

1	1	Marks are for AO2 (analyse)	9												
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		<p>Note: The following notes are indicative content only and should not be used as a checklist.</p> <p>Moral:</p> <ul style="list-style-type: none">- The developers may have to take on board the responsibility should an accident occur.- The developers may need to develop systems that cause the vehicle to make moral decisions in times of crisis e.g. if a crash is inevitable, what does the vehicle choose to crash in to.- The developer will have to accept that they are perpetuating or increasing use of vehicles which may have a negative impact on the environment.- The ability to keep them protected from hackers who might want to take over their controls while someone is on-board. <p>Ethical:</p> <ul style="list-style-type: none">- The developer may be putting taxi drivers out of business.- By developing self-driving taxis, other similar businesses may follow suit causing further ethical considerations.- Customers may not realise the taxi is computer-controlled until they enter the vehicle leaving them in a dilemma.- If a customer is taken ill the taxi may not be able to deal with the situation.													

		<div><div>Legal</div><div><ul style="list-style-type: none">- Legal responsibility for accidents may be called into question.- If videos/images are taken during driving these may infringe the privacy of the occupants.- Passengers may find it easier to defraud or not pay the taxi company.</div><div>Cultural:</div><div><ul style="list-style-type: none">- Some cultures may dislike the assignation of human virtues on machines.- The culture of the ‘cabbie’ may be damaged.- As most accidents are caused by driver error and so the use of driverless cars, in theory, would improve safety. How can the public be persuaded of this?- Driverless cars would, in theory, reduce congestion and so how can this be communicated to improve uptake?</div></div>	
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Examples could include:**Ethical**

- Law enforcement officers may see disturbing images/messages on the phone which could affect the way they feel.
- This may be seen as a breach of privacy.
- Personal data such as photos of family may be lost.
- Law enforcement officers may misuse the phones for their own purposes.
- Law enforcement officers may be able to use the phone to contact (potential) victims and offer support.
- Law enforcement officers may use the phones to perform “stings” on other criminals.
- The ethical issue is one of creating “a slippery slope.” If the law enforcement officers are granted access in this case, where will it stop? Will foreign governments have similar access – or the right for the encrypted data to be shared
- This could cause increased conflict between law enforcement officers and the public.
- People may have private photos/data which while legal may go against their culture or the cultural beliefs of the law enforcement officer.
- Breach of trust between manufacturer and client (count as legal if contract rather than trust).

Legal

- Relevant legislation identified with reference to personal information or privacy.
- Law enforcement officers may be able to make a decision not to press charges based upon evidence on the phone // May have to let people they believe to be guilty go free if they cannot access data.
- This may be in breach of (human rights of) privacy.
- Law enforcement officers may be able to use the data to solve other crimes.
- Law enforcement officers may be able to use the data to prevent further criminal activity.
- Allowing access to encrypted information stored on the phone may undermine the very freedoms and liberty that the law is meant to protect.
- Providing access to phones may also create a vulnerability that hackers (from hostile countries) can exploit.
- A legal issue when a judge gives permission for a phone’s encrypted data to be accessed and it can’t/it is refused.
- If we have the technology to prevent terrorist attacks by gaining valuable data from the attackers’ electronic devices then access to encrypted data should be allowed.
- The police may not keep the data as secure as the user wants.
- Law enforcement officers may edit the data on the phone.
- What level of authority/who is needed to give permission to a law enforcement officer to access data?
- Manufacturers may be breaking the law by refusing to allow access.

Students may be awarded marks for individual issues or expansions upon issues.

Expansion points may include further details on how the issue may arise or the impact of the issue occurring. Examples of expansion points could include:

- Law enforcement officers may accidentally lose data through inexperience.
- While it may be a breach in human rights privacy, this may be outweighed by lives saved.
- If personal data is lost, the owner of the phone may lose income from missed business appointments.

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- Can monitor staff/visitors via camera in case of abuse allegation. #
- Do visitors need to be told about cameras? #
- What happens to data when the resident dies? How long can the data be kept for?
- Can next of kin get access to data?
- Who owns the data – the company/home/residents? #
- In what country will the data be stored?

Cultural

- Some people from some cultures may not like being videoed (particularly without their knowledge).
- Residents may not want staff of the opposite gender viewing images of them in certain situations. #

Examples of points covered in depth

Issue	Explanation/Depth
It is unethical to collect data about people without them knowing what the data is to be used for	As it could be used for something that they do not want/agree with or make them vulnerable in some way
It is unethical to have residents wear devices if they don't have a full understanding of its capabilities	People cannot agree to wear something that records so much data if they do not know what it does
If the device is in testing, it may not be as reliable as the PERS device	System might fail or send incorrect data if there are problems

