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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	~~186430~~
2	Title of Examination Paper	USABILITY ENGINEERING
3	Module Code	M3X8648
4	Date and Time of Examination	8/5/18 1.30
5	Examination Venue	68830
6	Seat Number	5

7	Number of Answer Books handed in	1
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List the numbers of the questions you have attempted	Office Use
1A	18
1B	11
2A	17
2B	12
3A	22
3B	12
1A	18
1B	12
2A	17
2B	12
3A	22
3B	12
Total	92

61%

93 62%

PULL & TEAR

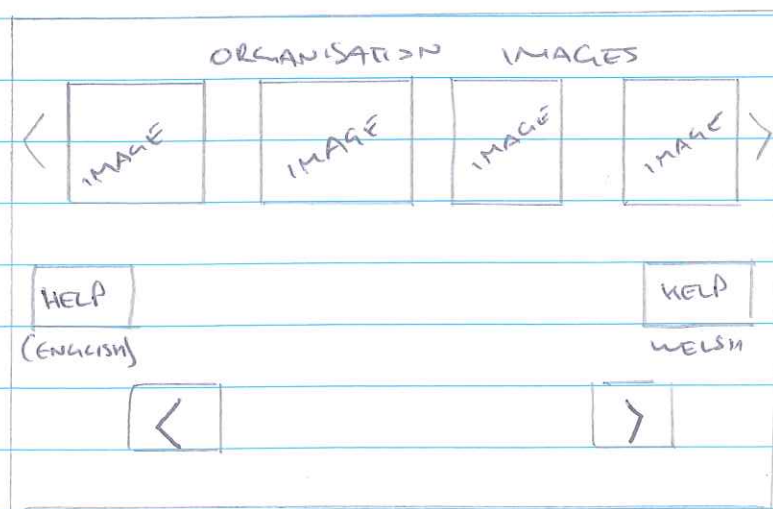
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PATENT PENDING
INFOSAFE

Q1 A)

THE EXHIBIT CALLED "ORGANISATION" HAS A GOOD EFFECTIVE DESIGN

THE EXHIBIT SHOWS THE ORGANISATIONS THAT EXISTED IN WALES DURING THE MID-19TH CENTURY. THE IDEA WAS A PROJECTOR WILL PROJECT AN IMAGE TO A MIRROR WHICH WILL THEN PROJECT DOWN TO A TABLE. ONCE PROJECTED ON THE TABLE, THE USER CAN PRESS DIRECTLY ONTO THE TABLE TO SELECT THEIR CHOICE. ONCE A USER SELECTS A PICTURE, MORE INFORMATION FROM THAT ORGANISATION WOULD APPEAR. VERY SIMILAR TO USING A TOUCH SCREEN TABLET, IT WAS EASY TO UNDERSTAND AND USE. THIS IS DOWN TO AFFORDANCE, DON NORMAN'S 6TH PRINCIPLE. DIFFERENT COLOURS WERE USED TO REPRESENT WELSH & ENGLISH. COLOURS ARE VISUAL SIGNS THAT CAN BE RECOGNISED. AUDIO FEEDBACK WAS ALSO USED CORRECTLY, THERE WAS AN AUDIBLE CLICK DURING EVERY INTERACTION. ARROWS WERE USED TO NAVIGATE THE EXHIBIT, THIS IS A WELL KNOWN METAPHOR, THEY WERE HIGHLIGHTED WHEN PRESSED. THE ARROWS WERE EASILY RECOGNISED "<" FOR BACK AND ">" FOR FORWARD. ON SCREEN HELP WAS ALSO AVAILABLE.

