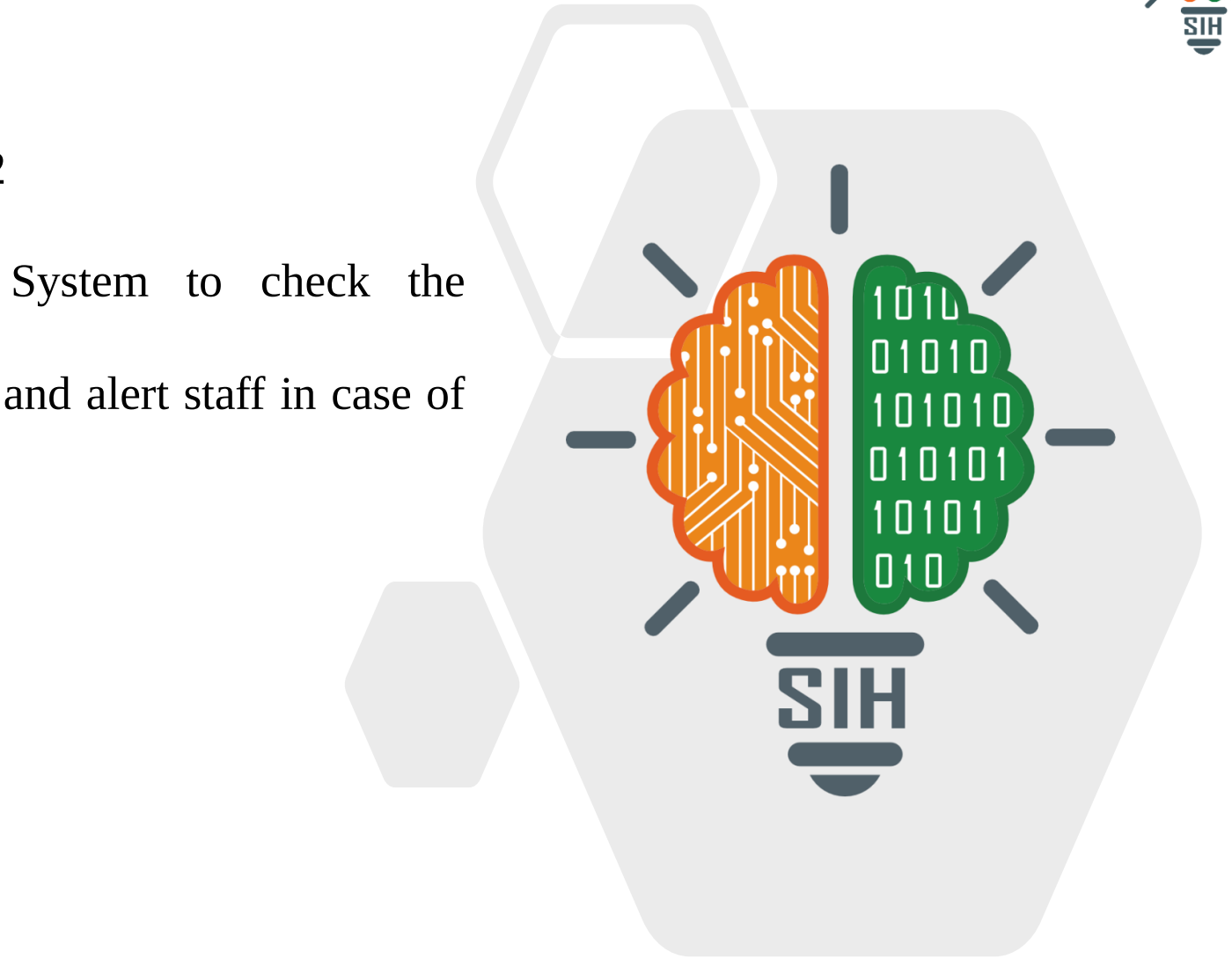
- **Problem Statement ID –** 1582
- **Problem Statement Title-** System to check the healthiness of earthing system and alert staff in case of any malfunction.
- **Theme-** Miscellaneous
- **PS Category-** Hardware
- **Team ID-** 1582
- **Team Name –** Tech Titans



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Earth Leakage Monitoring and Alert System

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❖ Proposed Solution–

- A real time monitoring system based on sensors and low-power-wide-area-network technology
- This system will acquire data in case of malfunction and transmit it to Data Acquisition System installed with GPS system.
- Communicates with nearest base station and triggers alert mechanism along with a message.

