UNIVERSITY OF BRISTOL

January 2024 Examination Period

School of Computer Science

Year 3 Examination for the Degree of Bachelor of Science in Computer Science

COMS300270-J

Human-Computer Interaction

Units Examined COMS30027 & COMS30075

TIME ALLOWED:
Two Hours

There are THREE questions
Answer TWO of the questions

Total marks: 100

This is an open book exam

Candidates may bring to the examination room a single folder of notes on A4 paper in any format.
Please note calculators are not permitted to be used in this exam.

TURN OVER ONLY WHEN TOLD TO START WRITING

Question 1

Imagine that you are part of the team that has been asked to develop *StudyBuddy*, a new health and wellbeing smartphone app for university students.

a) Describe the basic human psychological needs identified by Self-Determination Theory that underlie human wellbeing and a design feature that could be added to *StudyBuddy* to support each of these needs. Justify your choice of these design features.
[12 marks]

b) Give a brief description of the two main types of motivation in Self-Determination theory. Then explain how Self-Determination theory can inform the design of *StudyBuddy* so that students are intrinsically motivated to use the app, describing two design features which should be avoided and two design features that should be supported in order to achieve this.
[8 marks]

c) *StudyBuddy* has a 'to do' list function, which shows users the tasks that they have to complete on different days and enables them to record when they have completed them. The 'to do' list is partly automatically generated from the user's calendar, but users can also add items manually. Explain the concepts of *gulf of execution* and *gulf of evaluation* in Donald Norman's model of interaction. How can natural mappings and feedback help reduce the gulfs of execution and evaluation on the 'to do' list functionality?
[10 marks]

d) Some users of *StudyBuddy* have reported that although they like some elements of the 'to do' list interface, they are also frustrated by other parts of the interface. Describe Gaver's conception of affordances and use it to speculate on what could be working well and not so well with the 'to do' list interface.
[10 marks]

e) Choose one of the design features that you proposed in (a) and imagine that it is not working well. Describe how you would re-design the interface to ensure it provides an effective affordance.
[5 marks]

f) Describe how Norman's conceptualisation of affordance differs from Gaver's.
[5 marks]

Question 2

a) Explain the terms ‘subject’, ‘object’ and ‘tool’ as used in Activity Theory. Follow this by describing the main distinctive features of the Activity Theory approach, including the difference between ‘actions’ and ‘operations’ and the concept of ‘contradiction’.
[8 marks]

b) Your team has developed chatbot functionality in the *StudyBuddy* app, which enables users to discuss any issues that they have related to their health and wellbeing and get advice. Give a brief Activity Theory analysis of a user’s interaction with the chatbot, clearly identifying the elements in your analysis. Give a rationale for carrying out this type of analysis and explain why you have selected each element in your analysis.
[14 marks]

c) Explain what primary and secondary contradictions in an activity system are, illustrating these two levels of contradiction with examples from the analysis you produced in (b).
[4 marks]

d) Define the terms *breakdown, present-at-hand, ready-to-hand and unready-to-hand,* illustrating these concepts using examples from the *StudyBuddy* chatbot functionality.
[8 marks]

e) Explain how phenomenology can inform interaction design, illustrating your answer with examples from interactive technologies of your choosing.
[8 marks]

f) Your team have been asked to add game-like functionality to *StudyBuddy* that will support users to enter a flow state. What principles will inform your design?
[4 marks]

g) If your flow game is successful then what subjective experiences would you expect users to report?
[4 marks]

Question 3

a) Your team has developed a social forum for *StudyBuddy*, where users can anonymously post messages and read and comment on other users' messages and comments. Conduct a brief *Distributed Cognition analysis* of this social forum functionality, paying attention to the different places where processing is carried out, where information is stored and how information flows between components.
[14 marks]

b) Describe three insights that a Distributed Cognition analysis can provide into the design of social forums that facilitate collaboration on topics.
[6 marks]

c) What are the key differences between analysing a system using Distributed Cognition and Activity Theory? Illustrate your answer by reference to any technological system.
[8 marks]

d) What are the main differences between a GOMS conceptualisation of interaction compared to Distributed Cognition?
[8 marks]

e) Describe a new feature of *StudyBuddy* and how you could use a KLM analysis to inform the interface design.
[8 marks]

f) Describe an aspect of the *StudyBuddy* interface where you could use Fitts' Law to help you design the interface. Name two benefits of using Fitts calculations for interface design over more descriptive methods.
[6 marks]

End of Exam