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4		<p>Marks are for AO2 (analyse)</p> <p>Level of response question:</p> <table><tr><th>Level</th><th>Description</th><th>Mark Range</th></tr><tr><td>4</td><td>A line of reasoning has been followed to produce a coherent, relevant, substantiated and logically structured response. Answers in this level will demonstrate a clear justification of the use of lossy compression and will show a developed awareness of how the benefits of lossy compression are related to one another. The response covers all four aspects (lossy, ethical, legal, cultural) of the question. A range of the points made will have been expanded upon using clear examples and references to real world implications.</td><td>10–12</td></tr><tr><td>3</td><td>A line of reasoning has been followed to produce a coherent, relevant, substantiated and logically structured response. Answers in this level will address the use of lossy compression but there may not always be a clearly demonstrated understanding of the benefits. The response covers at least three aspects (lossy, ethical, legal, cultural) of the question. Some of the points made will have been expanded on and some of these will have been expanded upon using examples but these might not always exemplify the points made or be lacking in references to real world implications.</td><td>7–9</td></tr><tr><td>2</td><td>A line of reasoning has been followed to produce a mostly coherent, relevant, substantiated and logically structured response. The response lists some issues that are likely to focus on only two or three aspects (lossy, ethical, legal, cultural) of the question. Some of the points made will have been expanded upon but are likely to be lacking in clear examples or may not wholly relate to the points being made.</td><td>4–6</td></tr><tr><td>1</td><td>There is no evidence that a line of reasoning has been followed. Answers in this level may identify a point relating to the use of lossy compression but this part of the question may not be addressed at all. The response will attempt to identify some issues raised by the question; points are not likely to be expanded upon but where they are, the examples will be irrelevant or not relate to the points being made.</td><td>1–3</td></tr></table> <p>Indicative Content</p> <p>Justifying lossy compression:</p> <ul style="list-style-type: none">• Scale / volume of data: the company has a large volume of audio to store (because of the number of users that could have the smart speaker).• Size of files: lossy compression can reduce the file size (of individual audio files to be transmitted/stored) // greater compression than lossless.• Audio quality: it is still possible for files to retain (sufficient) quality (to permit analysis) // the audio quality depends on the amount of information retained / lost after applying lossy compression // remove unnecessary / redundant data.			Level	Description	Mark Range	4	A line of reasoning has been followed to produce a coherent, relevant, substantiated and logically structured response. Answers in this level will demonstrate a clear justification of the use of lossy compression and will show a developed awareness of how the benefits of lossy compression are related to one another. The response covers all four aspects (lossy, ethical, legal, cultural) of the question. A range of the points made will have been expanded upon using clear examples and references to real world implications.	10–12	3	A line of reasoning has been followed to produce a coherent, relevant, substantiated and logically structured response. Answers in this level will address the use of lossy compression but there may not always be a clearly demonstrated understanding of the benefits. The response covers at least three aspects (lossy, ethical, legal, cultural) of the question. Some of the points made will have been expanded on and some of these will have been expanded upon using examples but these might not always exemplify the points made or be lacking in references to real world implications.	7–9	2	A line of reasoning has been followed to produce a mostly coherent, relevant, substantiated and logically structured response. The response lists some issues that are likely to focus on only two or three aspects (lossy, ethical, legal, cultural) of the question. Some of the points made will have been expanded upon but are likely to be lacking in clear examples or may not wholly relate to the points being made.	4–6	1	There is no evidence that a line of reasoning has been followed. Answers in this level may identify a point relating to the use of lossy compression but this part of the question may not be addressed at all. The response will attempt to identify some issues raised by the question; points are not likely to be expanded upon but where they are, the examples will be irrelevant or not relate to the points being made.	1–3	12
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Ethical, legal and cultural examples are likely to overlap; when marking student responses, credit should be given for the range and clarity of points made, regardless of category. Points could include:

Ethical:

- The company has a justifiable goal, (ie by seeking to provide voice controls and improve its algorithms, the company is benefitting its customers, particularly individuals who cannot use traditional input methods).
- The company may record activity that is illegal, raising questions about its responsibility to report the activity to the authorities and duty of care to customers.
- Company employees may misuse the recordings for their own purposes.
- Company employees may be exposed to inappropriate material, raising questions about the duty of care that the company has for its employees.
- Creating 'a slippery slope' through the recordings, ie if the company is allowed to record customers for this purpose, where will it stop?
- The company is contributing to an erosion of privacy for individuals in their home / increasing existing surveillance.
- The company should obtain permission / consent from users before recording them in clear and understandable terms so that customers are providing informed consent.
- There is the potential for increased distrust between users and the company.
- The company may use the recordings for purposes other than improving the voice recognition algorithms.

Legal:

- The company must comply with legislation specifically covering the transmission and storage of data across different countries / territories of operation, including the General Data Protection Regulation (GDPR) or the Data Protection Act.
- The company has a responsibility to ensure their security / integrity / confidentiality / availability of the customer data it stores.
- The company must introduce controls to take account of individual privacy rights / legislation across different countries / territories of operation.
- The international nature of the company means that it may have opportunities to circumvent legislation within particular / different countries / territories, eg by getting user permission to transmit data to and store data in less restrictive countries / territories.