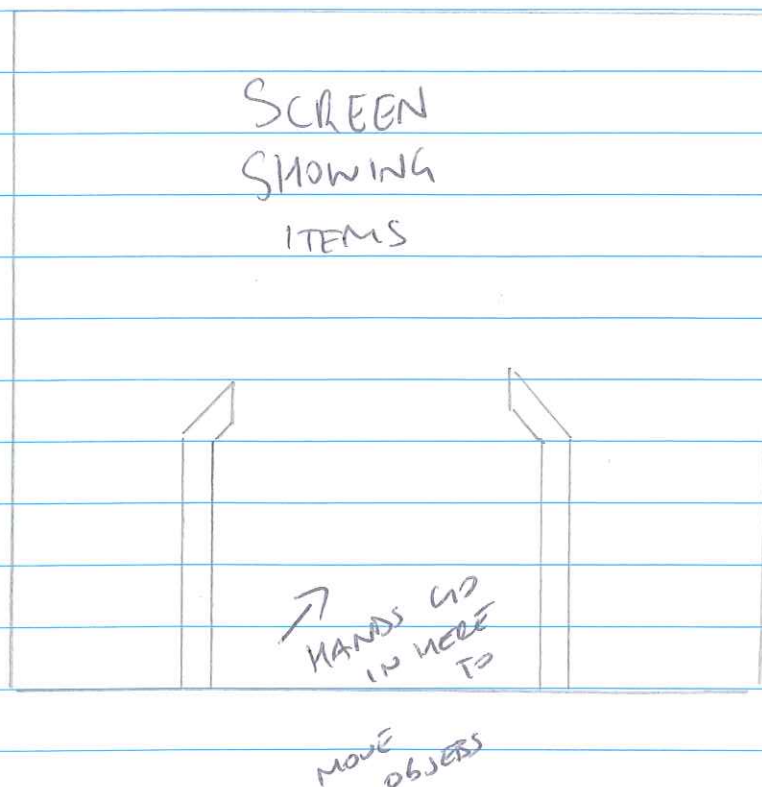


Q1 A) Part 2

THE EXHIBIT CALLED "COMMUNITIES" HAS A LESS EFFECTIVE DESIGN.

THE EXHIBITION SHOWED FAMILY ITEMS THAT WERE USED DURING THE EARLY 20TH CENTURY. ALL ITEMS WERE DISPLAYED ON A LARGE SCREEN AND THE USER COULD SKIP TO THE NEXT ITEM OR ROTATE THE ITEM 360° WITH THE USE OF HAND MOVEMENTS.

THIS EXHIBIT DID NOT SHOW HOW YOU WERE SUPPOSED TO USE THIS INTERACTIVE EXHIBIT. DON NORMAN'S FIRST PRINCIPLE STATED THAT USABILITY IS AN IMPORTANT FACTOR, THINGS SHOULD BE EASY TO UNDERSTAND ONCE LOOKED AT. HUMANS SHOULD INSTINCTUALLY KNOW WHAT THEY NEED TO DO. THERE SHOULD HAVE BEEN SOME AFFORDANCE TO STATE WHAT SHOULD BE DONE. I HAD TO BE TOLD WHAT TO DO. THERE WAS ALSO NO AUDIO FEEDBACK, DON NORMAN'S 2ND PRINCIPLE.



Q1 b)

I WOULD RECOMMEND THE THE BAD DESIGN WAS CHANGED TO INCLUDE, AFFORDANCE WHICH IS THAT THE USER SHOULD INSTINCTUALLY KNOW WHAT TO DO WITH THE EXHIBIT. EVEN A PICTURE OF HANDS IN FRONT OF THE HAND SCREEN, THEN IT WOULD BE AN EASY CLUE TO USE THE SYSTEM. USE AUDIO FEEDBACK TO SHOW WHEN SCREENS ARE MOVED OR AN OPTION IS SELECTED. BY APPLYING THESE USABILITY GUIDELINES TO THIS EXHIBITION, THE USERS WILL QUICKLY AND EASILY UNDERSTAND WHAT THEY NEED TO DO TO USE THE EXHIBIT.



