E3.15 Human-Computer Interaction

There are SIX questions. ***Answer TWO questions from Section A and TWO questions from Section B.***

Examiners Responsible **Professor R. Spence & Dr J. V. Pitt**

First Marker	**Professor R. Spence** *(Q4–6)*	**.....**	**.....**
	Dr J. V. Pitt *(Q1–3)*	**.....**	**.....**
Second Marker	**Dr J. V. Pitt** *(Q4–6)*	**.....**	**.....**
	Professor R. Spence *(Q1–3)*	**.....**	**.....**

Special Information for Invigilators:

The candidates should use separate answer books for questions from Section A and questions from Section B. Place answer books for Section A and Section B on each candidate's desk.

Information for Candidates:

Candidates should use the appropriate answer book for questions from Section A and for questions from Section B.

Section A *(Use a separate answer book for this Section)*

1. A large retail organization provides multimedia kiosks in its high street stores, to give customers information and recommendations about products, to support a loyalty card scheme (with customer profile and reward points), and to offer advertising, promotion schemes and related services.

   All these facilities are supported by a number of 'believable character agents', who each have a different representation to reflect their different roles and functions.

   This question is concerned with the 'believable character agents' and the kiosk.

   (a) Identify which 'believable character agents' might be useful in the overall system and commercial context, describe each of their individual roles and/or functions, indicate by whom the agents might be owned, and give an appropriate representation.

   [10]

   (b) Discuss how the use of 'believable character agents' affects the design of the kiosk. Factors to consider include users, system (input/output devices), tasks and environment (workspace design).

   [6]

   (c) Briefly identify four different sorts of prototype that could be developed, and say (with reasons) whether or not such a prototype would be useful in the development of this kiosk.

   [4]

2. A large retail organization provides multimedia kiosks in its high street stores, to give customers information and recommendations about products, to support a loyalty card scheme (with customer profile and reward points), and to offer advertising, promotion schemes and related services.

All these facilities are supported by a number of 'believable character agents', who each have a different representation to reflect their different roles and functions.

This question is concerned with the partial design of an interface for the kiosk.

It has been decided that the user (customer) can choose how many and which 'believable character agents' will appear on the screen at any one time. In particular, users should be able to get the agent to "explain itself" in order to make an informed choice.

(a) Draw a Dialogue Network Diagram (DND) for the sub-task of choosing which agents will appear on the screen, using a touchscreen interface that will be provided for the kiosk.
Explain the notation used in the DND.

[8]

(b) Sketch an interface for the dialogue defined in part (a), and specify the Action-Condition-Effect (ACE) rules for the interface.
Briefly summarise the advantages and disadvantages of ACE rules in interface design.

[8]

(c) State which guidelines you have followed in designing the interface sketched in part (b), briefly indicating how this has affected the design.

[4]

3. A large retail organization provides multimedia kiosks in its high street stores, to give customers information and recommendations about products, to support a loyalty card scheme (with customer profile and reward points), and to offer advertising, promotion schemes and related services.

All these facilities are supported by a number of 'believable character agents', who each have a different representation to reflect their different roles and functions.

This question is concerned with task design and evaluation of the kiosk.

It has been decided that any user (customer) can browse the system for product information, advertising, promotion schemes, etc., but at any point s/he can insert a loyalty card, after which the user can view their profile and claim rewards. For security purposes each loyalty card will have a PIN (Personal Identification Number) which must be entered correctly to access these services.

(a) Construct a simple Jackson Structure Diagram (JSD) for a customer using the kiosk to browse product information, review special offers, etc., and to insert a card in order to view his/her profile, and claim rewards.
Explain the notation used in the JSD.

[8]

(b) (i) What is the particular property of JSD that makes the task representation awkward in part (a)?
(ii) What assumptions are being made about the task performance, as compared to the task design described in part (a)?
(iii) How does the facility to insert a loyalty card at any time affect the Dialogue Network Diagram (DND) that would be constructed from the JSD in part (a)?

[6]

(c) State, with justification, what evaluation process you would use and evaluation product you would produce under the following circumstances:
(i) A working prototype of the kiosk has been constructed, and the developers want quick feedback on usability.
(ii) A working prototype of the kiosk has been constructed, and the developers want to know whether novice users would make fewer errors in the presence of 'believable character agents'.
(iii) A fully operational kiosk has been installed in a few stores for a number of months and has been used by several thousand loyalty card holders.

