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91898



Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 2 Digital Technologies and Hangarau Matihiko 2025

91898 Demonstrate understanding of a computer science concept

Credits: Three

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of a computer science concept.	Demonstrate in-depth understanding of a computer science concept.	Demonstrate comprehensive understanding of a computer science concept.

There are two questions in this assessment. Choose ONLY ONE question to answer.

You should aim to write **800–1,500 words** in total.

Excellence

TOTAL 07

INSTRUCTIONS

There are two questions in this assessment, on the topics of:

- artificial intelligence (AI) (page 3)
- computer encryption (page 8).

Choose **ONLY ONE** question to answer. Note that parts (b), (c), and (d) of each question include options for you to choose from.

Read all parts of your chosen question before you begin. Do not repeat your response in different parts of the question.

You are not permitted to access any resources (either in hard copy or online) other than those supplied in the assessment itself.

QUESTION ONE: Artificial intelligence (AI)

MOST COMMON TYPES OF IN-VEHICLE SENSORS



Source: <https://www.apriorit.com/dev-blog/728-ai-applications-automotive-industry>

- (a) (i) How does AI use the inputs from various sensors in a car?
Give TWO ways in which the use of AI improves car safety.

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AI gathers data from sensors such as LiDar, radar and cameras, along with data like the car's speed and current steering direction. This data is then fed into the input nodes of a neural network which then processes the data through the hidden layers. The neural network then outputs whether the car should accelerate, brake, steer left or steer right according to the data gathered from the sensors.

Using AI in car safety systems has many benefits. AI does not get distracted like a human does. When humans are tired or intoxicated, their reaction time and awareness decreases, which increases the chance of their driving becoming poorer and could eventually lead to a crash. AI cannot get tired or intoxicated, and is always constantly aware of its surroundings and able to make split second calculations to provide the best chance of avoiding a crash.

AI can also be used in to monitor the driver themselves by using a camera and computer vision. This AI gathers data such as blink rate, facial expression and the driver's eye direction to determine if the driver is too fatigued or distracted to continue driving safely. It can then alert the driver and encourage them to pull over and take a break. This also decreases the chance of a crash happening due to distraction or fatigue.

- (ii) What are some of the key problems or issues in AI car safety systems?
In your response, ensure that you demonstrate clear links to computer science concepts.

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A key issue in AI car safety systems is the possibility of bias. If the training data is not representative of all different situations and scenarios, the AI can underperform on certain situations. For example, if the training data for the AI is comprised of all sunny, open roads with clear lane markings, the AI's neural network will get really good at reacting to these specific conditions. However, when faced with a wet, foggy road, a road with lots of twists and winds, or a road with no lane markings, its neural network will not be trained to handle these situations effectively, causing it to underperform on these situations and potentially causing a crash.

Overfitting can occur if, for example, the training data only contains people with black clothes. The neural network will be trained to detect black clothing very well, but may fail to detect people in white or coloured clothing. This is very dangerous as it can cause cars to not detect pedestrians, potentially leading to fatal crashes. To counter bias and overfitting, the training data should be very diverse and contain a wide variety of different situations and scenarios so the neural network can be balanced and effective in different situations.

Another key issue in AI car safety systems is the ethical dilemma that could arise in the case of an unavoidable crash. For example, the self-driving car could be on a slippery road that makes it impossible to brake in time and it will either hit a fallen tree, which will definitely kill the passenger, or it can turn and hit a pedestrian, which will cause the passenger to survive. The AI must choose between these options in a split second. This creates an ethical dilemma, since how can the AI choose who's life to take? This is an issue that must be addressed before self-driving cars become popular.



Source (left image): <https://www.geeksforgeeks.org/natural-language-processing-overview>

Source (right image): <https://www.sciencelearn.org.nz/images/5156-neural-network-diagram>

(b) Provide details of how ONE of the following is used or implemented, or occurs.

- Natural language processing
- Neural networks.

Enter your selection here:

Write your answer in the box below.

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Natural language processing (NLP for short) is an area of AI that is centred around the idea of creating machines that can understand and replicate human language. These NLP models are trained on billions and billions of articles and books so it can learn the patterns that make up sentences. The sheer amount of sentences fed into the NLP model allows it to learn how sentences are structured in terms of probability. It doesn't actually understand the language like humans do, it is just fed so much training data that it can predict with high accuracy which words will come after others to form a sentence. NLP is used in a variety of fields such as in chatbots like ChatGPT, which allows these AI's to converse and learn from an actual human. Other examples of NLP include speech-recognition models like Siri and Alexa, which are trained to detect and understand human speech and respond based on what was said. However, since NLP models rely on probability, with low amounts of training data, they can often make mistakes without realising them, and in extreme cases, AI hallucinations can occur where the AI confidently spits out completely incorrect information. However, modern NLP models are trained on so much data that they can accurately produce speech most of the time.

