



PRIFYSGOL CYMRU

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UNIVERSITY OF WALES

Trinity Saint David

Examination Answer Book

24 Pages

Instructions to candidates

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right and seal to hide your name.
3. The answers must be **legibly** written. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. **Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.**

1	Student Number	218015
2	Title of Examination Paper	Usability engineering
3	Module Code	M3X8648
4	Date and Time of Examination	8 May 1:30 P.M
5	Examination Venue	Gym
6	Seat Number	A 8

7	Number of Answer Books handed in	
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List the numbers of the questions you have attempted	Office Use
1A	22
1B	7
2A	11
2B	8
3A	21
3B	12
1A	22
1B	8
2A	12
2B	8
3A	21
3B	12
	81
Total	54

83
55%

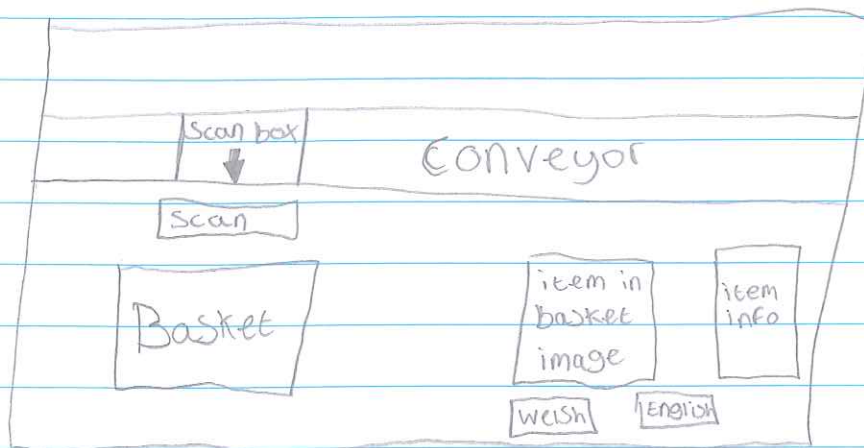
Please complete this section and SEAL before the examination starts.

Surname SIMS Forename(s) JACOB
(Block Capitals)

FOLD
Complete section, remove strip, fold as indicated and SEAL

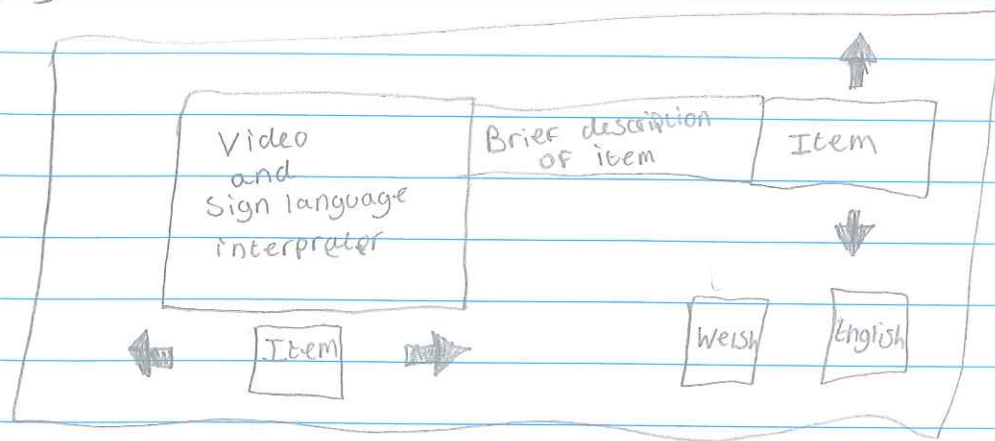
Overview

Q1 Display 1



Display 1 (effective) is an augmented reality exhibit where users sit at a table that is layered with a projection which depicted a conveyor belt, appearing the same as what would be found at a Supermarket. The user could interact with the projection by moving/scanning the items from the conveyor belt into their basket, which could be done by pressing the Scan button when an item was within the Scan box parameters. The language of the System could also be changed by pressing either the button containing "Welsh" or "English", which would change the language that the information was conveyed accordingly. The system itself communicated the information visually, as users would need to read the information from the item info box. The overall purpose of this display is to teach users about the history of the items that were sold in the co-op. I consider this display to be effective since its use of metaphor to create an object/setting that users are familiar with, helps simplify the process of human reasoning which, in turn, allows the user to easily infer how to use the interface, which, in this display, is to "scan" items from the conveyor belt into the basket, which populates the item info box with relevant information to teach the user. The process is also apparent through the exhibit's use of predictability and familiarity.

