

ADAM PITT.

w15016196

DE0974 Personal Project
NIKE VR Station
DESIGNR



CONTENTS.

BRIEF.

PAGE 3

MY PROJECT SO FAR.

PAGE 4

Semester one work
Development from previous project
Making my final project

RESEARCH.

PAGE 13

User research
Market research
Technology Research

DEVELOPMENT.

PAGE 24

DESIGNR service planning
Unity - First steps
DESIGNR VR area
Final Prototype
Video

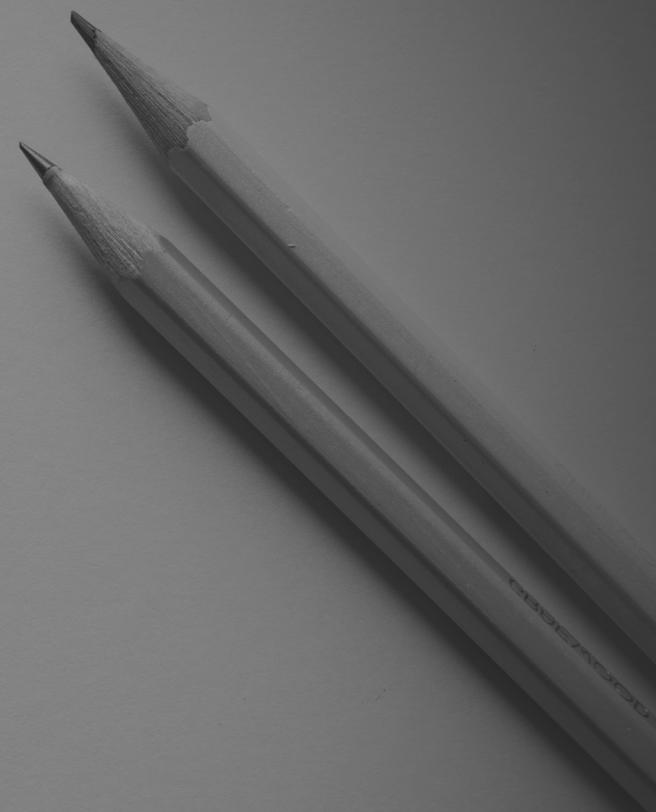
CONCLUSION.

PAGE 56

Survey results

“Your task is to investigate what is happening on the cutting edge of your chosen technology. Who is doing what, how and why? What software/hardware is currently available and what are the strengths and weaknesses of competing products. What developments are just around the corner? How has technology changed your chosen area of research and the people who work within it? You are required to predict where your chosen technology may be going, be able to suggest new and innovative ways that your technology could potentially be used, and design a prototype to demonstrate your concept.”

PROJECT SO FAR.



DE0974 - Personal Project



ADAM PITT - w15016196

SEMESTER ONE WORK.

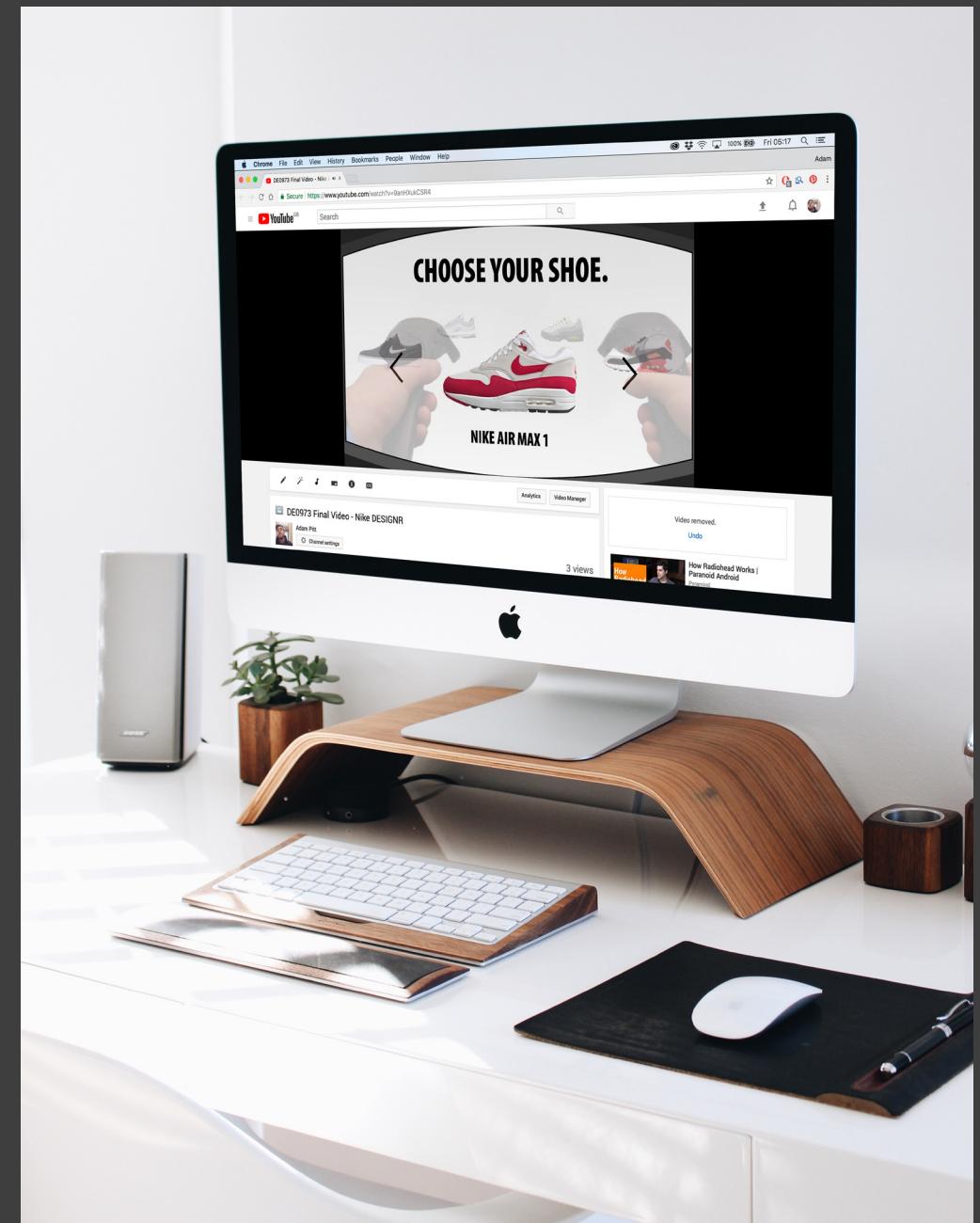
The work I produced for the first semester of this module was purely conceptual and was not functional. I had created my prototype video in Adobe After Effects and used visual effects and green screen footage to produce a convincing prototype of my idea.

My aim for second semester is to carry the concept forward and create a functioning version of my concept using a HTC Vive and the game engine Unity. I want to create a system where users can customise and personalise a Nike shoe in virtual reality.

This is very ambitious as I have no experience with Unity and have never used a HTC Vive previous to this project. However before I start trying to tackle the problem, it is important to reflect on the work I produced in semester one.

The following pages have been taken from my previous document and give a concise summary of what I wanted my project to be.

Throughout the rest of this document, any page that has an off-white background has been taken from my work I carried out in semester one.



WHO? WHAT? WHY?

My concept will be for both male and female adults who want a personalised pair of Nike shoes, where they can get a feel for the materials and quality throughout the creation process.

A Nike sneaker customisation service that combines virtual reality with a physical binder of material swatches to create a tangible interface for the user.

Current systems do not allow for users to visualise their sneaker in an up-close and personal environment which will be achieved through virtual reality. The ability to upload your own designs onto a Nike sneaker is not currently available today. The combination of virtual reality and real world interaction creates an immersive environment where the user feels like they are in control of the entire creation process.

CONTEXT OF CONCEPT.

My concept will allow users to choose a standard Nike sneaker and then edit certain options on the shoe as they please in a virtual environment.

The virtual reality system would be located in the back of a Nike store and would take up no more room than a standard changing room.

As well as the VR headset and the controllers the rooms will all include a catalogue that contains swatches of materials that customers can interact with and get an idea of what their shoe will feel like before they purchase it.



<https://cdn.filepicker.io/api/file/QoVFFIH5SIzP0UpbS8z>

THE EXPERIENCE.

The experience my project is trying to address is the experience of feeling like a sneaker designer for the largest sportswear company in the world.

