N17/3/ITGSX/HP3/ENG/TZ0/XX/M

Diploma Programme
Programme du diplôme
Programa del Diploma

Markscheme

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Information technology in a global society

Higher level

Paper 3

12 pages

Examiners should be aware that in some cases, candidates may take a different approach, which if appropriate should be rewarded. If in doubt, check with your Team Leader.

If candidates answer more than the prescribed number of questions:

- In the case of an "identify" question read all answers and mark positively up to the maximum marks. Disregard incorrect answers.

- In the case of a "describe" question, which asks for a certain number of facts *eg* "describe two kinds", mark the **first two** correct answers. This could include two descriptions, one description and one identification, or two identifications.

- In the case of an "explain" question, which asks for a specified number of explanations *eg* "explain two reasons", mark the **first two** correct answers. This could include two full explanations, one explanation, one partial explanation *etc*.

1. (a) Identify **two** items of data that may be included in the XML file uploaded to the cloud server after a user of *KHT* wearable technology finishes jogging. **[2]**

Answers may include:
- GPS data (*ie* position every *n* seconds)
- heart rate (every *n* seconds)
- time / date of run
- duration of the run
- total distance
- speed during the route
- pace (*ie* time taken to run 1 kilometer/mile)
- identifier for device(s) used for measuring (*ie* watch model)
- type of activity (*eg* jogging)
- calories
- gain / loss of elevation / profile of the course
- number of steps
- user identifier *eg* username, unique watch ID
- skin temperature
- glucose/oxygen levels at points in run.

*Award **[1]** for each item of data that may be included in the XML file uploaded to the cloud server after a user of KHT wearable technology finishes jogging, up to a maximum of **[2]**.*

(b) Outline **one** difference between copyright and patent. **[2]**

Answers may include:
- purpose: copyright is to defend an idea from being copied, a patent is to give protected development time to a company with a new idea by excluding others from that field or invention
- other use: Patents are frequently used aggressively by companies to block possible new product developments by competitors, whereas copyrights are used by companies to ensure that they are rewarded from those that use it
- duration: Copyright is granted for longer than patent (eg usually 60 years copyright and 20 years patent - depending on country)
- application: Copyright is usually given to the creator automatically, but not always (though it is recommended to register it) whereas Patent must be applied for from an official organisation
- type of item protected: Copyright is for items such as songs, manuscripts whereas a patent would be for an invention/product.

***Note to markers**:*
*Award **[1]** for a response that has some understanding of the differences between a copyright and patent and **[1]** for additional clarification of the differences up to a maximum of **[2]**.*

2. ANT+, cable and WiFi are methods of transferring data from the *KHT* wearable devices to the user's desktop, smartphone and other devices such as an exercise bike.

Compare these **three** methods of transferring data. **[6]**

Answers may include:

ANT+
Advantages:
- requires very little power so will not drain battery
- can be used to communicate with a range of fitness devices as long as they recognize each other's profile
- available already on many mobile devices and gym equipment
- the standard is agreed by a group of companies which ensures it remains open in the future and will not become vendor-specific
- can use encryption
- allows flexibility of movement within a short range
- is convenient, as no cables are required.

Disadvantages:
- ANT+ only works at relatively short range
- it would require knowledge of the protocol by programmers
- it is not available by default in as many devices as other methods.

Cable
Advantages:
- most efficient / fastest
- relatively secure as physical access is required
- can have standard connectors so fits with many devices.

Disadvantages:
- can affect waterproofing
- less convenient as cable has to be available
- limits proximity of devices
- makes using the device while synchronising data less convenient for users.

WiFi
Advantages:
- allows for flexibility of position and movement during data transfer
- can use existing network or WiFi Direct so no router required
- relatively long range
- different WiFi protocols have different levels of security, all permit encryption of different strengths.

Disadvantages:
- can consume a lot of power and if used continuously would drain device's battery
- requires antenna which would affect the size of the device.

N.B.: *do not award marks if students mention anything to do with internet connectivity as an advantage of wifi as this is off course.*

Students may take another approach and compare 3 features and develop each one eg which protocols can be used to transfer between which devices.