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Q2 A)

WITHIN THE MUSEUM, AN INTERFACE EVALUATION STRATEGY I WOULD RECOMMEND IS THE HEURISTIC WALKTHROUGH. THIS EVALUATION METHOD IS DESIGNED TO TEST THE USABILITY AND FUNCTIONALITY OF A SYSTEM. IT WILL EVALUATE BOTH DESIGN + IMPLEMENTATION. SEVERAL EVALUATORS WILL INDEPENDENTLY TEST A SYSTEM AND THEN COME UP WITH A POTENTIAL LIST OF USABILITY PROBLEMS ~~THE~~ USERS MAY COME ACROSS.

LIST OF HEURISTIC EVALUATORS:

- 1 VISIBILITY OF THE SYSTEM
- 2 MATCH BETWEEN SYSTEM AND THE REAL WORLD
- 3 USER CONTROL AND FREEDOM
- 4 CONSISTENCY + STANDARDS
- 5 ERROR PREVENTION
- 6 RECOGNITION RATHER THAN RECALL
- 7 FLEXIBILITY AND ~~EFFICIENCY~~ EFFICIENCY OF USE
- 8 AESTHETIC AND MINIMALIST DESIGN
- 9 HELP USERS RECOGNISE, DIAGNOSE + RECOVER FROM ERRORS
- 10 HELP AND DOCUMENTATION

JAKOB NIELSEN'S APPROACH SPECIFIES THAT BETWEEN 3/5 EVALUATORS IS SATISFACTORY, WITH 5 TYPICALLY RESULTING IN ABOUT 75% OF THE OVERALL USABILITY PROBLEMS BEING DISCOVERED.

AFTER EACH EVALUATOR HAS ASSESSED THE USABILITY PROBLEM, THEY WILL BE GIVEN A SEVERITY RATING OF BETWEEN 0-4.

Q2 b)

AN INTERFACE EVALUATION STRATEGY I WOULD RECOMMEND FOR AN AR EXHIBITION WOULD BE A COGNITIVE / WALKTHROUGH. THIS EVALUATION METHOD IS USED TO EXAMINE THE USABILITY OF SOMETHING. THE COGNITIVE WALKTHROUGH AS RECOMMENDED BY POLSON HAS BEEN DESIGNED TO SEE IF A NEW USER CAN EASILY CARRY OUT TASKS WITHIN A GIVEN SYSTEM. THE IDEA IS THAT IF GIVEN A CHOICE MOST USERS PREFER TO DO THINGS TO LEARN A SYSTEM RATHER THAN READ A MANUAL OR FOLLOW INSTRUCTIONS. THE BIGGEST BENEFIT OF A COGNITIVE WALKTHROUGH IS THAT IT IS EXTREMELY COST-EFFECTIVE AND FAST TO CARRY OUT WHEN COMPARED TO MANY OTHER FORMS OF USABILITY EVALUATIONS.

THERE ARE 4 QUESTIONS THAT THE COGNITIVE WALKTHROUGH WILL ASK:

- 1 WILL THE USER TRY TO ACHIEVE THE RIGHT EFFECT?
- 2 WILL THE USER NOTICE THAT THE CORRECT ACTION IS AVAILABLE?
- 3 WILL THE USER ASSOCIATE THE CORRECT ACTION WITH THE EFFECT DESIRED?
- 4 IF THE CORRECT ACTION IS PERFORMED, WILL THE USER SEE WHAT PROGRESS IS BEING MADE TOWARDS THE SOLUTION OF THE TASK?

THESE QUESTIONS ARE ANSWERED ABOUT THE EXPECTATIONS OF THE USER'S BEHAVIOUR.

"FOR AN INTERFACE TO BE A SUCCESS, IT MUST PROVIDE THE RIGHT FUNCTIONALITY, AT THE RIGHT TIME, IN THE RIGHT PLACE, AND IN THE FORM OF THE USER'S POINT OF VIEW"

BOOK: C. WHARTON - THE COGNITIVE WALKTHROUGH METHOD

Q2 B)

THE MAIN DIFFERENCE BETWEEN THE TWO EVALUATIONS ARE :

HEURISTIC WILL EVALUATE BOTH DESIGN + IMPLEMENTATION. IT WILL TEST BOTH USABILITY AND THE FUNCTIONALITY OF THE SYSTEM, AND WILL USE SEVERAL DIFFERENT EVALUATORS.