It will be possible for the user to choose the colour, material and they will even be able to submit their own images/patterns that can then be added to the sneaker to make their creation one-of-a-kind.



<https://news.nike.com/news/anatomy-of-air-the-air-max-95>

INNOVATION.

The level of personalisation will be similar to that on Nike's current customisation service on their website, called NIKEiD.

However the system I am designing will give users the opportunity to get a better visualisation of their shoe before it arrives.

The advantage of having the system located inside of Nike stores means that users can try on the model of shoe they want to customise so they can get a feel for the fit before they purchase. Something that was impossible through NIKEiD.



USP.

The unique selling point of my project is the fact that nothing in the market today allows users the level of interaction and personalisation when creating your perfect sneaker.

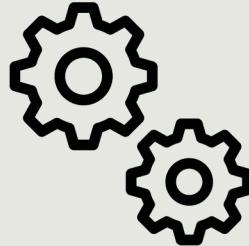
Companies such as Nike, Adidas and Vans all have their own service that enables customers to create their own shoe by changing the colour, materials and potentially adding their own lettering (e.g. their initials).

My proposed system will offer all of this but with the added selling point of a tangible user interaction as well as the ability to upload their own designs and images to their shoe.

As well as this, the user will also have the ability to envision their creation in a virtual environment. Allowing them to manipulate the shoe as they please and view from any angle they wish.



https://social.eyeforpharma.com/sites/default/files/standout_0.jpg



**MAKE A WORKING VERSION OF THE
PROTOTYPE.**

This will be the most challenging and time consuming of the future developments for the project. However it is necessary if I want to take this concept further. This will require me to take my finished 3D Blender model and take it into Unity for users to manipulate and edit.



**ADD DIFFERENT MODELS OF NIKE
SHOES TO CUSTOMISE.**

Adding one or two extra model(s) of Nike shoes into the system will add depth to my project and will allow users to select a different shoe to customise. This will be important to potentially attract users to use Nike DESIGNR multiple times.



**ALLOW USERS TO ADD CUSTOM TEXT
TO THEIR SHOES.**

This is a feature I wanted to add to the Blender version of my model and the prototype concept. However I was unable to and had to stop attempting to due to time restraints. It is definitely something I will revisit in the future of my project as it allows an extra level of customisation and personalisation for the user.

FUTURE DEVELOPMENTS.

The previous page shows the future developments for the project in this semester. It also shows some of the possible features I would like to incorporate into the final version of my prototype.

As I have never used the software I will be creating my prototype in, I have no idea if what wish to achieve is possible, let alone feasible in the period of time I have available.

For this reason the features incorporated into my final prototype may change due to the ambitious nature of my project.



RESEARCH.



<https://www.goalcast.com/wp-content/uploads/2016/10/F1-5.jpg>

DE0974 - Personal Project



ADAM PITT - w15016196

INTRODUCTION.

As I knew the area of technology which my project was going to be focused around and using, I didn't need to conduct further research in this area and have included relevant research I conducted during last semester.

Although I conducted user research during the first semester of the project, I needed to revisit my users as my project has changed in response to the feedback I received after semester one.

It was also important for me to conduct further research into the market the DESIGNR service will be entering, to ensure that no developments have been made, or products have been introduced, within the industry that would make my proposed system obsolete or superfluous.



SURVEY.

One method I used to collect some primary research was I created an online survey to get insight into people's thoughts and opinions on the sneaker personalisation services around today.

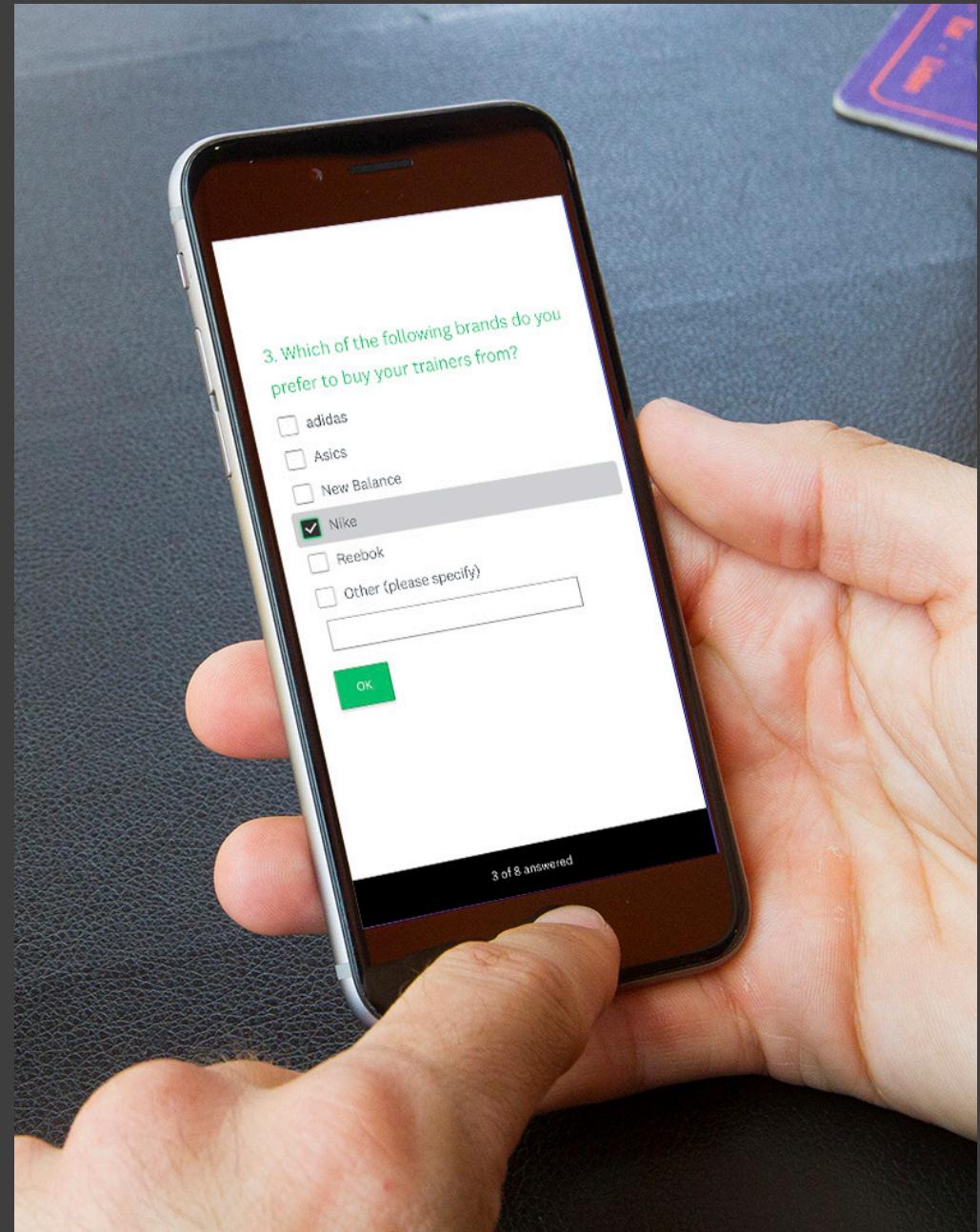
I gathered information on a number of things including, but not limited to: what users experiences of existing sneaker customisation service were, what brand of sneakers people prefer to buy and what features they would like to see incorporated into a new customisation service.

In total I got 32 responses from mostly relevant people who are passionate about sneakers and would be interested in a new service such as DESIGNR.

The survey helped me to create more realistic user personas and assisted me when deciding what features to include within the system.

The questions I asked in the survey can be found in the link below. At various points in this document I will reference the results I got from the responses, which can all be found at the end of the document.

<https://www.surveymonkey.co.uk/r/6JX3JTC>



PERSONA 1.

NAME Dan Brodie

AGE 26

LOCATION Newcastle

OCCUPATION Graphic Designer

USER PROFILE The Enthusiast

Dan is a designer who has been working in Newcastle since graduating from University 5 years ago. During his time at university, he developed a passion for sneakers and collecting them. Since graduating Dan has bought a new pair of shoes nearly every time he's received a pay cheque. He tends to buy his shoes in store as he does not like the idea of buying online due to the uncertainty of the shoe sizing and material quality. He loves the idea of creating his own sneaker or colour way but has held off from using one of the available online services on offer due to the aforementioned reason.

