MECHATRONICS

WITH DR JUSTIN STARR

Talking *points*

KNOWLEDGE

1. What is mechatronics?
2. What is remote access training?

COMPREHENSION

3. What are the benefits and drawbacks of remote access training, compared to simulations?
4. Why is training a priority for industries such as energy and manufacturing?

APPLICATION

5. What do you think are some of the specific safety measures necessary for remote access training using heavy machinery?
6. How do you think PRAISE-ET might make touch-based sensory feedback possible for remote students?

ANALYSIS

7. How do you think the desired skills of, for example, car mechanics are likely to change in the next few decades?
8. What questions might you ask manufacturing and engineering companies to identify how to make the mechatronics curriculum closely aligned with industry needs?

EVALUATION

9. To what extent do you think the trend for ever-more specialised skills is likely to persist far into the future? For instance, do you think AI will reach a stage where it can operate, troubleshoot and fix itself?
10. Justin mentions the need for good cybersecurity to protect machines. As more processes become connected to the internet, what do you think are the implications for cybersecurity and companies' and nations' vulnerability? How might this be countered?

Activity

Think about a household machine that incorporates both electronics and mechanics, such as a printer, a washing machine or a food processor.

Now, imagine you are designing a system that trains somebody who has never seen such a device before how to use it by being able to operate it remotely. It should be able to train them to such a standard that, when they come to use the machine in real life, they know exactly what to do.

Consider the following:

- Begin by listing as full a range of scenarios as you can that using such a machine can entail. This includes all its different purposes (for example, for a washing machine, different settings for synthetic or cotton clothes).
- List the ways it could go wrong.
- Which elements could be completely electronic (for example, a button on your keyboard activates a button on the device), and which might need to incorporate robotics (for example, 'arms' that can twist levers, carry things, or take things apart)?
- What sensory inputs (for example, vision, hearing, touch) should you include? What equipment would you need to provide this?
- How will the student be able to notice, and respond, if something goes wrong?

Draw an annotated plan of this system. This will involve a drawing of the modified machine, and a drawing of the remote setup. Label all the parts.

Compare your plan to a classmate's. Did they have any good ideas that you could incorporate into yours? Could they understand your drawings and annotations? What constructive feedback do you have for them?

More *resources*

- This article from Future Jobs for You explores the likely future applications of artificial intelligence in mechatronics: www.futurejobsforyou.com/artificial-intelligence-for-mechatronics/
- This video from Virtual Dreamers gives an informal introduction to mechatronics and whether it could be a career for you: www.youtube.com/watch?v=-8vfewUGUWE