[6]

Section B *(Use a separate answer book for this Section)*

4. A particular investigation requires that the interests (e.g. football, gardening, chess, etc.) of a lay person must be elicited. At present, that person is presented, on a display screen, with a blank table and asked to type in their interests line by line. An experimenter is present to answer any questions.

   Devise a new and hopefully improved interface in which the identification of interests occurs principally by touch, with the keyboard only used for unusual interests. You can assume that the experimenter is again present to give guidance when needed, and that a period of about 15 minutes might be allocated for this activity. The result will be a list of the person's interests.

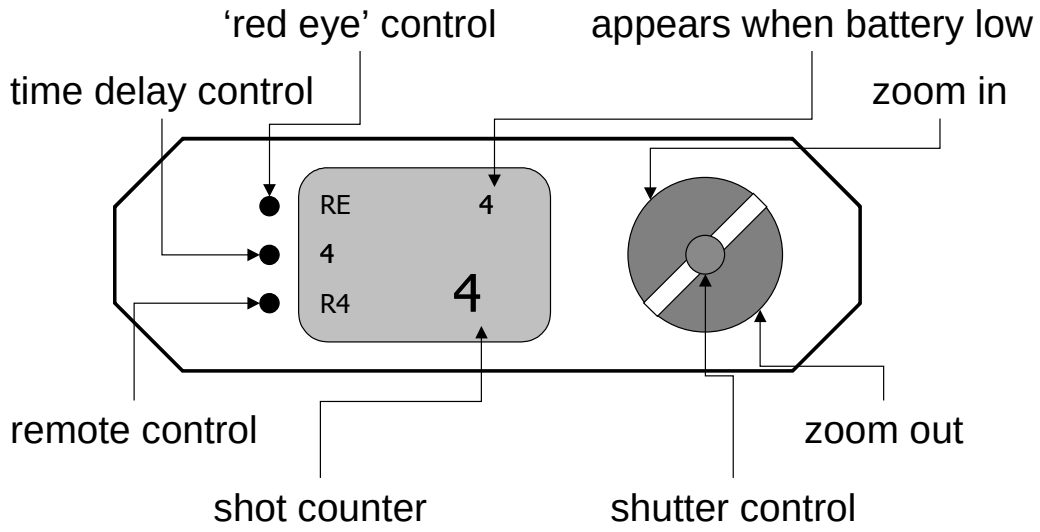
   Use sketches to illustrate your design, and identify the design rationale which has guided it. Do not concern yourself with the difficulty of programming the interface you design.

   [20]

5. Describe Norman's stages of Action, briefly illustrating each stage with a practical example.

[8]

The diagram below shows a plan view of the top of a proposed new camera. The surface is flat. No colour is involved. Pressure on a control does not lead to discernible movement of that control. In the Liquid Crystal Display items are in two states, normal and highlighted.



Critique the design, relating and beneficial or disadvantageous features to an appropriate Stage where relevant. Suggest improvements in the design, again relating them where appropriate to one of Norman's stages, and comment on any conflicts that may present themselves to the designer.

[12]

6. Clearly describe, and clarify the essential differences between, the presentation techniques of distortion (as in the Bifocal Display) and suppression (as enunciated by Furnas). In each case identify and discuss the features that are open to design choice. Illustrate a typical application of each technique in the context of an interactive system designed to help a potential house purchaser to decide upon one or a few houses worthy of inspection.

[20]

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There are SIX Questions. Answer TWO from Section A and TWO from Section B

MODEL ANSWERS

ANSWER 1

MARKING SCHEME
(a) 10 marks: 0.5 for each agent name, owner, role and appropriate representation
(b) 6 marks: 1 for each affect justified wrt to user, system, task or environment
(c) 4 marks: 0.5 for each prototype role, use, and justification for use (or not) (up to 4)

(a) [Application]

Agent	**Owner**	**Role**	**Representation**
Profile	User (Customer)	Maintains user profile, loyalty points, etc.	Genie
System	Software Mfr	Help	Mechanic
Recommender	Retailer	Make recommendations according to profile	Butler
Advertiser	Third party	push advertising to user	Advertising executive
Trust	Trusted third party	reliability of recommendations	Banker, GP

The 'trick' here is the trust agent, which has not been discussed in lectures, but any internet/e-commerce aware student who picks up on the hint in the question should b able to suggest this.