QUOTE

"If I'm going to spend £100+ on a pair of shoes I want to be confident that they will be a high quality product."



PERSONA 2.

NAME Sharon Marino

AGE 22

LOCATION London

OCCUPATION Blogger

USER PROFILE The Fashionista

As the writer of her own fashion blog in London, Sharon spends a lot of time on her feet. Whether it's stood up on the tube or making her way around the highstreet, Sharon feels it is imperative that she is wearing comfortable footwear. As the writer of a fashion blog, it is also important to Sharon that she can express her own, personal sense of style. A comfy pair of shoes that allow Sharon to express her individuality would be ideal.

QUOTE

"I love to express my own individuality, and I love to be comfortable. I'm looking for a pair of sneakers that tick both boxes."



SNEAKER CUSTOMISERS.

Similar to the previous semester when I conducted my market research / competitor analysis, there are currently no virtual reality sneaker customisers. So the main competitor for my project is still Nike's existing service, NIKEiD.

A new development I did find from my research was a NIKEiD service that allows users to customise a pair of Nike shoes using augmented reality (AR). The way the system works is a user chooses a blank model shoe from a shelf next to the system. They then place the shoe onto a stand in-front of them and then a series of projectors, light up the blank shoe to show the colours that the user selects. A video showing the system in action can be found here: <https://www.youtube.com/watch?v=Xf3VdMENFKs>. The service is currently only available within the large 'Niketown' stores in London and Paris.

This service however, is sufficiently different from my concept as the technology behind the systems are completely separate so I do not need to change my project besides from the feedback received after semester one.



VR PRODUCT CUSTOMISATION.

For further market research I stopped looking simply for sneaker customisers and widened my search to look at virtual reality product customisation in any industry.

Similar to last semester, the only service/product that I could find was once again the Audi VR showroom. A service that allowed users to choose between various options on a 1:1 virtual replica of an Audi model car.

This differed massively from my concept for a number of reasons. The service offered by Audi has far less freedom to my proposed service. The DESIGNR service encourages personalisation and choice as once users have entered the booth, they have open reign to exercise their creativity. Whereas all the customisation for the Audi service was done by an employee who supervised users with a tablet in their hand to navigate the options. Also the Audi VR showroom was never turned into a genuine service that users could purchase a car through. The service was showcased at the International Consumer Electronics Show in 2016 as a concept. Contrasting this, the DESIGNR service is intended to allow users to customise and then purchase whatever shoe they create.

As my service is clearly different from this service I carried on with my research, making no changes to my concept.

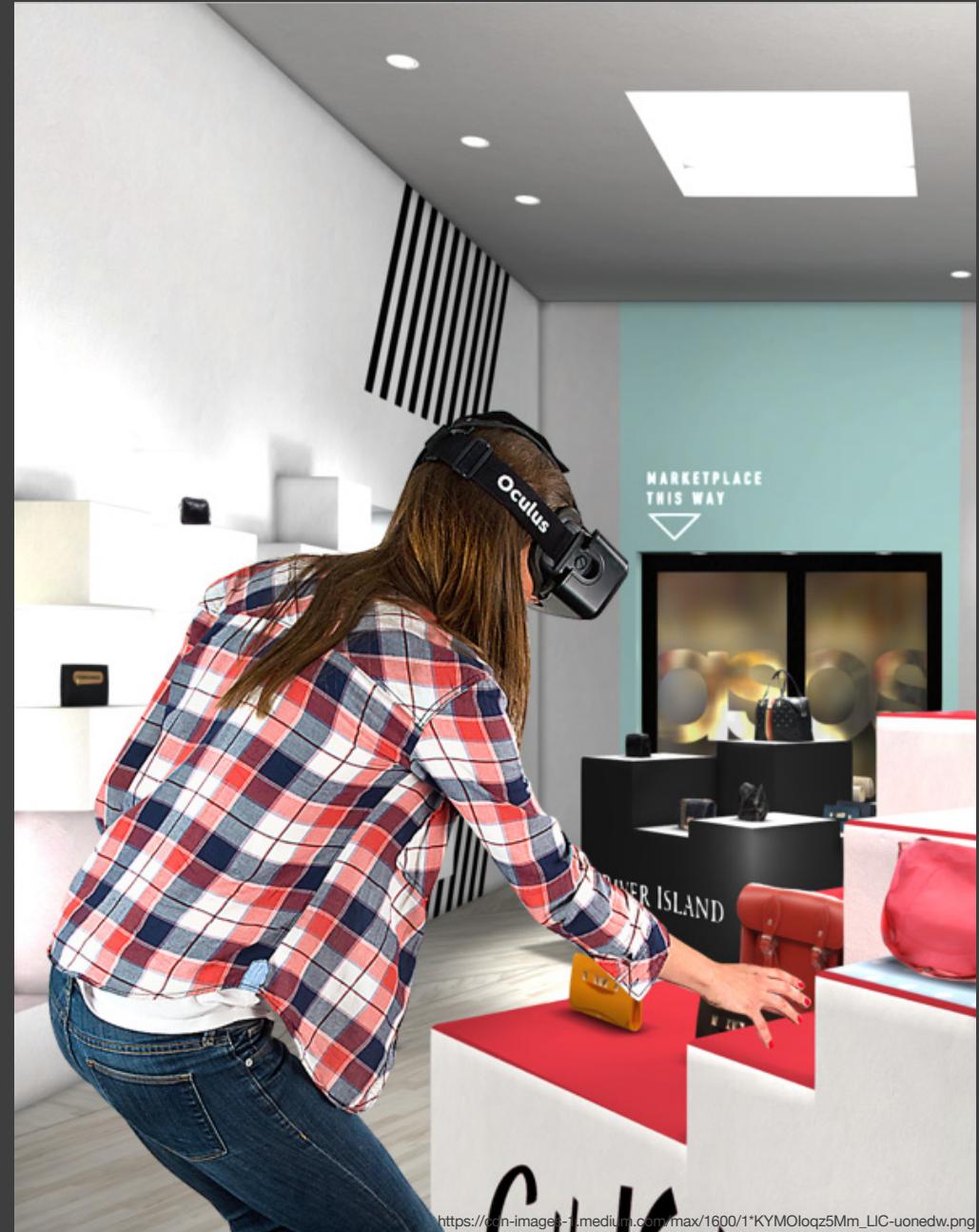


https://audimediacenter-a.akamaihd.net/system/production/media/51939/images/6178525635b5f5738e4bb71899e849e96bd9952a/A1710298_x750.jpg?1504073347

VR RETAIL SERVICES.

Broadening my search even more, I moved away from the customisation aspect of virtual reality and began researching retail services that use VR.

I quickly discovered that this was not a big market but a service that kept appearing in news articles was a concept by a company called Trillium for ASOS. The concept puts users into a virtual shop that they can walk around and browse various products in virtual reality. However it seems as though the idea is still very much in development as the demonstration video looked gimmicky and unfinished. It is impressive however because the concept is meant for smartphone virtual reality, and does not use a system as powerful as a HTC Vive.



VIRTUAL REALITY (CONTINUED).

The capacity of virtual reality goes far further than mobile phone applications. Dedicated headsets such as the HTC Vive and the Oculus Rift can achieve far more immersive and complex environments in comparison to mobile phone apps.

“Conversation about virtual reality has long been confined to the realms of gaming and entertainment, and for good reason. But it would be a disservice to the technology to ignore the potential for virtual reality to transform our lives in much bigger ways”^[3]. This is a quote I’ve taken from futurism.com and it highlights the potential for virtual reality and it’s nearly endless capabilities for the future. However it also shows that a lot of the projects and developments for virtual reality are based around gaming. I have managed to find a few projects which aren’t games but the vast majority are at the moment.

As I do not have the ability to play around with this technology due to the fact that I do not have a headset at my disposal most of the research on this page will be from secondary sources.

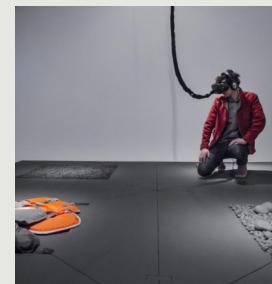
[3] <https://futurism.com/images/7-incredibly-ambitious-virtual-reality-projects/>



EVEREST VR

Everest VR is HTC Vive exclusive that allows users to experience what it feels like to climb Mount Everest in a series of first person challenges as you strive to reach the top of the world. Incomparable visual fidelity combine with player agency in a VR journey that feels both real and emotionally stunning.

