

75th ECTC 2025

Students' Competition

**Condition Monitoring Concept of
Electronic Components or Systems**

Students' Competition Team

Condition Monitoring Concept of Electronic Components or Systems

Context:

Condition monitoring detects issues early, ensuring reliability and preventing failures in electronic components and systems. Teams are tasked with developing a condition monitoring system using readily available sensors and computational platforms such as laptops, mobile phones, or small computer kits. Be creative in designing a small system to monitor the condition of electronic components or systems. If necessary, create and deploy a digital twin on a microcontroller (μC) to simulate real-time monitoring.

Challenge:

- Research & Concept Design: Identify key sensors and study condition monitoring techniques for electronic systems. Develop a concept using available platforms (laptops, phones, small computer kits, sensors, etc.).
- System Integration: Design and integrate sensors to monitor critical parameters (e.g., temperature, voltage) with the chosen platform.
- Algorithm Development: Create software to analyze sensor data and detect potential issues in real-time.
- Prototype & Test: Build and test the monitoring system to validate functionality and reliability.
- Optional Digital Twin: Develop and deploy a digital twin on a microcontroller (μC) for real-time simulation and monitoring if applicable.



Suggested References:

1. A. Prisacaru, P. J. Gromala, M. B. Jeronimo, Bongtae Han and Guo Qi Zhang, "Prognostics and health monitoring of electronic system: A review," 2017 18th International Conference on Thermal, Mechanical and Multi-Physics Simulation and Experiments in Microelectronics and Microsystems (EuroSimE), Dresden, Germany, 2017, pp. 1-11, doi: 10.1109/EuroSimE.2017.7926248.
2. M. Ahsan, S. Stoyanov and C. Bailey, "Prognostics of automotive electronics with data driven approach: A review," 2016 39th International Spring Seminar on Electronics Technology (ISSE), Pilsen, Czech Republic, 2016, pp. 279-284, doi: 10.1109/ISSE.2016.7563205.
3. <https://www.howtogeek.com/784198/how-to-monitor-your-computers-gpu-temperature/>
4. <https://pimylifeup.com/raspberry-pi-monitor-temperature/>

If you select this challenge, use in the emails title code: **Ch5**