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14.00 - 16.00pm

CMPU 2008 Human Computer
Interaction
National Stadium, Irish Athletic
Boxing Centre

Programme Code: DT228
Module Code: CMPU 2008
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TECHNOLOGICAL UNIVERSITY DUBLIN

KEVIN STREET CAMPUS

BSc. (Honours) Degree in Computer Science

Year 2

SEMESTER 2 EXAMINATIONS 2018/19

Human Computer Interacftion

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TWO HOURS

ANSWER QUESTION (1) AND ANY TWO OTHER QUESTIONS

**QUESTION (1), CARRIES 40 MARKS.
QUESTIONS (2), (3), AND (4) CARRY 30 MARKS EACH.**

- Q1. (a) Why should a distinction be made between *novice* and *expert* users when designing computer interfaces? **(6 marks)**
- (b) Describe the five Gestalt laws of perceptual organisation and explain why they are important in screen design. **(10 marks)**
- (c) Explain how the following design principles can be used to enhance the design of an interface.
- Affordance
 - Mapping
- (4 marks)**
- (d) Miller has proposed that 7 ± 2 chunks of information can be held in human short-term memory at any one time. How does such a characteristic of short-term memory influence interface design? **(5 marks)**
- (e) Describe a simple test which may be used to show how humans use *automatic processing* when processing familiar information. Briefly explain the relevance of automatic processing when designing a system interface. **(8 marks)**
- (f) Choose *two* alternative input technologies that may be suitable for use by a blind user who is unable to use a standard keyboard and explain how your choice of input technologies may be influenced by the nature of the user's impairment. **(7 marks)**

- Q2. (a) An interface designer is deciding whether to use *recognition* or *recall* to enhance the learnability of a system. Which design approach would you recommend and why?

(7 marks)

- (b) Learning through *analogy* is one of the main learning approaches taken by users when learning to use new computer systems.

(i) Explain how users learn through *analogy*. **(5 marks)**

(ii) Indicate how learning through analogy can be facilitated within computer systems design. **(2 marks)**

(iii) Describe how learning through analogy is supported by the Graphical User Interface (GUI). **(3 marks)**

- (c) The Key Stroke Level Model (KLM) is to be used to develop numerical predictions of user performance of a new system. Using the operator steps and times provided in Table 1, estimate the time that will be taken by an experienced computer user to enter the following information into a text box on the screen:

“Position tracking log is open”

Explain any assumptions made in your calculations.

(13 marks)

Operator	Description	Time (sec)
K	Pressing a single key or button	0.35
	Average skilled typist (55 wpm)	0.22
	Average non-skilled typist	0.28
	Pressing shift or control key	0.08
	Typist unfamiliar with keyboard	1.20
P	Pointing with a mouse or other device on a display to select an object	1.10
P1	Clicking the mouse or similar device	0.20
D	Draw a line with a mouse	Variable
H	Bring “home” hands on the keyboard or other device	0.40
M	Mentally prepare/respond	1.35
R(t)	System response time is counted only if it causes the user to wait	T

Table 1

- Q3. (a) Define the terms *user interface* and *usability*. **(4 marks)**
- (b) The job or task of the user must be understood prior to system design. Describe *four* methods a designer might use to do this. **(8 marks)**
- (c) The Principles of Universal Design define seven principles that can be used to guide the design process of computer systems. Briefly explain the concept of Universal Design and describe how *any five* of the design principles can be used to guide the design of an Automated Teller Machine (ATM). Include *at least one* specific design suggestion for each of the five principles that you use. **(18 marks)**

- Q4. (a) A new electronic ticketing system has been commissioned that will be used at railway stations for quick and easy purchase of train tickets.
- (i) Recommend a suitable *lifecycle model* that should be used to develop the system. **(6 marks)**
- (ii) Recommend an appropriate *interaction style* for the system. **(5 marks)**
- (iii) Recommend appropriate *input and output device(s)* for the system, explaining the reasons for your choice. **(11 marks)**

Give a clear indication of the rationale for your recommendations in (i), (ii), and (iii), and for the alternative option(s) that you have rejected.

- (b) Describe how any *two* of Nielsen's usability principles may be applied to improve the usability of the electronic ticketing system described in Part (a). Use specific examples to support your answer. **(8 marks)**