Level		Marks
0	*No knowledge or understanding of ITGS issues and concepts. No use of appropriate ITGS terminology.*	0
1	A limited response that indicates very little understanding of the topic or the reason is not clear. Uses little or no appropriate ITGS terminology. No reference is made to the scenario in the stimulus material.	1–2
2	A descriptive account or partial comparison of the different mechanisms used to transfer data between the wearable technology and the user's desktop. There is some use of appropriate ITGS terminology in the response.	3–4
3	A clear and detailed comparison of the different mechanisms used to transfer data between the wearable technology and the user's desktop. Explicit and relevant references are made to the scenario in the stimulus material. There is appropriate ITGS terminology throughout the response.	5–6

3. Insurance companies have contacted *KHT*. They would like to use the data collected from the wearable devices of *KHT* 's customers to help calculate the price of their insurance policies (lines 77–81, 111–121).

Discuss whether *KHT* should share its customers' data with these insurance companies. **[8]**

KHT

Positive impacts for sharing data:

- *KHT* will obtain revenue from the insurance companies or the data brokers for providing this data
- *KHT* could open up new business ideas, partnering with insurance companies to provide packages (*eg* policy and device)
- *KHT* could receive data from the insurance companies and their calculation (of which exercise data was only a subset) and this could be interesting in providing more health advice for the customer.

Negative impacts for sharing data:

- customers may move away from *KHT* products to a competitor, due to having concerns about their data being shared
- the data provided by *KHT* devices may not be reliable or sufficient in quantity to accurately calculate an insurance premium, so this could result in modifications or further work needing to be done by the company to ensure its quality (*eg* data cleaning and cross-checking or validation).

Customer

Positive impacts for sharing data:

- sharing such data may actually be in the interests of the customers as it may result in lower insurance costs if they are healthy and exercise frequently
- sharing this data may allow insurance companies to tailor or modify the health insurance plan of their customers to make it cover certain conditions that were previously not covered
- the insurance company may be able to identify risks that *KHT* were not able to see, therefore the customer would be better informed about their health
- insurance companies may partner with other fitness or healthy lifestyle companies to develop a rewards program – so customers gain discounts *etc*.

Negative impacts for sharing data:

- customers may experience higher insurance costs due to data which was collected about their exercise patterns
- security of customer data could be put at risk, exposing them to any number of potential misuses by third parties.
- loss of anonymity – and how this impacts them – due to the data collected
- loss of privacy – due to sharing data collected and how it is used and by whom
- lack of reliability of fitness data could lead to unfair changes in insurance costs.

Both customer and *KHT* (possible ways of managing impacts):

- *KHT* and the insurance companies could agree in writing to use the data in an ethical manner
- *KHT* and the insurance companies should comply with the relevant data protection laws
- the amount of data being shared should only consist of the minimum required for the insurance companies to calculate their premiums
- the duration of the data storage by the insurance companies and the method of disposal should be agreed upon so that data is not remaining in the possession of the insurance companies after their calculations finish
- a policy should be written up and accepted by the users before their data can be shared with the insurance company.

SL and HL paper 1 part (c) and HL paper 3 question 3 markband

Marks	***Level descriptor***
No marks	• *No knowledge or understanding of the relevant ITGS issues and concepts.* • *No ITGS terminology.*
Basic ***1–2 marks***	• *Shows only a little ITGS knowledge.* • *Makes at least one argument.* • *May not have any comparison/conclusion.*
Adequate ***3–4 marks***	• *Shows a little more ITGS knowledge but still weak.* • *Has more arguments, (at least two) and possibly from different stakeholders.* • *Has a conclusion or judgments which are probably not backed by much reasoning.*
Competent ***5–6 marks***	• *Shows good ITGS knowledge and detail.* • *Has more arguments and they are balanced (+ and –) and for different stakeholders.* • *Conclusion/judgments are supported by the arguments and is well thought out.*
Proficient ***7–8 marks***	• *Shows very good ITGS knowledge.* • *Arguments are very balanced and detailed.* • *Conclusion is based completely on the arguments.*

4. *To reach the highest markband, your response to question 4 must include evidence of independent research linked to the KHT case study.*

Mika, Lily, Adel and Fajar are investigating how *KHT* should move forward from its current position. They have been discussing two proposals:

- whether to improve the reliability and functionality of the wearable technologies (lines 89–99) or
- whether to develop the services offered by *KHT* that allow customers to customize the wearable technologies, enabling them to trigger alerts such as when there are changes to health advice (lines 102–110, 124–128).