(c) Choose ONE of the following to answer:

- Explain how AI is needed in healthcare to deliver patient care.
- OR
- Explain what opportunity machine learning has provided in healthcare.

Enter your selection in the box below:

Write your answer in the box below.

B I U

Machine learning (ML for short) has proven itself to be a game-changer in the healthcare industry. ML is the idea of machines being able to learn from training data and predict outputs on new data without being explicitly programmed to do so. In healthcare, one way ML is being used is for quicker diagnosis from medical scans. By analysing thousands of labelled medical scans, the ML algorithm identifies the pattern between scans and diagnosed condition. When given millions of scans, these patterns become really precise and accurate. After training, when given new unlabelled scans, the ML can correctly predict the diagnosis a lot of the time. By using ML algorithms, the efficiency of hospitals can be increased. If the ML algorithms are given simple medical scans, it leads to a quicker diagnosis for these patients, increasing efficiency. This also allows human doctors to focus on the more complicated medical anomalies. Also, since ML algorithms are AI, they do not get fatigued, meaning they will not miss anomalies in medical

medical anomalies. Also, since ML algorithms are AI, they do not get fatigued, meaning they will not miss anomalies in medical scans like a human doctor could do if they are fatigued. Both of these facts create better opportunities for hospitals to provide more in-depth, effective healthcare for patients while also increasing the efficiency of hospitals, allowing for more patients to be seen and helped.

(d) Choose ONE of the following to answer:

- Explain, giving examples, what can be done to future-proof the use of AI-generated content in social media.
- OR
- Explain, giving examples, known ethical issues that have occurred from the use of AI-generated content in social media.

Enter your selection in the box below:

Explain, giving examples, known ethical issues that have occurred from the use of AI-generated content in social media.

Write your answer in the box below.

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AI generated content can have significant impacts and ethical concerns in the social media industry. Using AI, content creators can produce several videos a day. Over time and with hundred of creators using AI, the field quickly becomes saturated with these unoriginal videos specifically designed for views. This also damages other content creators that put in the hard work to create insightful and interesting videos without the use of AI. The AI videos take almost no effort to make, but still gain lots of views and go viral, whereas the original videos may not get the attention they deserve due to the industry being saturated with AI content.

Another ethical issue that has occurred from the use of AI-generated content in social media relates to teenagers. AI can produce perfect faces and bodies in their videos. Young boys and girls that see these videos may become insecure and depressed since they believe that their body is not good enough compared to the figures they see on social media. A lot of the time, these videos don't explicitly say they are AI generated which can trick more teens. In past cases, the pressure and depression that arises from seeing thousands of these videos has resulted in the teenager committing suicide. To try and prevent this from happening, social media outlets have begun to take action by clearly signalling the user if a video is AI-generated, along with other protocols.

Another ethical issue that has recently occurred is the deepfaking of famous social media influencer and boxer Jake Paul. People have used AI to generate fake videos of Jake Paul saying a variety of things. This is obviously a big ethical concern because this can, and has, tricked people into believing that Jake Paul actually said those things. With AI generated content continuously getting more and more indistinguishable from real content, deepfakes like these are likely going to keep happening.

Excellence

Subject: Level 2 Digital Technologies

Standard: 91898

Overall grade: 07

Q	Part	Marker commentary
One	(a)	(i) The candidate described the sensors involved, how they were processed by the AI, and the potential effects on the outputs. In the first way it was LiDar, radar and cameras, with the AI processing to output to the steering, brakes and accelerator. The second example concerned fatigue monitoring.
		(ii) This question relates to the Excellence criteria of the standard. The candidate gave a limited response that did not meet the requirements for Excellence.
	(b)	An introduction was given that explained what natural language processing is, followed by two good examples of where NLP is used.
	(c)	The candidate again gave a short explanation of what machine learning is, and then gave a good example of the application of ML in healthcare.
	(d)	Ethical issues were chosen by most candidates. Three topics in ethical issues were covered. The candidate covered the saturation that is occurring in social media with easy-to-create AI videos, the effect on body image of AI generated videos, and issues with deep faking.