

The multimodal era: different types of data (text, image, video, audio, sensor data)

Module 1: Introduction to the Concepts of AI

M1-TI-MLC6

Class Scenario: Applying Multimodal AI to an Industrial Fault Diagnosis Task

Field: Mechanical Engineering / Mechatronics / Industrial Automation

(easy to modify to fit other professional subjects)

Duration: 100 minutes

Learning goal: Students will experience how multimodal artificial intelligence can be used to analyse different types of information (text, images, video, and sensor data) in combination and to support professional decision-making.

Materials: internet access, smartphones, an AI application (OpenAI GPT-40).

Type: group work (4-5 students/group)

1. Introduction (10 minutes)

The teacher describes a real-world workplace scenario: the performance of an electric motor on a production line is declining, and the maintenance team is tasked with quickly identifying the problem.

Students are provided with the following information:

- a 30-40-second video showing the motor in operation;
- two photographs of the equipment from different angles;
- a brief maintenance log;
- a table containing sensor data on the motor's temperature, vibration, and current consumption.

The teacher points out that in a real industrial environment, professionals must make decisions based on multiple sources of information simultaneously.

2. Using Multimodal AI (25 minutes)

Students work in groups with the multimodal AI tool.

The AI's tasks:

- Summarize the most important information from the maintenance log;
- Analyse operational anomalies visible in the video;
- Examine the photos and identify any damage or unusual components;
- Interpret sensor data, create graphs, and highlight deviations from normal operation.

Students compare the AI's analysis with their own observations and then decide which information best supports the presumed cause of the fault.

3. Developing a proposed solution (25 minutes)

With the help of AI, the groups will prepare:

- a brief technical explanation of the cause of the fault;
- a guide outlining the steps of the repair process;
- a flowchart or infographic illustrating the diagnostic process;
- a short presentation intended for the maintenance manager.

The AI helps refine the technical language, create visual elements, and ensure the presentation has a logical structure.

4. Simulation (20 minutes)

Students practice the repair process in an AI-based simulation.

After each decision, the simulation shows its consequences, such as changes in machine performance, repair costs, or safety risks. Students can practice professional decision-making in a risk-free environment.

5. Reflection, assessment (20 min.)

At the end of the class, the groups present the evidence they used to reach their final diagnosis. The teacher and students jointly evaluate which tasks the AI genuinely assisted with, which decisions required human expertise, and how the multimodal approach supported professional problem-solving.

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