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Digital society

Standard level

Paper 1

10 May 2024

Zone A afternoon | Zone B afternoon | Zone C afternoon

1 hour 30 minutes

Instructions to candidates

- Do not open this examination paper until instructed to do so.
- Answer two questions.
- The maximum mark for this examination paper is **[40 marks]**.

Answer **two** questions. Each question is worth [20 marks].

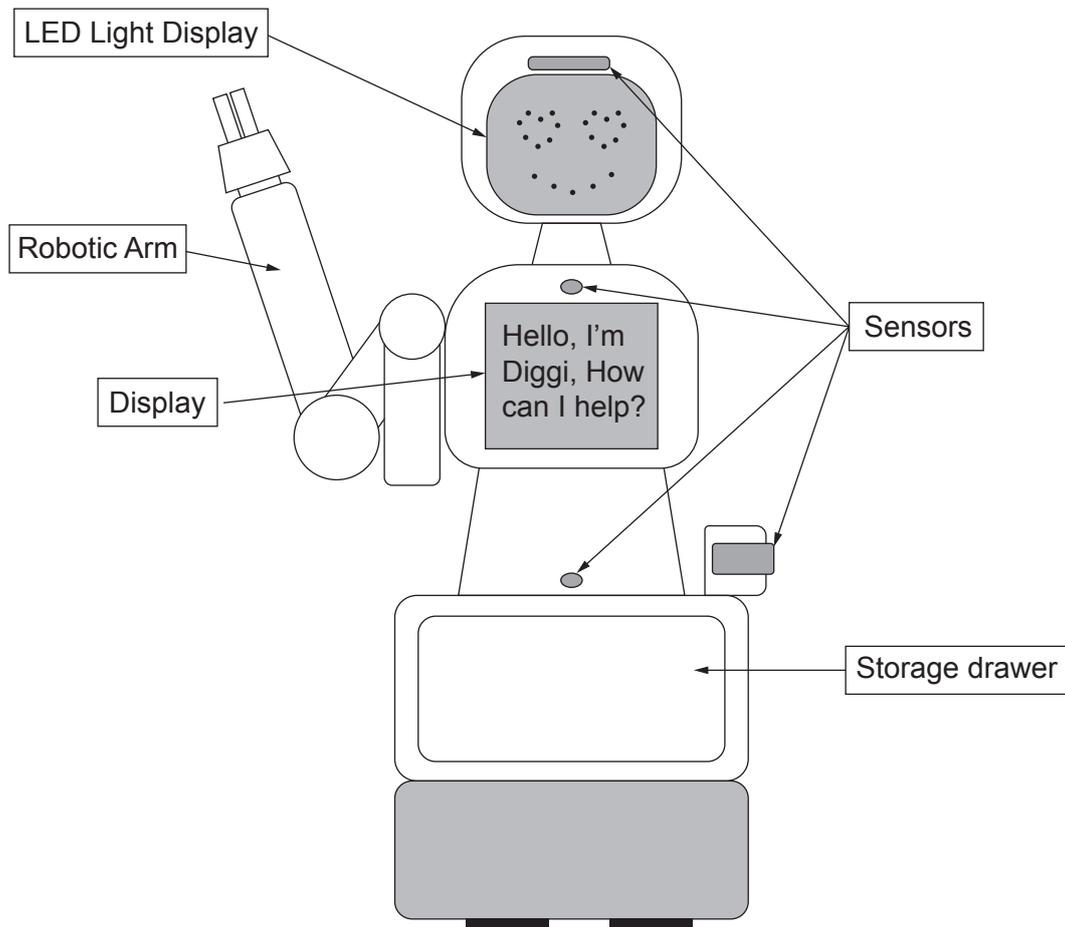
1. Diggi the health service robot

Some hospitals have started using a service robot called Diggi to assist the nurses and other staff with delivering tools and supplies to the places they are needed in hospitals.