A textual description of the appropriate representation is sufficient, no extra marks for pictorial representation. Many different possibilities, looking for connection with role (i.e. link with icon design). Hence genie (a la Aladdin) for user agent, banker for trust agent, etc.

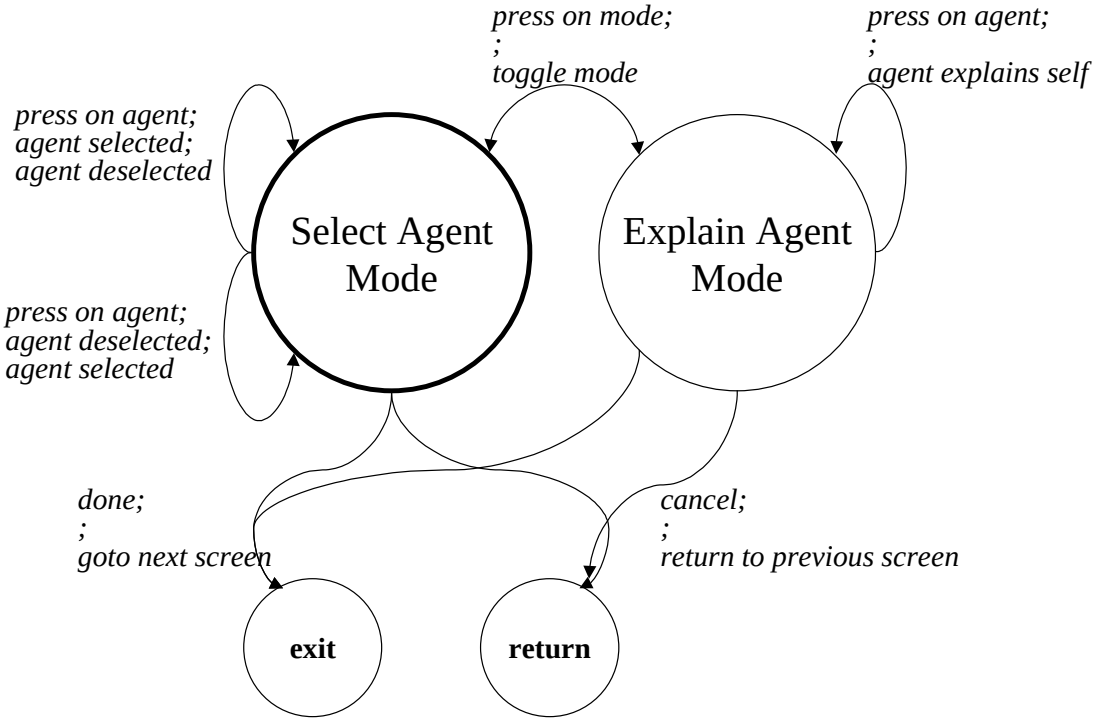
(b) [Application]
believable character agents implies voice
voice implies speakers for output, microphone for input (match I/O modalities)
affect on users/system: consider hard-of hearing, option for text write outs consuming screen space
affect on users/system: speech recognition requirements for whole user group, increased expense
sound: auditory requirements imply enclosed environment
enclosure: consider thermal/lighting requirements and use guidelines
enclosure: space restriction (tasks: where put shopping, no keyboard, how change profile?)
space restriction: possibly no seat, so duration of use (e.g. for browsing) might be diminished, may be a bad thing from sales point of view

(c) [Bookwork and Application]
Simulation: working system with rigged functionality; might be used in field trials with actual users if interface not expected to change much (i.e. interface design complete);
Demonstrator: envisionment of ideas, clarify concepts, agree direction (e.g. in Participatory Design); would be used to involve store owners in development;
Parallel Prototyping: development of two systems, one main system and one 'mirror' which contains fully functional controls for training etc.; would probably not be used as no emergent functionality in this system;
Pilot Study: see if design is tenable; would probably not be used as creates user expectations (to be avoided with novice and/or occasional users as in this system).

