Monitoring and Control

1 Vocabulary

1.1 Look at these expressions and discuss what they mean:

cutting-edge   trade-off   feed to   emergency braking

          mud   throttle controls   welding

rigid   predictable   grind to a halt   malicious

     bias   erodes   vulnerable

2. Listening Comprehension

2.1 Listen to the first part of the podcast "Deep Dive" and answer the following questions.
1. Summarize what will be discussed in this episode of the podcast.

2. Discuss your expectations concerning the content of this episode of the podcast.

2.2 Listen to the second part and work on the following tasks:

1. Compare and contrast sensors and detectors.

2. Compare and contrast open and closed loop systems.

3. Assess when it is more suitable to use a detector rather than a sensor, when it is more suitable to apply open loop systems rather than closed loop systems.

2.3 Listen to the third part of the podcast and decide if these statements are True (T) or False (F).

a) The automotive industry offers a stable environment concerning automation.

b) Emergency systems in cars usually rely on only one type of sensor or detector.

c) Automated systems in cars must process data in real time.

d) In self-driving cars, automated systems can only monitor and control speed.

e) In emergency systems only open loop systems are used.

2.4 Listen again and discuss the following questions.

1. Explain the meaning of the term 'redundancy' in the context of 3D mapping of the surrounding of a car.
2. Explain what PID control is and how it works.
3. Evaluate the benefit of PID control.
4. Assess the difference between AI-based automation and automation not using AI in the field of self-driving cars.

2.5 Listen to part 4 of the episode and complete this summary:
Automated systems give robots independence, allowing them to _____ (1) on their own through integrated control and sensing technologies. Robots are sophisticated _____ (2) systems, equipped with various sensors for vision, touch, and position measurement, enabling them to not only _____ (3) programmed motions but also react to their environment. A key technology for mobile robots is Simultaneous _____ (4) and Mapping (SLAM), which lets robots build maps of new areas and determine their own location, helping them _____ (5) and avoid _____ (6) by regulating their speed and planning new paths independently. For tasks that require high precision, like _____ (7), automated control uses sensor feedback for exact movement and force, ensuring _____ (8) product quality. Such independence is crucial for applications in dangerous environments, such as search and rescue, where robots use sensors to detect _____ (9) and can operate reliably, sending data and signals back to _____ (10) teams even in unstable conditions.

2.6 Before you listen to the final part of the episode of the podcast:

1. Discuss possible challenges, downsides or limits of automated systems.

2.7 Listen to the final part of the episode and work on the following tasks.

1. Discuss what makes automated systems so expensive.

2. Evaluate when human intuition is superior to automated systems.

3. Assess why cyber security is such a crucial issue.

4. Explain the term 'automation bias'. Develop strategies to cope with this phenomenon.

5. "How should we, as engineers and policymakers, define the line between machine reliability and essential human intuition in critical environments, like, say, large-scale infrastructure or even medical robotics?"

3. Reading

3.1 Read the article [Stanislav Petrov: The man who may have saved the world](#).

1. Briefly summarise the events and highlight what role automated systems played.
2. Discuss what this story teaches us about the reliability of automated systems and how – as a consequence – we should cope with them in critical areas.