THE COGNITIVE WALKTHROUGH WILL EVALUATE THE USABILITY OF THE SYSTEM AND ALLOWS USERS TO TRY AND USE THE SYSTEM WITH INSTRUCTIONS, WHICH MOST PEOPLE WILL BE ABLE TO DO WITH TECHNOLOGY.



Q3 A) Part 1

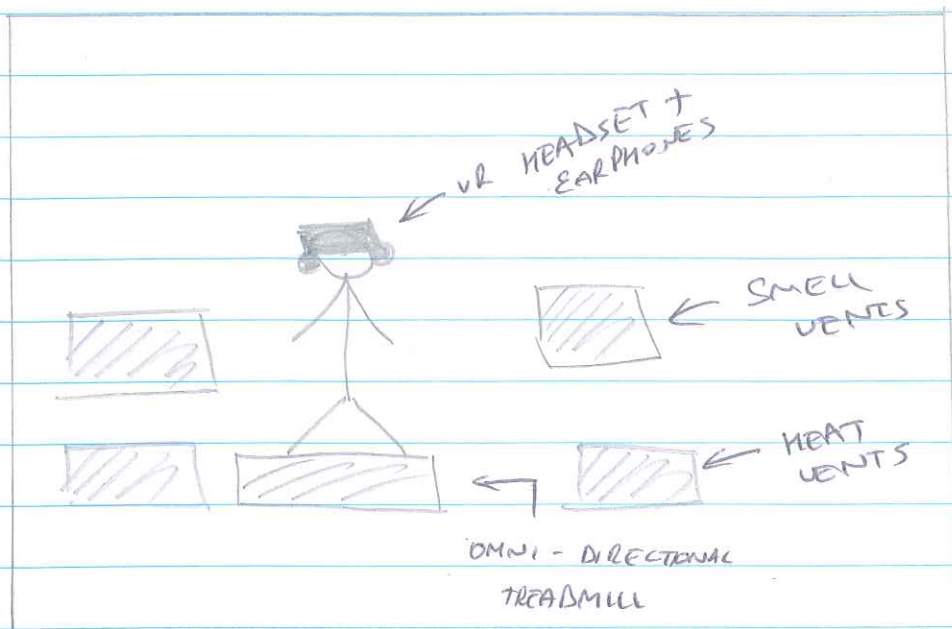
VR Exhibit

THE PROPOSAL OF THE VR EXHIBIT WILL BE FOR THE WELSH STEEL INDUSTRY.

THE EXPERIENCE WILL CONSIST OF A BLACKED-OUT ROOM WHERE THE USER WILL WEAR AN OCULUS RIFT VR HEADSET AND EARPHONES. THIS WILL DISPLAY THE DIFFERENT SCENES OF THE STEEL MILL. TO ADD TO THE EXPERIENCE, THE USER WILL STAND ON AN OMNI-DIRECTIONAL TREADMILL, THIS WILL ALLOW FOR THE END USER TO FEEL AS THOUGH THEY'RE WALKING THROUGH A SIMULATION RATHER THAN STANDING STILL. IT WILL ALSO CONSIST OF OTHER FACTORS TO HEIGHTEN THE IMMERSIVE FEELING. SINCE THE EXPERIENCE WILL SHOW THE FEELING OF BEING IN A STEEL BLAST FURNACE, THE DARKENED ROOM WILL USE HEAT AS AN IMPORTANT FACTOR. HEAT VENTS WILL BLOW OUT HOT AIR TO SIMULATE THE HEAT A STEEL WORKER WOULD WORK IN. THE SMELL IS ANOTHER IMPORTANT FACTOR, THE SMELL OF WORKING IN A STEEL BLAST FURNACE WILL BE REPLICATED. IRON ORE SMELLS WOULD BE SENT THROUGH VARIOUS VENTS WITHIN IN THE ROOM. THE USER WOULD EXPERIENCE THE SULPHUROUS, ACID, AND METALLIC SMELL, WITH MANY STEEL WORKERS SAYING IT SMELT LIKE WET RUST.

