



Intelligent systems engineering

with Professor Narges Armanfard
and her iSMART Lab

Talking points

Knowledge

1. How many people over 100 years old were alive in 1950? What had this number grown to in 2021?
2. Apart from ageing populations, what other factors are affecting healthcare systems around the world?

Comprehension

3. What are the benefits of machine learning (ML) algorithms that can analyse electroencephalogram (EEG) signals and magnetic resonance imaging (MRI) images?
4. How could smart home technologies improve healthcare?

Application

5. Imagine you are a doctor who is helping a patient set up a new smart home health monitoring system. What information would you need to give them to ensure they had a proper understanding of how the technology will impact them?
6. Imagine you are developing an artificial intelligence (AI) algorithm that will analyse health data obtained from a wearable device. What would you have to consider to ensure you are following the principles of responsible AI research?

Analysis

7. How could the research conducted at iSMART Lab benefit patients who live in remote areas and are unable to visit their doctor regularly?

8. Wearable devices and smart home technologies may be able to provide patients with real-time, personalised recommendations about their health. How could this impact their lives?
9. Wearable devices and smart home technologies capture sensitive health data. Why do you think this might be a concern for some people?

Synthesis

10. In order for the iSMART AI algorithms to be used in a clinical setting, they will have to be rigorously tested to ensure that they are accurate and reliable. How would you design a test to prove that epilepsy detection software is capable of reliably and accurately finding epilepsy on-set regions in the brain?

Evaluation

11. AI is becoming increasingly powerful. As we have seen, this technology can be a wonderful tool and provide many benefits to the world. However, some experts are worried about its potential for causing harm. To what extent do you believe that AI will be a benefit or a problem for humanity, and why?

Creativity

12. Intelligent systems have the power to revolutionise healthcare systems as well as many other systems, such as transportation and education. How might the world of the future be different as a result of revolutionary AI technology?



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Activities

1. Create an information leaflet for a smart home health monitoring device

Smart home health monitoring technology has the potential to provide massive benefits to patients with all kinds of health issues. However, it is likely that some people will remain sceptical of this new technology. They may not understand how it works, have concerns about their privacy, or have read a lot of news stories about the dangers of AI.

Imagine that a new smart home technology has been approved for use in the real world. This new device will capture video footage from a patient's house and alert medical professionals if the patient exhibits signs of having a stroke.

Your job is to create an information leaflet that tells patients about this new technology. Remember that patients will likely have a poor understanding of how the technology works and may not trust it or want it in their homes. How can you convince the patients that this technology will benefit them and that it is safe and secure?

2. AI discussion

AI has been in the news a lot lately. Many prominent figures in the field of AI penned an open letter calling for research into powerful AIs, such as ChatGPT-4, to be paused for at least six months. They had concerns that some AI technologies were advancing too quickly and could lead to the spread of misinformation, the loss of jobs and massive financial instability. On the other hand, the work of iSMART Lab shows us that AI has the potential to transform society for the better.

In groups of four, discuss how you feel about AI. Before you start your discussion, each write down a couple of sentences about what you currently think and feel about AI. To begin your discussion, take it in turns to read out what you have written down to the rest of the group. Then, use the prompts below to discuss the subject in more detail. Make sure to respect the opinions of everyone in your group; remember this is a discussion, not a 'win or lose' debate.

- How is AI helping us already?
- How could AI help us in the future?
- How could AI harm us in the future?
- Would you be comfortable giving an AI device personal information about yourself? Why, or why not?

- To what extent would you trust an AI device to give you medical advice?
- What are your personal experiences with AI?
- Are you excited about the potential AI or are you worried? Why?

Bring your discussion to a close and think about how you feel now. Look at what you wrote down at the start. Have your thoughts and feelings changed? Did anyone mention something that you had not thought of before? Did you disagree with something someone said? Write another couple of sentences to reflect on your discussion.

More resources

- There are many popular science books on the topic of AI. Some stand-out books from the last few years include *Life 3.0* by Max Tegmark, *Human Compatible* by Stuart Russell, and *The AI Revolution in Medicine: GPT-4 and Beyond* by Peter Lee, Carey Goldberg, and Isaac Kohane.