❖ Uniqueness

- Minimization the monetary loss after the fault.
- low latency mechanism
- Provides enhanced safety over a longer period of time.

❖ How it addresses the problem –

- Second layer of safety due to the presence of sensors and real time communication with nearest base station along with alerting signals at the point of faults.
- Sensor based system which transmits real time data to centralized monitoring system, which enables real time monitoring and hence reduces the manpower required with increase reliability and enhances safety.

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TECHNICAL APPROACH

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Continuous Monitoring System

- Sensors like GFCDRs, Voltage Monitoring Relays, Earth Leakage Current sensor, Earth Resistance Sensor, Humidity sensor, Temperature sensor, Vibration sensor and Smoke detector.
- Microcontrollers like Arduino or Raspberry Pi.
- Power Supply will be Rechargable Battery.
- Monitoring Software
  - Data Collection
  - Data Processing

Information Transmited to Base Device (at base pole)

- Via wired connections.

Alert System

- Visual system - LED based warning at poles.
- Sound System-ultrasonic electronic repelent for animals and message for humans.

Base Device

- Consist of GPS System like NEO-M8N, NEO-6M, etc.
- Connectivity like Sigfox OG technology, NB-Iot,etc.

Informing Electrical Department

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FEASIBILITY AND VIABILITY

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❖ Feasibility And Viability

- Technical: Easy availability of sensors and microcontrollers.
- Financial- providing an additional layer security to existing devices thus preventing major loss caused after the fault.
- Operational- automated monitoring system could save time and manpower.
- Maintenance - regular checks and updates are easy to manage.
- Compliance - Meets safety regulations and standards.
- Reliability – With real time monitoring and immediate actions, existing systems can operate for a longer period of time.

❖ Challenges:

- Interference between Different sensors of different electric poles.
- Environmental condition can affect sensors and other device.
- Utilizing cost management strategies.
- Noise Problem - sensors are sensitive to noise

❖ Strategies to overcome challenges -

- Isolation of different sensors to avoid disruption.
- Optimize components selection to balance cost and performance.
- Use noise filtration mechanism to avoid noise problems

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IMPACT AND BENEFITS

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❖ Impact:

- Societal impact – Saving human's as well as animals' life against electrical hazards.
  - An additional Recorded voice system for animals for hazardous situation.
- Financial impact - Saves money on repairs and extend life of equipment.
- Low latency – early detection and diagnosis is possible.

❖ Benefits:

- Improving the power quality and reducing energy loss .
- Early and fast alert system – to avoid latency.
- Data from different sensors like humidity sensor, temperature sensor can help in environmental monitoring .
- Current sensors can help in detection of unlawful energy consumption.
- Reliability- It makes sure that the earthing system works well and supports overall system stability.

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RESEARCH AND REFERENCES

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- Collecting and displaying sensor data to the web - Using Arduino / Project Guidance - Arduino Forum
- Raspberry Pi
- NEO-6M GPS Module: Setup & Introduction | ElectroSchematics
- LoRa Alliance - Homepage - LoRa Alliance® (lora-alliance.org)
- Zigbee | Complete IOT Solution - CSA-IOT
- Home - Sigfox 0G Technology
- You tube channel – Robojax
- en.wikipedia.org
- Sigfox.com
- http://robokits.co.in
- Times of India
- "IEC 60364-7-714", 1996-04 1st Ed. Electrical Installations of Buildings Part 7. Requirements for Special Installations or Locations Section 714: External Lighting Installations, 1996.

- "IEC 60364-4-41", Low-Voltage Electrical Installations Part 4-41: Protection for Safety Protection Against Electric Shock 2005 Ed.5, 2005.