ANSWER 2

MARKING SCHEME
(a) 8 marks: 1 for each state and arc, 2 for notation
(b) 8 marks: 4 for sketch, 2 for ACE as in DND, 2 for adv/disadv
(c) 4 marks: 1 for each relevant guideline and use in sketch

(a) [Application]
Its a touchscreen, so should be able to press on agent to select/explain, with two different modes. Can also get them to explain themselves. However, other designs may use pressing on agent to explain themselves, and next/prev/select buttons to select.



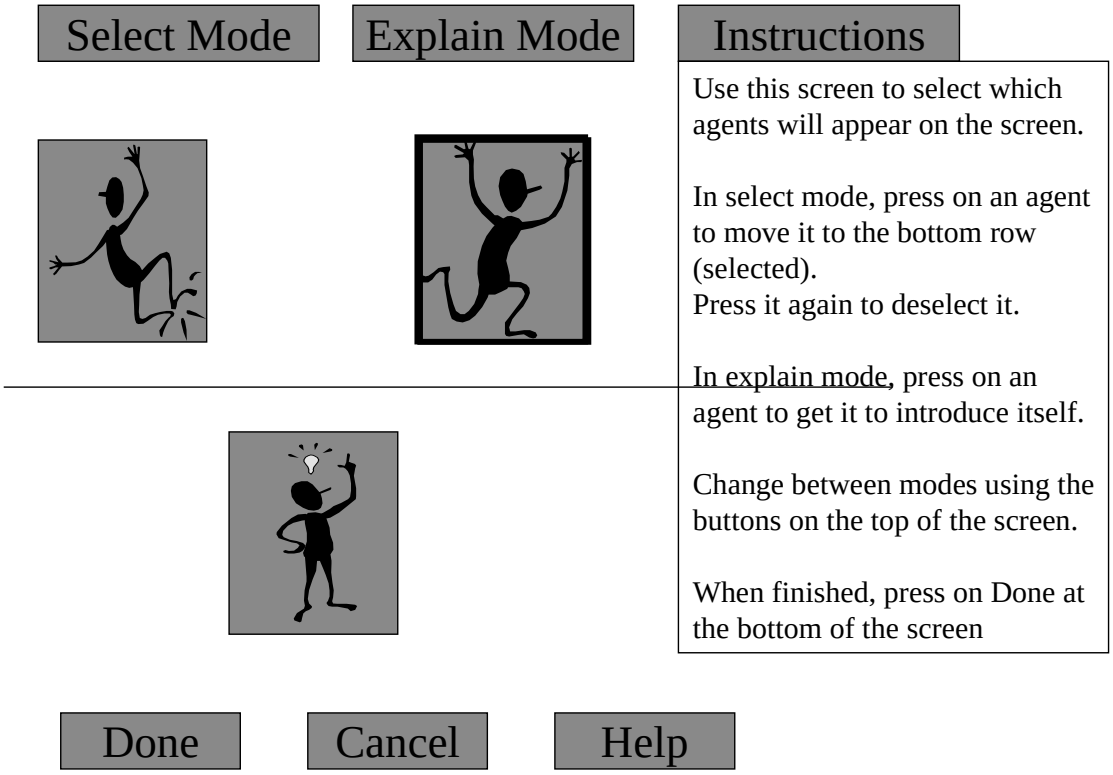
notation:
state to indicate state of computer processing awaiting action from user,
arc transition between states,
labelled with user action, system conditions on traversal, effects on screen display and physical system effects,
heavy border indicates start state, return/exit special states to indicate end of sub-dialogue

(b) [Bookwork and Application]

Action-condition-effect rules come from labels on the arcs in the DND!