<https://www.viveport.com/apps/2518cf75-3ee1-442a-b863-2235e8f3b303>



SCANLAB - DISPLACED WITNESS

This project was an art installation that took place at the Baltic in Newcastle, based on the refugee crisis in Greece. It is the only media on this list that I have experienced first-hand. It was extremely immersive and gave users a very tangible experience due to the fact that there were physical elements to stand on that complimented the virtual aspect.

<https://scanlabprojects.co.uk/work/displaced-witness/>



PROJECT CARS

Already the most technically-advanced racing game on the planet supporting 12K, second screen apps, and 40+ wheels and peripherals, the world of virtual reality as made possible via the Oculus Rift and HTC Vive now offers players the most immersive and natural perspective of the action ever.

<https://www.projectcarsgame.com/vr.html>

HTC VIVE.

"The HTC Vive is a virtual reality headset developed by HTC and Valve Corporation. The headset uses "room scale" tracking technology, allowing the user to move in 3D space and use motion-tracked handheld controllers to interact with the environment" [4]

- + Incomparable experience
- + Comfort
- + Intuitive interface
- Bulky
- Hard on neck and back

Ratings from the web

Tech Radar (<http://www.techradar.com/reviews/wearables/htc-vive-1286775/review>)



Tech Advisor (<http://www.techadvisor.co.uk/review/wearable-tech/htc-vive-review-2017-3635648/>)



Currys (<https://www.currys.co.uk/gbuk/tv-and-home-entertainment/gaming/virtual-reality/htc-vive-10144056-pdt.html>)



[4] https://en.wikipedia.org/wiki/HTC_Vive



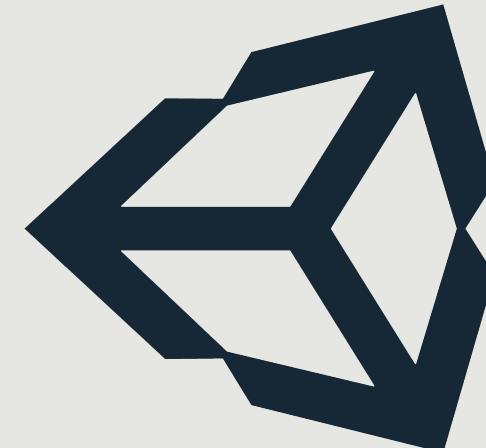
https://d201n44z4ifond.cloudfront.net/wp-content/uploads/sites/6/2017/03/02222041/HTC_VIVE_VR_Birthday_VIVE_DAY_Facebook-HMD.jpg

UNITY.

“Unity is a cross-platform game engine developed by Unity Technologies, which is primarily used to develop video games and simulations for computers, consoles and mobile devices. First announced only for OS X, at Apple’s Worldwide Developers Conference in 2005, it has since been extended to target 27 platforms” [5]

- + Easy to use.
- + Easy to programme on.
- + Available for almost any current generation platform.
- + Collision detection without mathematics.
- + Endless possibilities.
- + Games always come optimised for console manufacturers
- Heavy (engine takes a lot of space on your HDD).
- Expensive if you need all features.
- Using the engine requires you to agree with their policies.

Unity will be used primarily in semester two of this project as it will be the software that allows users to view and manipulate the model shoes in a virtual reality environment. However I still conducted research into it as it has helped me to make decisions about what software to use for my prototyping this semester.



unity

[5] [https://en.wikipedia.org/wiki/Unity_\(game_engine\)](https://en.wikipedia.org/wiki/Unity_(game_engine))

http://mms.businesswire.com/media/20170113005447/en/564225/5/unity-logo-rgb_highres.jpg

DEVELOPMENT.



DE0974 - Personal Project



ADAM PITT - w15016196

INTRODUCTION.

The following section will show the steps I took when creating the prototype for my final project and how the project developed and adapted throughout the course of the semester.

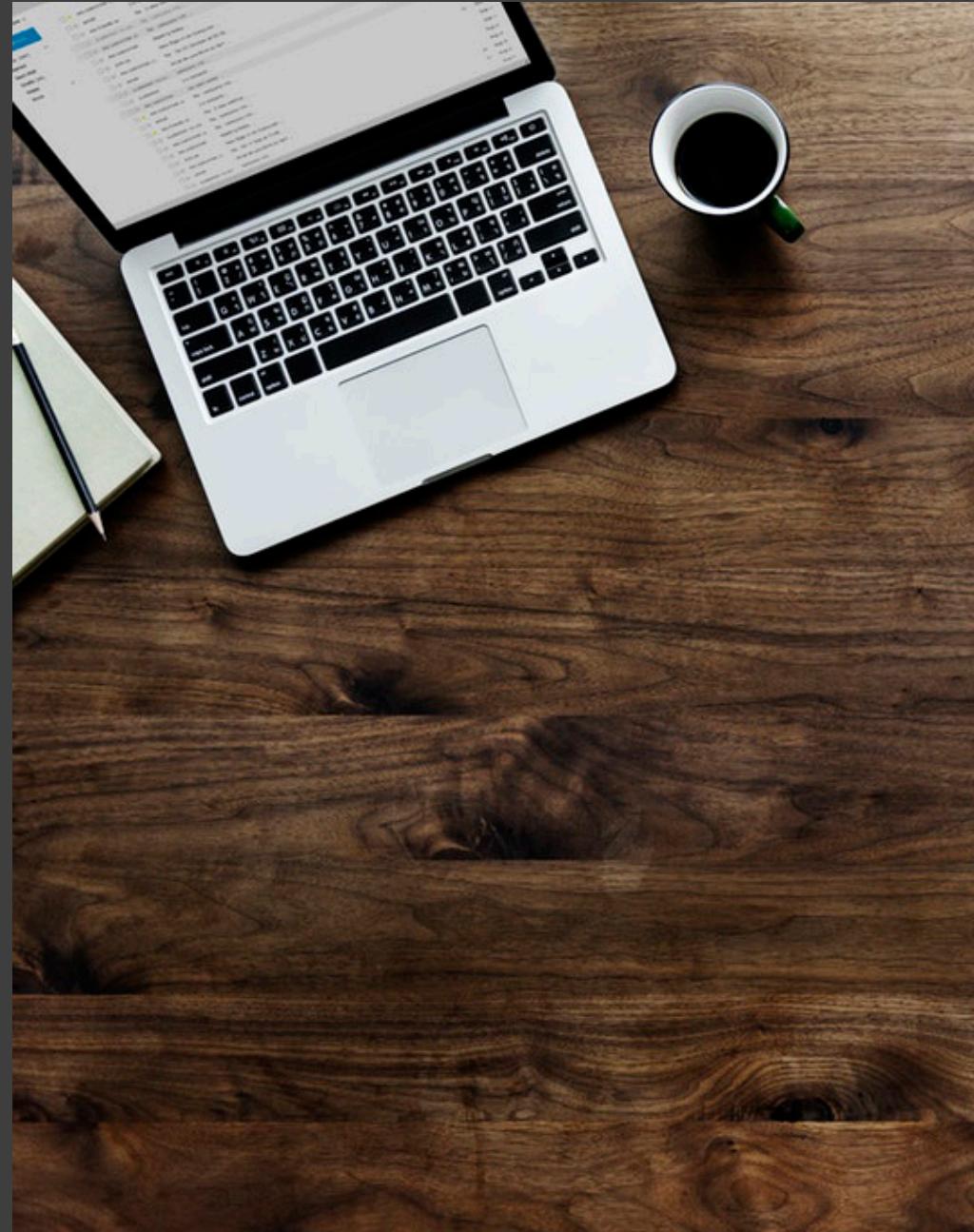
The development of the prototype will be broken up into 4 sections, with the development of my final video at the end. The four sections are as follows: the planning and creation of the Nike DESIGNR service, my initial experimenting with the Unity software, the designing and creation of the virtual reality environment that the user will customise their shoe within and finally the culmination of the previous steps, the creation of my final prototype.



SERVICE DESIGN.

The service design of the Nike DESIGNR system was something I did not really explore during semester one of this project.

For my final project however it was important that I revisited and created a strong concept of how users will interact and use the system.



WHERE WILL THE SYSTEM BE LOCATED?

During semester one of the project I decided that the system would be located solely in Nike Stores. However there may be other suitable options.

I identified a possible three additional options and assessed the plausibility of them.