Display 2



Display 2 (less effective) is an interactive exhibit where users navigate using a touch-screen to learn more about the future of industry, by selecting an item from either the bottom, or the right of the screen. The user can click the arrow buttons to navigate through the items. After selecting an item, a video would play that would inform the user about the type of industrial future information they selected. Following this, users can select to have the content displayed/narrated in Welsh or English by clicking the corresponding button. The information from this display is communicated in both visual and auditory form whilst also incorporating an accessibility feature in the form of a sign language interpreter, ^{catering} ~~making~~ the display to be accessible to users who have impaired hearing. I consider this display to be ^{less} ~~more~~ effective because it suffers poor learnability and relies on the user having experience with touch screen interactive exhibits, in order for them to understand what to do. While it has decent flexibility, as it can convey information in multiple forms, it does lack heavily in its robustness as there is no guide or help for the user to achieve the end goal.



Comparison of display 1 and 2

Human Factors

Display 1 incorporates human vision as the method of communicating information, relying on its users to visually interpret and process the light data into information. Display 2 incorporates both human vision and human hearing as the method of communicating information, relying on its users to process both auditory and visual data into information.



Learnability

Display 1 has good learnability as it uses metaphor to create a setting users are familiar with.

Display 2 has poor learnability as it relies too much on human reasoning, meaning users must infer what to do without any previous experience.



8.

7

Q2 Recommended evaluation Strategy for interactive exhibit: Nielsen's 10-
① heuristics.

The reason I believe this to be the optimal strategy is because the 10 heuristics cover the general usability principles that ultimately determine whether an interface supports good/bad usability, which is why it would be a useful strategy to use for interactive exhibits. Secondly, the 10 heuristics is relevant to this scenario as good interactivity revolves around how well the interaction uses the principles proposed in this strategy, so by ensuring that each principle is present, the interactive design should be considered useable.

The 10 heuristics are as follows and are ^{each} to be graded from 0-4, 0 represents bad, 4 represents good:

- 1- Visibility of System Status
- 2- Match between System and real world
- 3- User Control and Freedom
- 4 - Consistency and Standards
- 5 - Error prevention
- 6 - Recognition rather than recall
- 7 - Flexibility and efficiency of use
- 8 - Aesthetics and minimal design
- 9 - Help users recognise, diagnose and recover from errors
- 10 - Help and documentation

② Recommended evaluation strategy for augmented reality: Cognitive walkthrough.

The reason I believe Nielsen's Cognitive Walkthrough is optimal for this scenario is because, firstly, augmented reality is commonly evaluated using this strategy. Secondly, it identifies usability problems during a prototype stage, meaning the system can be adjusted/fixed before release. Ultimately, this strategy ensures each action/interaction with the system produces the expected outcome by testing the action's outcomes against a criteria. This differs from Nielsen's 10 heuristics as

it tests the usability against the use of actions that are relative to the system as opposed to a list of generic good usability principles, ~~which are otherwise more applicable~~ ^{which are otherwise more} ~~that is the reason~~ ^{to static exhibits.}

Q3

Q A potential VR exhibit that could be adopted by Swansea museum is a mining virtual reality, where the user is ^{fully immersed} ~~placed~~ in to a mine using a headset and sensory controllers. This would trick the user's sense of vision, hearing and movement which is sufficient enough to achieve immersion, making the user feel like they are in the mine. To add to the immersion heat blowers could also be added in the booth/room this takes place to simulate the wave of heat that would come from real-time explosions within the simulation/VR that the user is in. All in all, this ~~VR~~ ^{VR} exhibit would help younger generations understand how tough working in the mine truly was, as well as how ^{help} contextualise how far modern development has come so that we no longer have to ~~do~~ ^{work} jobs like in the mines.