THE HARDWARE / SOFTWARE NEEDED WILL BE

- OCULUS RIFT VR UNIT + HEADPHONES
- HEAT VENTS
- VENTS FOR THE SMELL
- OMNI-DIRECTIONAL TREADMILL
- POWERFUL PC TO RUN THE VR SOFTWARE



VR EXHIBIT: WELSH STEELWORKS

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Q3 B) PART 2

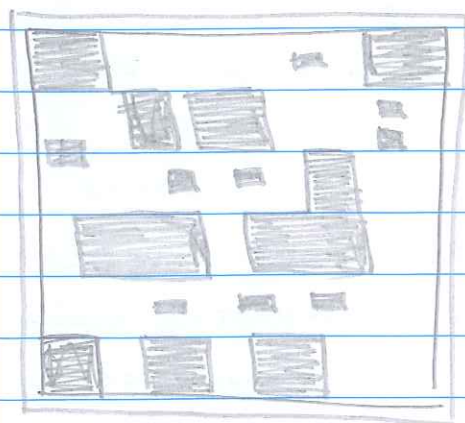
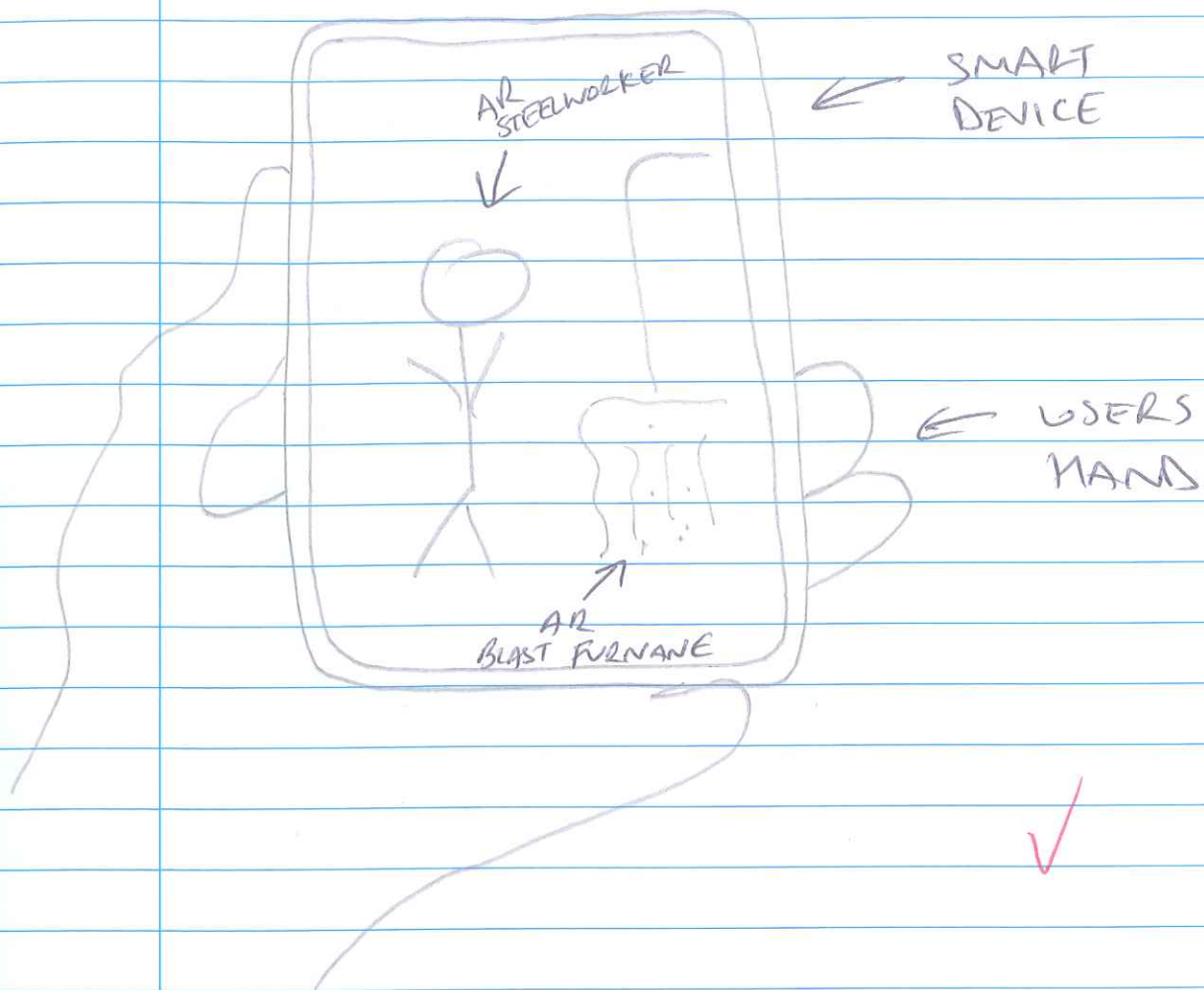
THE AR PROPOSAL FOR THE WATERFRONT MUSEUM WILL BE AN WELSH INDUSTRY APPLICATION.