As the larger 'Niketown' stores already have stations that allow users to customise Nike shoes using the existing NIKEiD service, it makes sense that multiple instances of the DESIGNR system would be available for use in these stores.

The additional three potential options can be seen on the right.

From the survey I conducted, I found that the vast majority of people felt as though the DESIGNR system should only be located in Nike stores around the world. This made sense as if something were to happen to an instance of the designer system, an engineer would be needed to deal with the problem. Getting an engineer to any of the other locations would be difficult and expensive. For this reason, I have decided that the systems will only be located within Nike Stores.

1. - https://www.retailgazette.co.uk/wp/wp-content/uploads/JD-Sports_shopfront_sport-leisure_Gold-Coast_Facebook.jpg
2. - http://www.thephotocabin.co.uk/wp-content/uploads/2015/10/touchwood_shopping_centre_photo_booth_2.jpg
3. - <https://hypb.imgix.net/image/2015/10/end-clothing-newcastle-flagship-store-1.jpg?q=75&w=1000&fit=clip&auto=compress%2Cformat>



1. EXISTING STOCKISTS OF NIKE FOOTWEAR (E.G. JD SPORTS, SIZE?, FOOTLOCKER)

PROS:

- + Much wider audience
- + Will be supervised by the stores staff to ensure the system is not mistreated

CONS:

- A larger amount of DESIGNR systems would require more maintenance
- Expensive to set up

2. STAND-A-LONE BOOTHS LOCATED IN PUBLIC SPACES

PROS:

- + Automated service will reduce need for staff, thus saving money

CONS:

- Potential for misuse if under no supervision
- Expensive to maintain
- Wide audience but not everyone will be looking to buy expensive sneakers



3. SNEAKER RETAILERS THAT STOCK LIMITED NIKE RELEASE (E.G. END., SNEAKERSNSTUFF, FOOT PATROL)

PROS:

- + Visitors to the store will already be passionate about sneakers
- + Audience will be used to spending a little extra money for a pair of sneakers

CONS:

- Not many stores around the UK



USER JOURNEY.

Looking back at the final video for my semester one submission I worked out all the steps that are necessary for a user to complete the customisation of a shoe model.

The steps can be seen to the right.

Once I had identified all of the steps involved I would be able to display the information as a service blueprint. Making it clear which actions require user interaction and which can be done behind the scenes, out of the users visibility.

The service blueprint I created can be seen on the following pages. The stages written in italics are stages of the process that only apply to users who create an account before visiting the Nike store. The rest of the stages apply to pre-registered users as well as users who are using the system without registering.

USER CREATES AN ACCOUNT OR LOGS IN TO THE DESIGNR SECTION OF THE NIKE WEBSITE AND UPLOADS THEIR CUSTOM IMAGES.

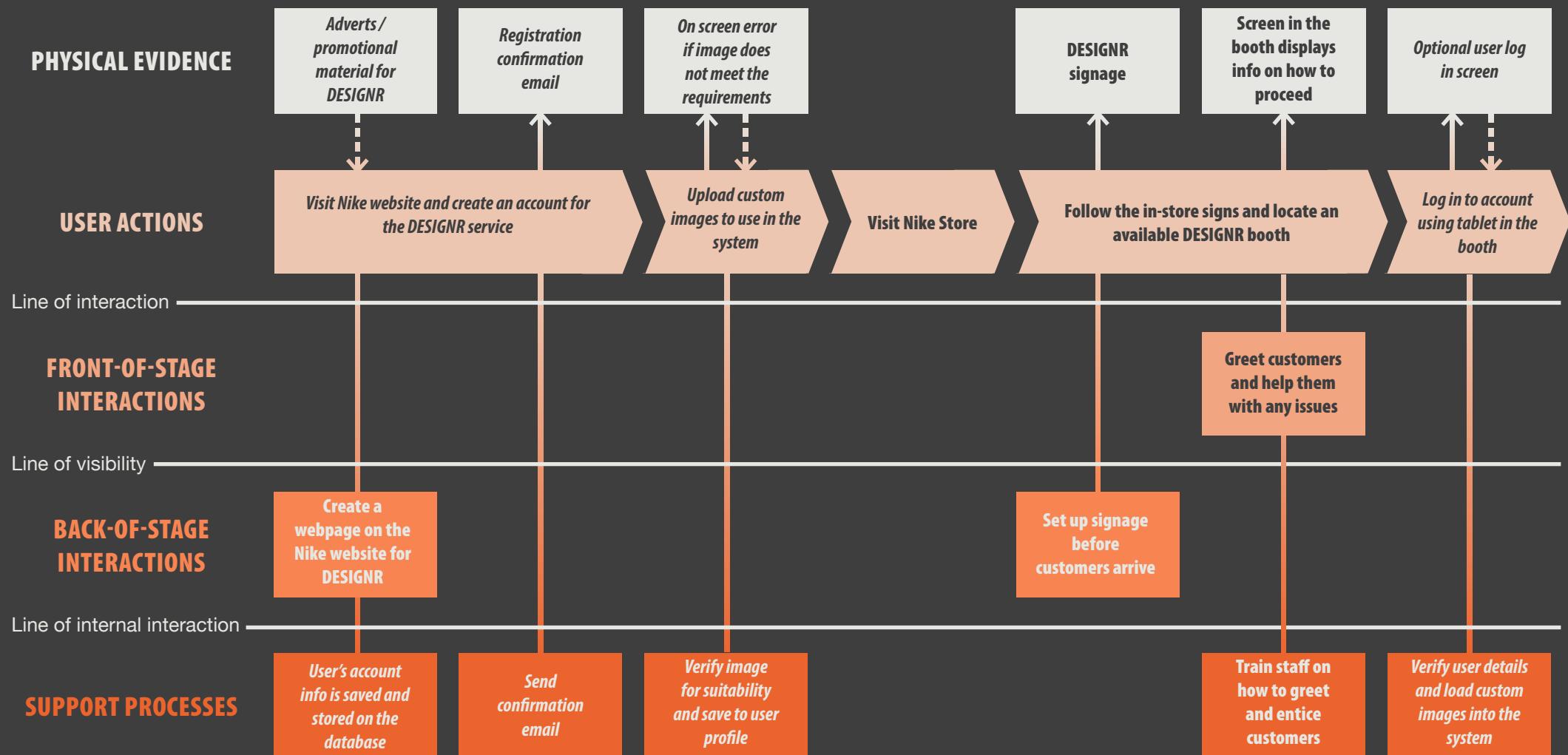
USER ENTERS NIKE STORE
VISITS THE DESIGNR AREA OF THE STORE.
WAITS UNTIL THEY SEE THAT A SYSTEM IS AVAILABLE.
ENTERS THE NIKE DESIGNR BOOTH.
SEES THE MATERIAL SWATCHES ON THE TABLE IN FRONT OF A CHAIR.
SITS DOWN IN THE CHAIR AND PUTS THE VR HEADSET ON TO USE THE SYSTEM.

INSIDE THE VIRTUAL REALITY ENVIRONMENT
CHOOSES THE MODEL OF NIKE SHOE THEY WISH TO CUSTOMISE.
LARGE 3D MODEL OF SHOE IS DISPLAYED AND USER IS TAUGHT HOW TO USE.
SELECTS A SECTION OF THE SHOE AND THE MATERIAL/COLOUR PALETTE IS SHOWN.
FEELS TEXTURES WITHIN THE BINDER TO FIND DESIRED MATERIALS FOR THE SHOE.
CHOOSES A COLOUR (& MATERIAL IF APPLICABLE) AND THE 3D SHOE IS UPDATED.
REPEATS PREVIOUS STEPS UNTIL THE ENTIRE MODEL IS CUSTOMISED, USING CHECKLIST ON WALL BEHIND AND SECTION COUNTER (MENU) TO CHECK PROGRESS.
USING THE MENU, USER PLACES THEIR CUSTOM IMAGE ON TONGUE TAB.
ONCE HAPPY, THE USERS CONFIRMS THEIR DESIGN IN THE MENU.
TAKEN TO THE PREVIEW SECTION OF THE SYSTEM, WHERE THEY ARE ABLE TO VIEW THEIR CREATION UP CLOSE.
IF SATISFIED WITH THEIR DESIGN THE USER CLICKS 'FINISH'.