Before Diggi can fully become part of the care team it must learn to navigate the hospital and respond to the nurses' needs. Using artificial intelligence (AI), Diggi maps out a hospital through sensors and other machine-learning technology so that it can ultimately navigate and work autonomously. Diggi can also learn to use its robotic arm to open doors and operate elevator panels (see **Figure 1**).

The more Diggi is used, the more Diggi learns and adapts to the specific hospital environment. Diggi was designed by Cave Robotics following an extensive consultation exercise with potential users.

Figure 1: Diggi the health service robot



(This question continues on the following page)

(Question 1 continued)

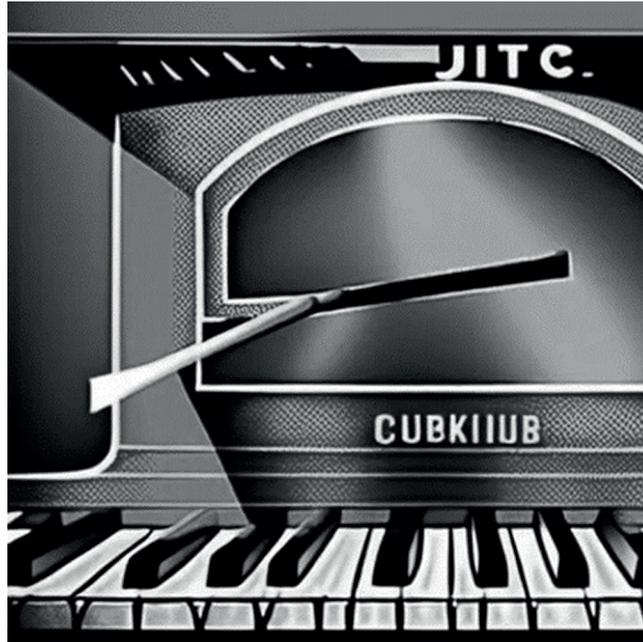
- (a) (i) Identify **two** output devices that might be included on a service robot. [2]
- (ii) Identify **two** types of sensors on a service robot which could be used to navigate through a hospital's corridors. [2]
- (iii) Identify **two** ways in which the developers of Diggi might make the robot seem more human. [2]
- (b) Diggi's design was based on data gathered by primary and secondary research.
- Explain **three** methods of primary data collection that would provide information that could enable Diggi to complete its tasks. [6]
- (c) Evaluate the opportunities **and** dilemmas associated with the use of service robots, such as Diggi, in the healthcare sector. [8]

2. “Art is dead”

Jazz musician, Janine de Klerk, is releasing some new work and needs an album cover. Instead of hiring a professional artist to create the album cover, she uses PIX-ia, an online artificial intelligence (AI) art generation program, to create the image.

Janine inputs keywords that are processed by PIX-ia’s algorithms to create a unique image. For example, the keywords “jazz club, smoke, piano” may create an image like the one shown in **Figure 2**.

Figure 2: An example of an image created by PIX-ia



PIX-ia uses unsupervised learning based on an art dataset of over 100 000 copyright-free images. It has been developed by the open-source software development community.