Hardware :- Headset (visual, auditory) Sensory controllers (movement)
Heat blowers (touch)

Software :- the VR that the users are in

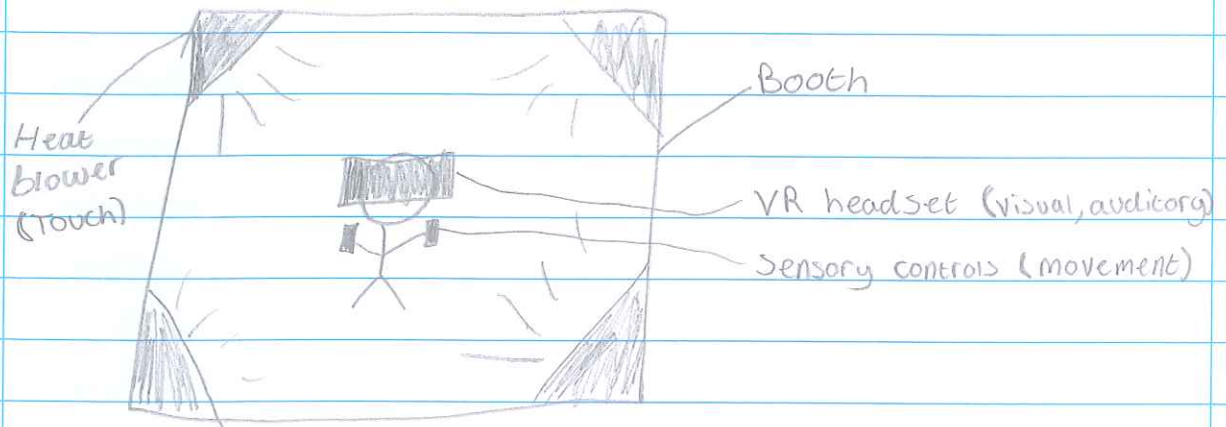
A potential AR exhibit that could be adopted is one that possibly brings static exhibits to life by pointing a smartphone camera at them while using an app. This would add an element of excitement to static exhibits ^{by} ~~prompting~~ prompting users to use the application to find out what the exhibit may have done in reality. For example, pointing

The camera at ~~the~~ ^{an} old train exhibit could show the user a simulation of the train moving on their phone, which could incorporate both visual and auditory information that the user could interpret.

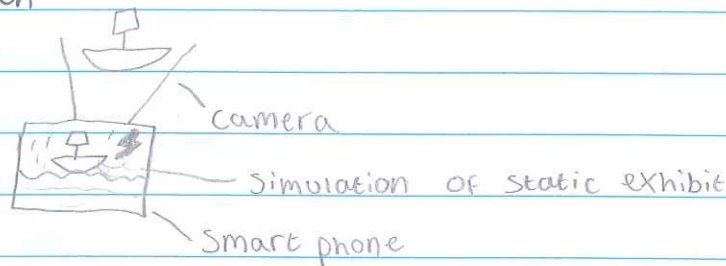
Hardware :- mobile phone, exhibit

Software :- an application that incorporates the AR.

VR Sketch



AR Sketch



- (b) The difference between VR and AR is that VR focuses on fully immersing the user into a VR ~~fake~~ reality, by tricking multiple human senses to respond to the virtual world. AR attempts to enhance reality by adding to it, usually applying a ^{transparent} layer between people and the real-world.

VR was founded by Ivan Sutherland ^{in 1968} who's vision was to pioneer a way of looking into and interacting with a visual world. His vision however, was limited

by the computing power. Today, the computing power that Sutherland longed for is available, which can be used to immerse a user into a virtual world that feels, looks and sounds real.

This technology today can be used by researchers to conduct simulations which can help provide an experience that is as close to reality which can help them run viable tests. An example of where VR is used is in the training of pilots. ✓