

UNIVERSITY OF EDINBURGH  
COLLEGE OF SCIENCE AND ENGINEERING  
SCHOOL OF INFORMATICS

**INFR11017 HUMAN-COMPUTER INTERACTION (LEVEL 11)**

**Monday 28<sup>th</sup> April 2014**

**09:30 to 11:30**

**INSTRUCTIONS TO CANDIDATES**

**Answer any TWO questions.**

**All questions carry equal weight.**

**CALCULATORS MAY NOT BE USED IN THIS EXAMINATION**

Year 4 Courses

Convener: I. Stark

External Examiners: A. Cohn, T. Field

**THIS EXAMINATION WILL BE MARKED ANONYMOUSLY**

1. (a) Two *basic* usability principles are:

- i. flexibility
- ii. learnability

For each of the above, describe three relevant, subsidiary usability principles and give a brief illustration of their application to user design.

[6 marks]

(b) You have been asked to perform a usability evaluation of a design for the menus which provide access to the functions of a mobile phone. Identify two usability *objectives* that you feel are appropriate for this evaluation task, justifying your selection.

[4 marks]

(c) Using your two usability objectives, outline how you would experimentally compare the usability of two prototype menu designs for the mobile phone. You should describe:

- The experimental hypothesis(es) and experimental design.
- The usability *metrics* you would choose to represent each of the usability objectives that you defined in part (b).
- How you would collect, analyse and interpret the data.

Your answer should include reference to independent and dependent variables, statistical analysis, confounding factors, ecological validity.

[15 marks]

2. You have been presented with a brief in *Interaction Design* to develop the concept of a digital living room. The occupants should be able to control the radio, television, music system, and the environmental conditions such as lighting, heating, and cooling, by simply pointing at the appliance and then gesturing to indicate the desired action.
- (a) Provide a conceptual model for the system, specifying the underlying metaphor, and outlining the concepts and functions and their relationships. [5 marks]
  - (b) What are affordances? Give three examples of natural affordances you could exploit to make it easier to learn to use this system. [4 marks]
  - (c) Explain how you might involve other potential users at the requirements specification stage to derive a more complete understanding of the requirements. [4 marks]
  - (d) State the equation for Fitts' law and explain how it could be applied to estimate some interaction times in this system. [4 marks]
  - (e) Provide a detailed specification and justification of how you would carry out user evaluation of a prototype system (e.g., number and type of participants, independent and dependent variables, data analysis methods, etc.). [8 marks]

3. You have been asked to comment on a brief in *affective* HCI which proposes a driver's assistant that detects the driver's condition and acts accordingly. For example, if it detects that the driver is getting sleepy, it might alter the air conditioning or engage the driver in conversation. Equally, if the assistant detects that a driver is stressed, it could infer that the driver is undertaking a difficult task, and should not be interrupted.
- (a) Distinguish invasive and non-invasive methods of monitoring the driver's affective state, giving at least one example of each method. [6 marks]
  - (b) Given that affect detection may be prone to error, what design guidelines would you suggest they follow in designing the driver's assistant and its interface? [6 marks]
  - (c) Suppose the driver's assistant has already speech input and speech output. Discuss the pros and cons of adding an animated talking head as part of the interface. Take two potential problems, and suggest HCI solutions. [6 marks]
  - (d) The driver's assistant could be given a sub-system for delivering location-based services, such as route finding or restaurant recommendations. Suppose two of your colleagues have already developed this sub-system. You have been asked to evaluate it. What would you do on a limited budget (£500) in a short time period (2 weeks)? [7 marks]