Evaluate these **two** proposals. **[12]**

Answers may include:

Some of the possible answers may be reversed and be applicable to a different strategy. For example, developing the reliability of the products may meet the requirements of a particular group of users, but may not be beneficial to all users.

Improving the reliability and functionality of the wearable technologies:
for:

- as this is linked to the development of products, it may open up new markets or appeal to different customers
- may be a relatively straightforward strategy to implement as it is playing to the strengths of the company and is less risky and cheaper than developing a different area of technology such as a more interactive website
- different user groups may have very different needs and the "one size fits all" approach may not be satisfactory to many users. Therefore diversifying may be a good strategy
- this strategy may open up new use cases (potential uses and users) and increase the demand for *KHT* products amongst this user group
- increases in quality may enable *KHT* to be considered as a "trusted" data provider which may bring benefits to the company and make any future data-based services more marketable
- would improve the potential for use with medical care professionals and clinics/hospitals
- may increase satisfaction of existing customers as they can manage their own health better
- allows more future proofing of device as and when new industry standards are developed.

against:

- this strategy may limit the value of their products as competitors are providing a deeper analysis of user data and giving health advice
- it may make the product less attractive to non-technical / non-specialists who would prefer general health advice rather than more accurate or detailed data on their activity
- changes to hardware and software on the actual devices are high risk, due to the fact that a bug may break the product and require refunds or product recalls, whereas an error in an additional web service could be repaired quickly and easily
- this could be an expensive strategy to follow as hardware would need to be perfected and tested extensively prior to launching
- this strategy could result in long delays before the improvements are ready.

Improving the range of services offered by *KHT*:
for:

- requires some form of diversification by the company and could open up potential customers or uses
- allows greater interaction between the company and its customers such as the ability for *KHT* to gather user feedback that may be used to develop new products
- enables different user groups to be targeted and reduces the likelihood of bulk information being disseminated that is not relevant to many customers
- may provide the most cost-effective method to move *KHT* forward
- may prove to be more time-effective as new software can be mostly tested and deployed automatically
- may take advantage of the developments and changes in the demand for more information to be provided by companies such as *KHT*
- is more attractive to customers who purchase devices based on the advertised feedback features, and do not know how reliable or plentiful the collected data is
- many of these new services would be software-based and implemented on the cloud/*KHT* servers, so the cost of production per unit, would be much less.

against:

- this may be outside the existing expertise of *KHT* who have worked mainly on developing and improving products (however the development of new services may be outsourced)
- this would require an investment of time
- this would require a financial investment
- this may require training of staff.

HL paper 3 question 4 markband

Marks	*Level descriptor*
No marks	• *A response with no knowledge or understanding of the relevant ITGS issues and concepts.* • *A response that includes no appropriate ITGS terminology.*
Basic ***1–3 marks***	• *A response with minimal knowledge and understanding of the relevant ITGS issues and concepts.* • *A response that includes minimal use of appropriate ITGS terminology.* • *A response that has no evidence of judgments, conclusions or future strategies.* • *No reference is made to the information in the case study or independent research in the response.* • *The response may be no more than a list.*
Adequate ***4–6 marks***	• *A descriptive response with limited knowledge and/or understanding of the relevant ITGS issues and/or concepts.* • *A response that includes limited use of appropriate ITGS terminology.* • *A response that has evidence of conclusions, judgments or future strategies that are no more than unsubstantiated statements. The analysis underpinning them may also be partial or unbalanced.* • *Implicit references are made to the information in the case study or independent research in the response.*
Competent ***7–9 marks***	• *A response with knowledge and understanding of the relevant ITGS issues and/or concepts.* • *A response that uses ITGS terminology appropriately in places.* • *A response that includes conclusions and/or judgments that have limited support and are underpinned by a balanced analysis.* • *Explicit references to the information in the case study or independent research are made at places in the response.*
Proficient ***10–12 marks***	• *A response with a detailed knowledge and understanding of the relevant ITGS issues and/or concepts.* • *A response that uses ITGS terminology appropriately throughout.* • *A response that includes conclusions, judgments or future strategies that are well supported and underpinned by a balanced analysis.* • *Explicit references are made appropriately to the information in the case study and independent research throughout the response.*