AS USERS ENTER THE MUSEUM THEY WILL BE INVITED TO SCAN A QR CODE OR TOUCH A NFC TAG ON THEIR SMART DEVICE TO DOWNLOAD AN APP TO ALLOW THE USER TO INTERACT WITH THE AUGMENTED ABILITY WITHIN THE MUSEUM.

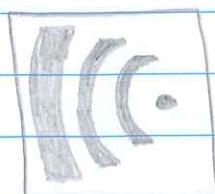
ONCE INSTALLED IT WOULD ALLOW THE USER TO SEE AR OVERLAYS IN THE REAL WORLD. AS A USER PROGRESSES THROUGH THE MUSEUM, QR CODES + NFC TAGS WILL BE SPREAD OUT THROUGH THE VARIOUS EXHIBITS. ONCE SCANNED OR TOUCHED THE APP WILL DISPLAY THE RELEVANT AR. IF THE USER IS IN THE COAL INDUSTRY SECTION, THEY WILL BE ABLE TO MOVE THE SMART DEVICE AROUND AND SEE COAL MINER WALK + WORK AROUND THE EXHIBITS, ALSO AUGMENTED DISPLAY STANDS CAN GIVE OUT MORE INFORMATION OF THE DAILY LIFE OF A COAL MINER. THE EXPERIENCE CAN BE REPLICATED IN EVERY EXHIBIT IN THE MUSEUM. STEEL WORK EXHIBITION CAN HAVE STEEL WORKERS WALKING AROUND + WORKING AND AGAIN AUGMENTED INFORMATION STANDS ARE AVAILABLE TO GIVE MORE INFORMATION.

HARDWARE + SOFTWARE NEEDED.

- QR CODES TO DOWNLOAD APP + OPEN EACH EXHIBITION
- NFC TAGS " " " " " " "
- DOWNLOADABLE AR APP, THIS WILL DISPLAY THE RELEVANT REALITY IN EACH EXHIBIT



← QR CODE



← NFC TAG

Q3 B)

VR IS THE USE OF COMPUTER TECHNOLOGY THAT CAN CREATE A SIMULATED ENVIRONMENT. VR WILL PLACE THE USER IN AN EXPERIENCE THAT LOOKS REAL BUT IS IN FACT A FAKE REALITY. THEY ARE VIEWING A SMALL SCREEN IN FRONT OF THEIR EYES, THE VR EXPERIENCE WILL TRY TO USE AS MANY OF A PERSON'S SENSES AS POSSIBLE, SUCH AS VISION, HEARING, TOUCH AND SMELL. ONE OF THE ONLY SENSES THAT IS NOT OFTEN USED IS TASTE.