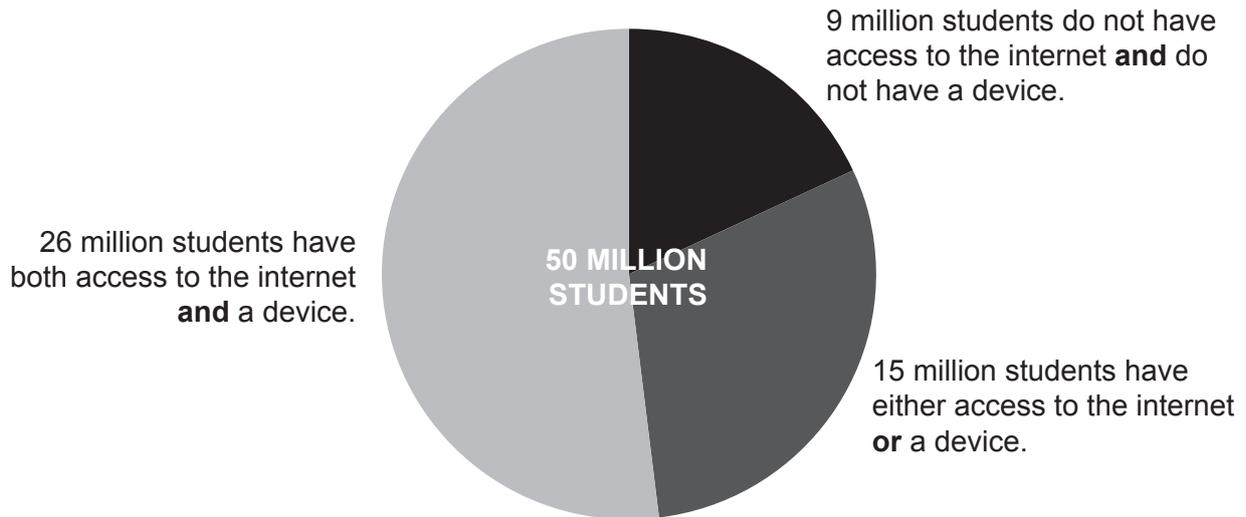
- (a) (i) Identify **two** characteristics of algorithms. [2]
- (ii) Identify **two** types of artificial intelligence (AI). [2]
- (iii) Identify **two** image formats that may be used by PIX-ia. [2]
- (b) (i) Explain **one** advantage of using the open-source software development community to develop PIX-ia. [2]
- (ii) Suggest **two** ways in which PIX-ia could obtain copyright-free images. [4]
- (c) Discuss the opportunities **and** dilemmas of using artificial intelligence (AI) to create new artworks. [8]

3. Connecting the unconnected

In many countries, there are significant differences between communities in their access to the internet. This has become a problem for students who rely on the internet to do their homework. This digital divide has been named “the homework gap”.

Figure 3 shows the scale of the homework gap in a more economically developed country.

Figure 3: The homework gap in a more economically developed country



To improve their access to the internet and reduce the homework gap, some communities are creating their own communications networks. These networks include infrastructure to connect people to the internet in community areas (such as bus stops, libraries and community centres), in businesses, and in their homes.

- (a) (i) Identify **two** items of hardware that are needed for a student to connect to the internet at home. [2]
- (ii) Identify **two** services provided by an internet service provider (ISP) **other than** access to the World Wide Web. [2]
- (iii) Identify **two** ways in which students could use the internet to collaborate online. [2]
- (b) (i) Distinguish between the internet and the World Wide Web. [2]
- (ii) Suggest **two** reasons why some communities have limited access to the internet. [4]
- (c) Discuss whether it is acceptable for schools to require students to access the internet when completing their homework outside of school. [8]

4. Using social media to help make financial decisions

Research shows that an increasing number of people are following the financial advice of social media influencers. These influencers claim to be specialists in financial trading, which includes stocks, shares and cryptocurrencies.

Unfortunately, many people who have followed this advice have lost a lot of money, as their investments have failed to make the profits claimed by the influencer.

As a result of public concerns about the role of influencers, governments are considering strategies to regulate how influencers are able to provide their financial advice.

- (a) (i) Identify **two** ways in which financial advice can be provided through social media. [2]
 - (ii) Identify **two** characteristics of cryptocurrency. [2]
 - (iii) Identify **two** reasons why cryptocurrencies have become increasingly popular. [2]
 - (b) (i) Explain **two** reasons why the financial advice given by social media influencers may not be reliable. [4]
 - (ii) Explain **one** strategy that could be used to verify the accuracy of the financial information provided by a social media influencer. [2]
 - (c) Some governments would like to regulate the content that social media companies post on their sites.

Discuss whether it is the responsibility of the government or social media companies to regulate the financial advice provided on social media. [8]
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References:

Figure 3 Common Sense Media, 2020. *Closing The K-12 Digital Divide In The Age Of Distance Learning*. [pdf online]. Available at: www.common sense media.org/sites/default/files/research/report/common_sense_media_report_infographicfinal.pdf [Accessed 24 April 2023]. Source adapted.