Cultural:

- All users being recorded can have benefits for groups of users with languages / dialects / accents where data is not widely available (even within the same country / territory).
- All users being recorded can allow the algorithms to advance more quickly, potentially allowing the company to make its products available across languages / user groups / countries / territories more quickly.
- The company should consider the customs and cultural norms of its different users (religions) / countries / territories of operation, particularly with regard to respecting expectations of privacy.
- Weighing up the benefit to specific user groups who rely more heavily on voice control, (eg individuals with physical disabilities) against the compromised privacy.

		<p>Students may be awarded marks for individual issues or expansions upon issues.</p> <p>Expansion points may include further details on how the issue may arise or the impact of the issue occurring.</p> <p>Examples of expansion points could include:</p> <ul style="list-style-type: none">• Company employees might lose or leak data due to coercion or inexperience.• If a personally identifiable recording is lost or leaks, there may be severe personal and/or professional consequences for the user(s) on the recording.	
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Qu	Pt	Marking Guidance	Marks												
5		<p>3 marks are for AO1 (understanding) and 6 marks are for AO2 (analyse)</p> <p>Level of response question</p> <table><tr><th>Level</th><th>Description</th><th>Mark Range</th></tr><tr><td>3</td><td>A line of reasoning has been followed to produce a coherent, relevant, substantiated and logically structured response. The response covers a wide range of issues that are consistently explained and/or supported by examples. A very good understanding of how an image is captured is shown. The response covers a wide range of moral/ethical, legal and cultural arguments, or examines a smaller range of arguments in greater depth.</td><td>7–9</td></tr><tr><td>2</td><td>A line of reasoning has been followed to produce a mostly coherent, relevant, substantiated and logically structured response. The response must include some analysis of the moral, ethical, legal or cultural issues involved. The response may include some understanding of how the image is captured. The response will cover a range of arguments in some depth.</td><td>4–6</td></tr><tr><td>1</td><td>There is little evidence that a line of reasoning has been followed. The response covers a small number of points which could cover either the image capture, or the moral, ethical, legal or cultural issues, or both. The response lacks range and depth.</td><td>1–3</td></tr></table> <p>Indicative content:</p> <p>AO1</p> <p>Image Capture</p> <ul style="list-style-type: none">• Light enters through / is focussed by the lens• on to (an array of sensors on) the sensor chip A. light sensors capture/record light (intensity) A. CCD as sensor.• Each sensor produces an electrical current/signal.• The signal represents a pixel.• An (ADC) converts measurement of light intensity into binary/digital data.• A (colour) filter is applied to generate separate data values for red, green and blue colour components.• The pixels are recorded as a group/array. <p>AO2</p> <p>Note: Some points may fit under more than one category. These have been indicated with a #.</p>	Level	Description	Mark Range	3	A line of reasoning has been followed to produce a coherent, relevant, substantiated and logically structured response. The response covers a wide range of issues that are consistently explained and/or supported by examples. A very good understanding of how an image is captured is shown. The response covers a wide range of moral/ethical, legal and cultural arguments, or examines a smaller range of arguments in greater depth.	7–9	2	A line of reasoning has been followed to produce a mostly coherent, relevant, substantiated and logically structured response. The response must include some analysis of the moral, ethical, legal or cultural issues involved. The response may include some understanding of how the image is captured. The response will cover a range of arguments in some depth.	4–6	1	There is little evidence that a line of reasoning has been followed. The response covers a small number of points which could cover either the image capture, or the moral, ethical, legal or cultural issues, or both. The response lacks range and depth.	1–3	9
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		<p>Moral/Ethical</p> <ul style="list-style-type: none"> • Could the AI or computer program include unconscious bias as a result of the dataset it has access to or the programmers? • Would the owners of the system use the system to steer customers towards more expensive/higher profit garments? • Will the owners of the system use the data collected for other purposes? # • May put pressure on users to spend more money than they have. • Application may include advertising for certain brands. • Photographs may be uploaded by third parties and the result used without knowledge / consent of the person in the photograph. # • Might the application recommend outfits which may be deemed inappropriate by some? <p>Legal</p> <ul style="list-style-type: none"> • Will the data be stored securely? # • Who will own copyright of the generated images? • An image identifies a living person and so can be classed as personal data under the Data Protection Act / GDPR. • How will the application authenticate that the photograph is of the person using the system or has the permission of the person whose photograph it is? • Will there be an age authentication of the user of the system? Will there be an age restriction? How is this verified? • How long will the images be made available for? <p>Cultural</p> <ul style="list-style-type: none"> • Some outfits suggested may be offensive to certain groups of users (eg in certain religions) • Could the AI make inappropriate decisions about what clothes to suggest based on ethnicity / gender / disability / body-size? • Developers may deliberately or unintentionally (due to the algorithm) influence fashion trends. 	
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