AN IMPORTANT FACTOR TO VR IS AUDIO, TO CREATE A TRULY IMMERSIVE VR EXPERIENCE, ACCURATE ENVIRONMENTAL SOUNDS + SPATIAL CHARACTERISTICS ARE A MUST. SOME HEADSETS COME WITH 7.1 SURROUND SOUND.

IVAN SUTHERLAND FIRST SPOKE ABOUT VR IN 1965, CALLING IT THE "ULTIMATE DISPLAY". HE SAID THAT YOU SHOULDN'T THINK OF A COMPUTER SCREEN TO DISPLAY INFORMATION BUT RATHER THAN AS A WINDOW INTO A VIRTUAL WORLD THAT COULD EVENTUALLY LOOK REAL, SOUND REAL, MOVE REAL, INTERACT REAL AND EVEN FEEL REAL. HIS 1965 PAPER PREDICTED THE TRAJECTORY OF TECHNOLOGY TOWARDS VR, HEAD MOUNTED DISPLAYS, EYE TRACKING, HAPTICS, SPEECH RECOGNITION AND EVEN HOLODECKS. BY 1968 HE RELEASED HIS PAPER ABOUT A HEAD MOUNTED 3D DISPLAY, THE DISPLAY WAS CALLED "THE SWORD OF DAMOCLES" AND IS WIDELY CONSIDERED TO BE THE FIRST VR HEAD MOUNTED UNIT.

THIS WAS A PRIMITIVE DESIGN IN TERMS OF INTERFACE + GRAPHICS BUT SUTHERLAND + BOB SPROUL WANTED THE USER TO EXPERIENCE SOME FORM OF REALISM.

THEY WANTED A HEADSET THAT WOULD SHOW THE USERS A DIFFERENT PERSPECTIVE DEPENDING ON WHERE THE USERS LOOKED OR ~~THEY~~ TURNED THEIR HEADS.

VR AND AR ARE TWO SIDES OF THE SAME COIN. AR SIMULATES ARTIFICIAL OR FALSE OBJECTS IN THE REAL WORLD WHILE VR CREATES AN ARTIFICIAL ENVIRONMENT TO OCCUPY VIA A HEADSET. AR USES SOFTWARE TO SUPERIMPOSE COMPUTER GENERATED IMAGES ONTO THE REAL WORLD VIA A MOBILE APPLICATION. VR HEADSETS DELIVERS A VIRTUAL WORLD WHICH THE USER CAN INTERACT WITH. THE SIMULATED ENVIRONMENT CAN BE INTERACTED WITH BY THE USER MOVING THEIR HEAD AND EYES. THE GRAPHICAL INTERFACE WILL THEN REACT ACCORDINGLY, AND THIS WILL RESULT IN A CONVINCING, INTERACTIVE WORLD FOR THE USER.

THE RESULT IS THE SAME FOR THE USER, THEY ARE IMMERSED INTO A DIFFERENT REALITY. AND THEY EACH REACT WITH SOMETHING THAT IS NOT IN THE REAL WORLD. VR WILL CREATE AND ENHANCE AN IMAGINARY REALITY AND AR WILL ADD A DIGITAL LAYER ONTO THE REAL WORLD, ~~THEY~~ ~~WILL~~ ~~CREATE~~ MERGING REAL AND DIGITAL WORLD TOGETHER. THEY HAVE BOTH BEEN DESIGNED TO ENRICH AND ENHANCE A USER'S EXPERIENCE.

TODAYS VR FAR OUTSTRETCHES SUTHERLANDS VISION

OF VR AND MASSIVELY IMPROVES ON HIS
IDEAS

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