UNIVERSITY OF EDINBURGH

COLLEGE OF SCIENCE AND ENGINEERING

SCHOOL OF INFORMATICS

INFR11017 HUMAN-COMPUTER INTERACTION (LEVEL 11)

Tuesday 26th April 2016

14:30 to 16:30

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. Burns, A. Cohn, P. Healey, T. Field, T. Norman

THIS EXAMINATION WILL BE MARKED ANONYMOUSLY

1. (a) Give two reasons why expert users may *not* prove to be a good source of information about the requirements for an interactive system. [*2 marks*]

   (b) Explain the idea of *internal consistency* as applied to interface design. [*2 marks*]

   (c) Describe a situation in which (i) a mouse might be preferred over a joystick, and (ii) a tracker ball over a mouse. [*2 marks*]

   (d) Describe briefly the following Interaction Types: (i) Manipulating, (ii) Exploring, and (iii) Instructing. [*3 marks*]

   (e) You are invited to design the control panel in a lift in which the buttons are restricted to a *single horizontal* row. Buttons are required for selecting floors (Ground, First, Second and Third), opening and closing the door (Door Open, Door Closed), for stopping (Stop), and for contacting during an emergency (Telephone).

      i. Propose a design (with diagrams) for the control panel in the lift, drawing the buttons in a *single horizontal* row. [*8 marks*]

      ii. Explain the design principles you employed in organising the control panel to help the user map intentions to actions. [*8 marks*]

2. (a) Explain how the concept of *affordance* is useful in Interaction Design. [*1 mark*]

   (b) Explain the distinction between logical and physical input/output devices. Give two examples of implementation of the *tactile* logical ouput function. [*3 marks*]

   (c) You have been presented with an Interaction Design brief to develop the concept of a digital laundry room in a *Smart Home* to control the washing machine, the tumble dryer, exhaust fan, dehumidifier, and the light by simply pointing at the appliance and gesturing to indicate the desired action.

      i. Provide a conceptual model for the system, specifying the underlying metaphor, and outlining the concepts, the functions and relationships for the different appliances. [*4 marks*]

      ii. Give three examples of natural affordances you could exploit to make it easier to learn to use the system. [*3 marks*]

      iii. Explain how you might involve potential users at the requirements specification stage to derive a comprehensive understanding of the requirements. [*4 marks*]

      iv. Provide a detailed specification and justification of how you would carry out user evaluation of a prototype system (*e.g.*, number and types of participants, independent and dependent variables, data analysis methods). [*4 marks*]

      v. A detergent manufacturer wishes to study the laundry habits of consumers, such as the amount of liquid detergent used for the weight of clothes and the mode of the wash (cold, warm or hot). Propose how you might instrument the washing machine and other laundry accessories with sensors to extract this information without any extra actions from the people using the washing machine, *i.e.*, the users are oblivious to the data collection and perform their wash as they would normally (you may assume that the users have given their consent). [*6 marks*]

3. (a) Explain *heuristic* evaluation as used for evaluating user interfaces. [*1 mark*]

   (b) State the formula and explain the variables which affect the interaction times when switching between controlling different interaction devices. [*2 marks*]

   (c) The waste-paper basket on the desktop provides an abstraction of the *delete* function. Why might it be considered dangerous hiding the underlying complexity of computer systems in this way? [*2 marks*]

   (d) You have been invited to design an Internet of Things product that would cater for older members of the population. It consists of a wearable device which monitors the vital signs of the person, such as heart rate and respiratory rate, and communicates this data wirelessly in real-time to a tablet for storage and display, and onward transmission to the server.

      i. Describe five of the principles due to Nielsen that you would expect to apply in evaluating the interface on the mobile device. [*10 marks*]

      ii. Illustrate your design of the user interface with diagrams and justify how it satisfies your choice of principles in the previous question. [*6 marks*]

      iii. Describe the considerations in your design of the user interface which makes it particularly suitable for elderly users. [*4 marks*]