Advantages of ACE:
notation for operational specification, links to visual development environment, basis for evaluation against design principles, forces designer to think of user preception

Disadvantages of ACE:
not very intuitive, not easy to show complete.
The following sketch should have a title and each agent should be identified by a text description:



(c) [Bookword and Application]
guidelines:

use brief familiar language, for title & for other fields

pay attention to visual appeal for navigation and browsing

spacing & layout: Be clear & consistent (e.g. same space for advertising), group related fields, make sequences natural

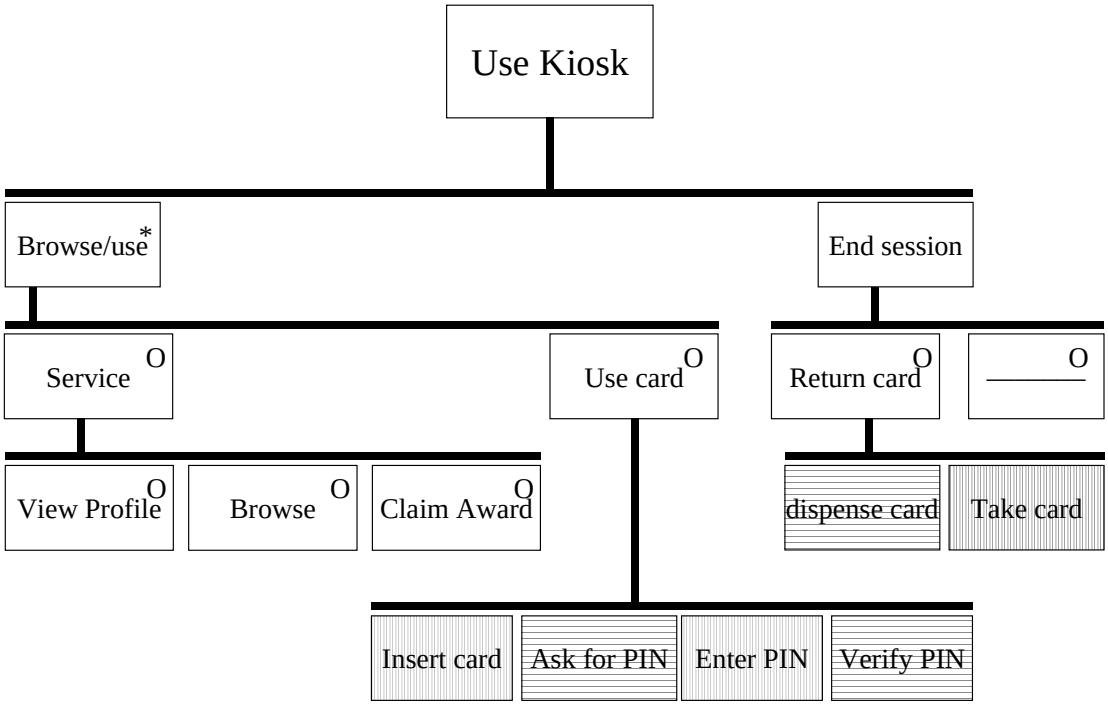
make the action to signify task completion clear

Should be self-evident how the guidelines have been used in the above

ANSWER 3

MARKING SCHEME
(a) 8 marks: 6 for task breakdown, 2 for notation
(b) 6 marks: 1 for statement or assumption
(c) 6 marks: 2 for each correct product, process and justification

(a) [Application]



notation
shading indicates joint, computer or user task
circle for alternates, asterisk for iteration

(b) [Application]
(i) JSD gives hierarchical break down task left to right, top to bottom. Not so convenient in this case for task which are concurrent, involve going back, or are context-dependent
(ii) firstly, that the current browse task is completed, the insert card task is performed, then a new browse task is started, but is actually the old browse task resumed
secondly, that conditional tasks are sorted out in later design stages
(iii) firstly, that like help, insert card sub-dialogue is available from any dialogue state
secondly, that conditional tasks (i.e. tasks that are conditional on the card having been inserted and validated) have the appropriate checks put on the condition slot of the label on the arc (i.e. as in (ii))

(c) [Application]
(i) expert walkthrough; formative report; real system, abstract user, quick report required
(ii) observational evaluation; summative report; real system, real users (required), quantative information required as basis for decision making
(iii) user reports; formative report; real user, abstract system, qualitative information required for evolution of system

ANSWER 4

MARKING SCHEME
20 Marks

ANSWER 5

MARKING SCHEME
20 Marks

ANSWER 6

MARKING SCHEME
20 Marks

THIS PAGE IS OTHERWISE BLANK AND SIGNIFIES END OF THE EXAM SCRIPT AND MODEL ANSWERS FOR
E3.15 HUMAN-COMPUTER INTERACTION.