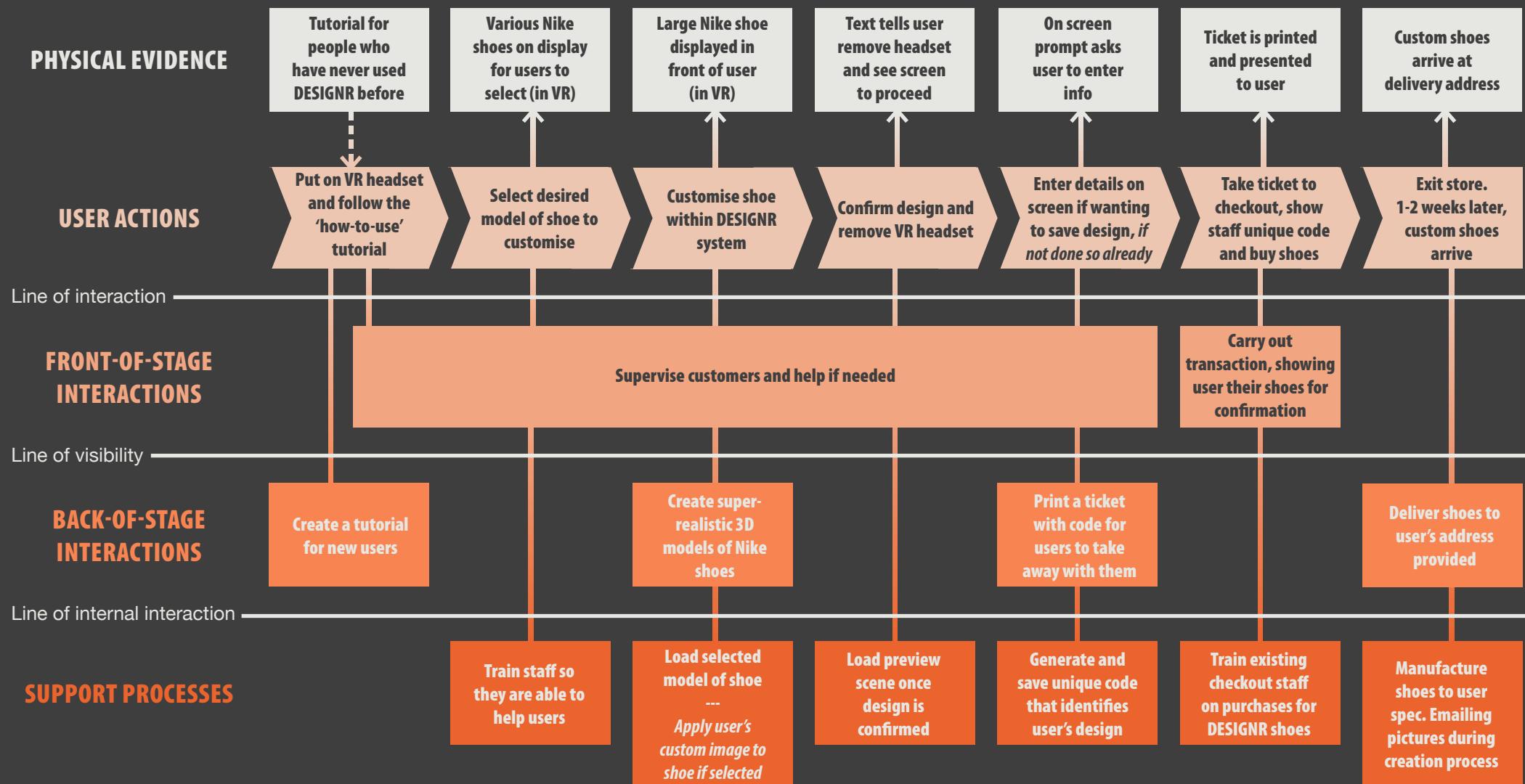
END OF THE PROCESS WITHIN VR
ON A PORTAL WITHIN THE DESIGNR BOOTH, ENTERS THEIR EMAIL WHERE THEY WILL BE SENT IMAGES OF THEIR CUSTOM SHOE. (IF USER DECIDES TO PURCHASE, THEY WILL ALSO RECIEVE EMAILS WITH PICTURES DURING THE CREATION PROCESS.)
AFTER ENTERING THEIR EMAIL, THE USER RECEIVES A UNIQUE CODE TO IDENTIFY THEIR DESIGN WHEN AT THE TILL AND ON THE NIKE WEBSITE.
VISITS IN-STORE TILL TO PURCHASE SHOES, GIVING DELIVERY ADDRESS IN PROCESS.
GETS GIVEN A RECEIPT THAT ALSO INCLUDES THE UNIQUE CODE.

USER EXITS STORE
REGULARLY CHECKS EMAIL TO SEE UPDATES AND IMAGES OF THEIR SHOES.
AFTER TWO WEEKS, USER RECEIVES THEIR CUSTOMISED SHOES AT THEIR ADDRESS.

SERVICE BLUEPRINT.



SERVICE BLUEPRINT (CONT.).



TRIALING THE SOFTWARE.

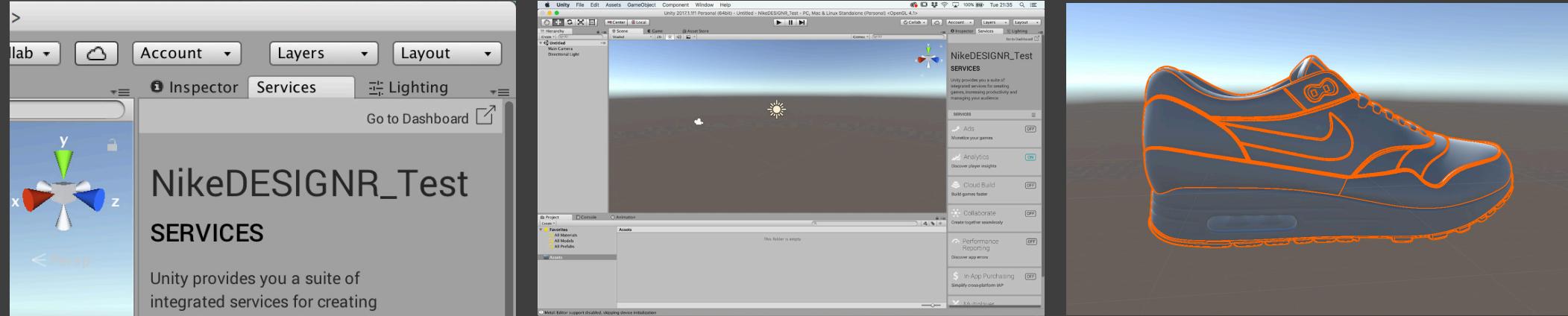
As I had never used the Unity software before, I felt it necessary to experiment a little before fully committing to the idea. For this reason, this section of the development was carried out early on in the semester.

The following pages showcase the creation process of the early stages my experimentation with the Unity software.

The final product I came out with after this experimentation was never intended to lead on to the final product I would submit. However it gave me a good platform to build from and was definitely worth the time it took at the early stages of the project.



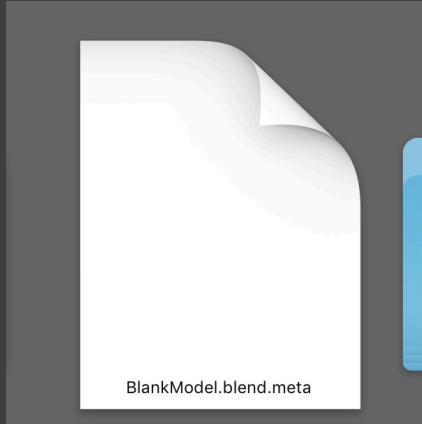
DEVELOPMENT - UNITY - FIRST STEPS



I started by creating a new Unity project. I named the project 'NikeDESIGNR_Test' as I had no intention of using this project for my finished product and because it is important to save many iterations and different versions in a project such as this. Primarily in case something stops working, so I could always return to a previous version.

Once I had created my project, I was presented with an endless expanse in which to work. As this exercise was simply to get an idea if my concept was viable, I did not mind what the scenery/environment looked like.

The next step I took was I imported the 3D model of a Nike Air Max 1 shoe that I used in Blender during semester one to make sure that the model was a high enough quality and ultimately could actually be imported successfully. Above is the model in Unity, I was very happy with how it looked which was good news as this would save me a lot of time I spent looking for a model in semester one.



Now that I had a scene with an empty world and the model shoe in it, I moved the project on to the laptop in university that was connected to the HTC Vive and would allow me to start experimenting in virtual reality.

The transfer process was relatively simple compared to what I was anticipating. The fact that I needed to transfer the project from an iOS operating system to a Windows one seemed as though it could be problematic, however after a bit of searching around the internet on Unity forums etc. I found that all I needed to do was ensure that '.meta' files were created for the individual elements of the project (see above) and it could be switched between the two platforms as any other file can.



Once I had the project successfully opened on the university laptop, I needed to turn the project from a regular Unity build (mouse and keyboard / controller based UI) into a virtual reality supported one.

To achieve this, I downloaded and installed a plugin called 'Steam VR'. This connected the HTC Vive headset to Unity via a Steam account, which I already had prior to the project, saving time in the long run.

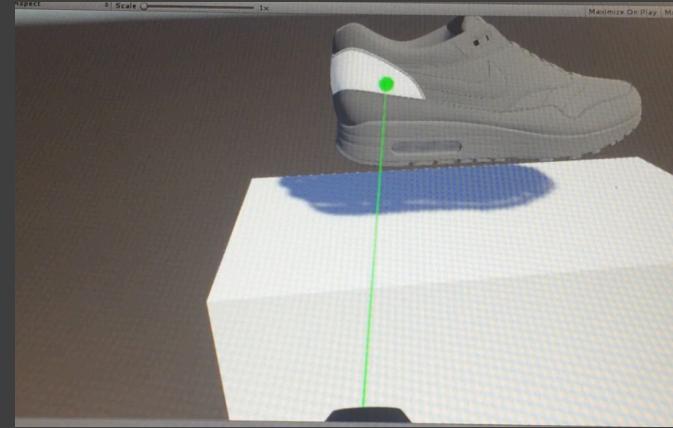
Once the plugin was installed I needed to change the Unity in-game camera (which usually is locked to the player's screen), to a pre-fabricated Steam VR camera-rig. This meant that the camera would follow the movements of the user wearing the VR headset. This was very straightforward and immediately after running the project build, I could see the virtual model shoe in-front of me.



Being a novice when it comes to Unity, not to mention virtual reality, I started researching online again to get an idea of a good place to start. Many comments and posts I read kept mentioning a free plugin called 'Virtual Reality Toolkit' (VRTK). Many advocated it's easy to use nature, effective functionality and extremely helpful community of developers who are very happy to assist new users via the community's Slack channel.

Due to the plugins glowing reviews I installed it as I was starting from scratch with a limited time scale for this project. So any help I could get was welcome.

```
▼ VRTK_SDKManager
  ▼ SteamVR
    ▼ [CameraRig]
      ► Controller (left)
      ► Controller (right)
      ► Camera (head)
      [SteamVR]
    ► VRTK_Scripts
```



To get the VRTK plug-in working in my Unity project, I needed to take the existing Steam VR camera rig and make it the target camera for the VRTK_SDK (software development kit). I also had to define where the Vive controllers were located in the hierarchy so that the VRTK SDK could follow and track them.

This then used the existing Steam VR camera functionality, but added hundreds of pre-made components that could be added to objects and controllers within a scene. These components were specifically made to work alongside one another and they saved me lots of time that I would have spent coding it manually.

The first components I experimented with were the 'VRTK_Pointer' script and its corresponding renderer. As I thought that these could be a good place to start as the basic VRTK tutorial examples show how to get the pointer working. The tutorials were easy to follow and soon enough I had the scripts working perfectly for the effect that I wanted to achieve.

Once the pointer was set up and running smoothly, it was extremely easy to personalise and customise the various options. So I set it so that it was only activated when the trigger was held and so that when the pointer hit a valid Rigidbody, the laser turned green, and if it was on an object which could not be interacted with, the laser turned red. This made it extremely clear to the user what could, and could not be clicked within the system.

Now that I had the pointer set up and working as desired, I moved on to see if I could achieve any sort of rotation of the shoe model using the controllers. This was an important aspect of the project that I wanted to make the most of in VR. The 3D nature of VR allows for far more depth compared to viewing something on a screen in 2D. This was something I wanted to highlight in my project. I didn't simply want button presses on the various controllers to influence the rotation. I wanted users to act out physical gestures to interact with the system to increase the immersion in the virtual environment.

After a few hours of trial and error, I managed to get some form of rotation on the shoe. It was far from intuitive and fairly glitchy. However I thought that with more time and work I could sort it. So I was now convinced that my concept was achievable and I moved on with the project.

INSPIRATION.

Once I'd had a play around with Unity and had some of the manipulation/rotation of the model sorted, I started looking into what I wanted the virtual reality environment to look like within the DESIGNR system.

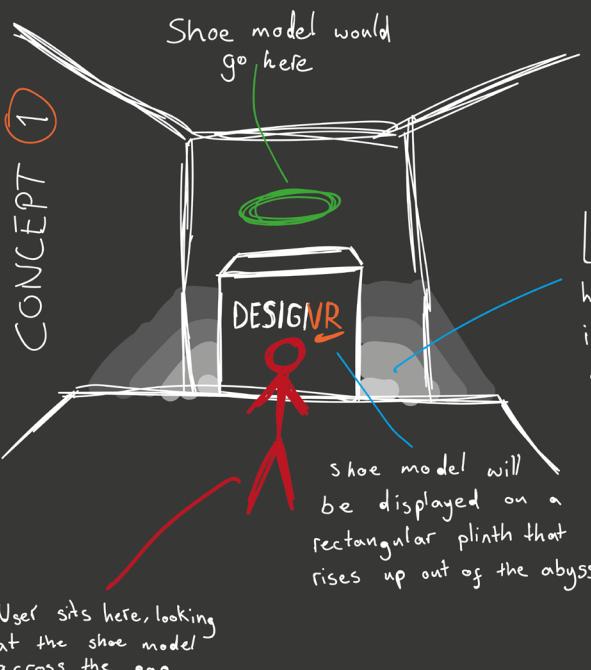
I began by creating a mood-board (see right) for inspiration of what the area could look like and how it should make the user feel when they are interacting with the system. I knew that I wanted it to look futuristic and clean.

I also wanted the branding and logo to be prominent within the system so that it would leave a lasting impression of the user and increase the strength of the DESIGNR brand.

With all this in mind, I began generating and sketching some initial ideas for the virtual reality environment.



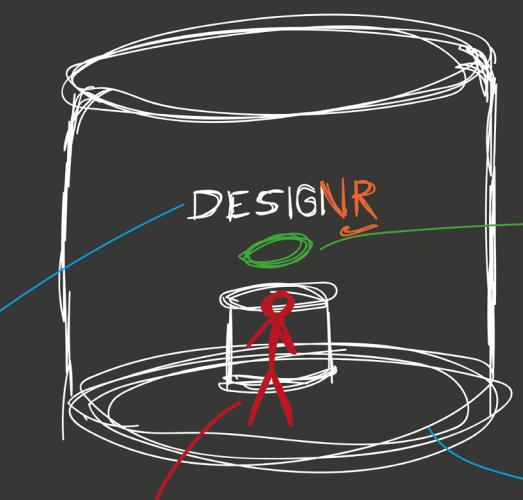
INITIAL IDEAS.



Large crevasse that will have the illusion of being infinitely deep. To look like a scene out of a science fiction movie.

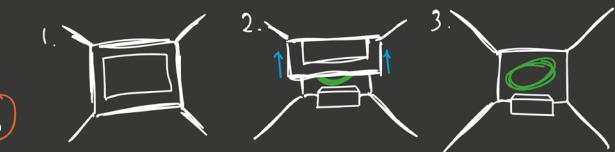


Large DESIGNR logo on the back wall will be visible to the user at all times. A design choice Nike often use in the Brand's current stores



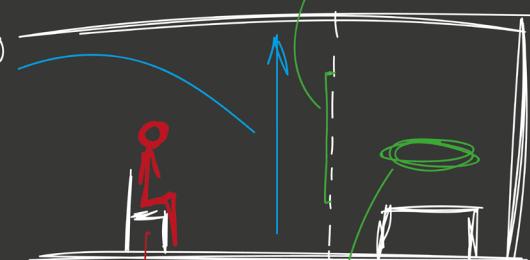
CONCEPT ②

User sits here, facing the shoe plinth

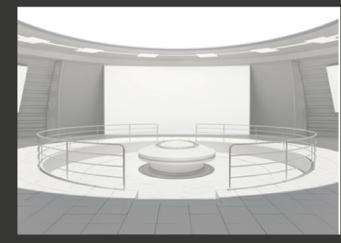


CONCEPT ③

Once the user is happy with their creation and confirms the design. The screen and the wall slide upwards, revealing the model in 3D which they can walk round to preview



User sits directly in front of the screen on the wall. They change the colours and manipulate the shoe exactly as they will in the other two concepts.

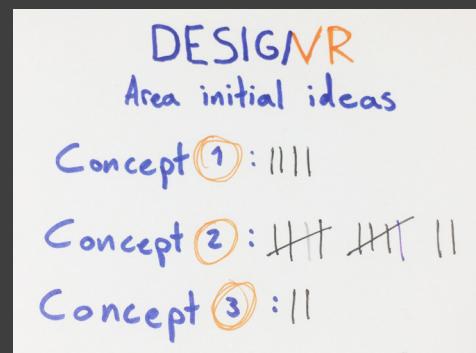


NEXT STEPS.

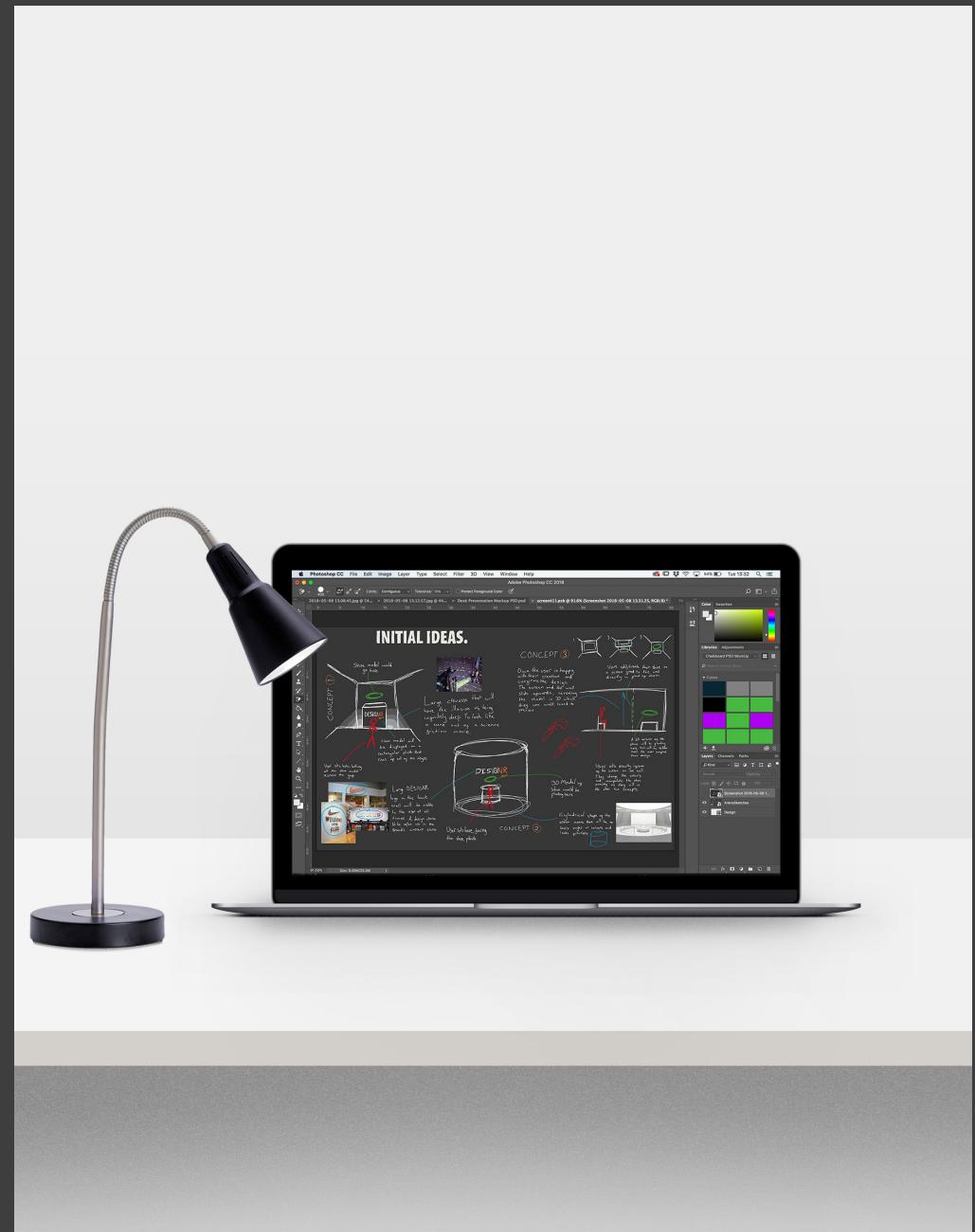
After sketching out my initial ideas, I showed my designs to my peers to get some feedback and to see which concept they preferred and thought would be most suitable for my project.

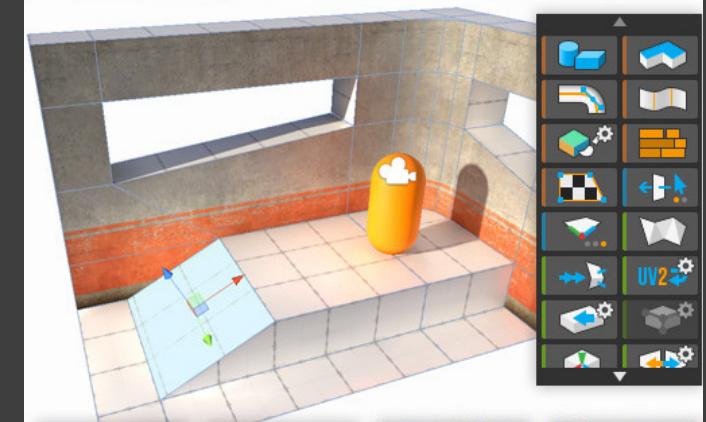
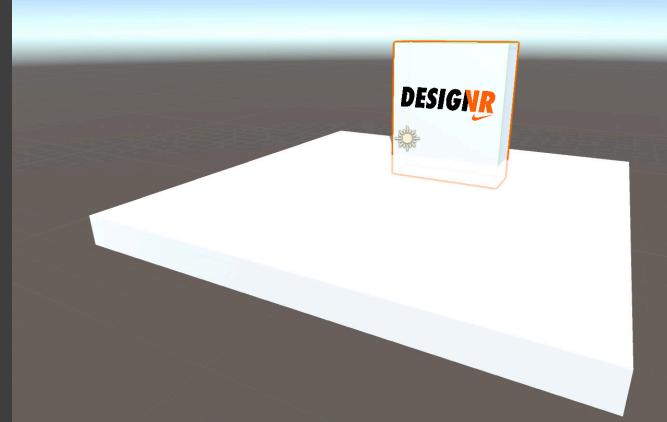
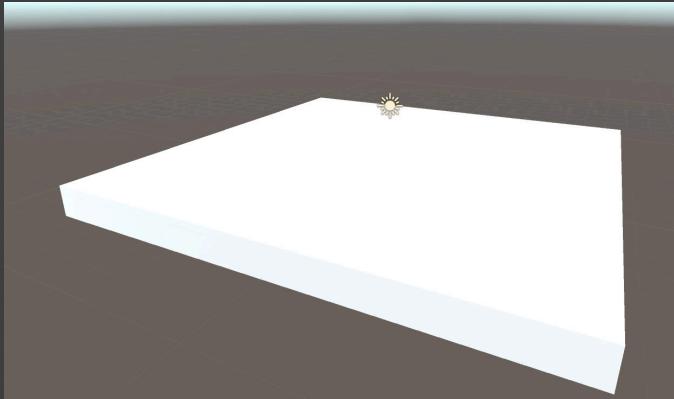
My personal favourite was Concept 2 as it showcases the shoe well and looks futuristic with the rounded edges and simple design. From a more practical point of view, it also had plenty of room to the sides of the logo on the back wall which seemed perfect for me to fit in the UI elements of the system.

I was pleased after conducting the quick survey that the majority of those I asked also felt the same way about which design was most suitable (see below).



Now I needed to reproduce my initial idea concept in 3D form within Unity.





The creation of the VR area was something I did whilst out of university hours, as I had limited hours in the suite with the VR headset. This was due to the opening and closing times of the building.

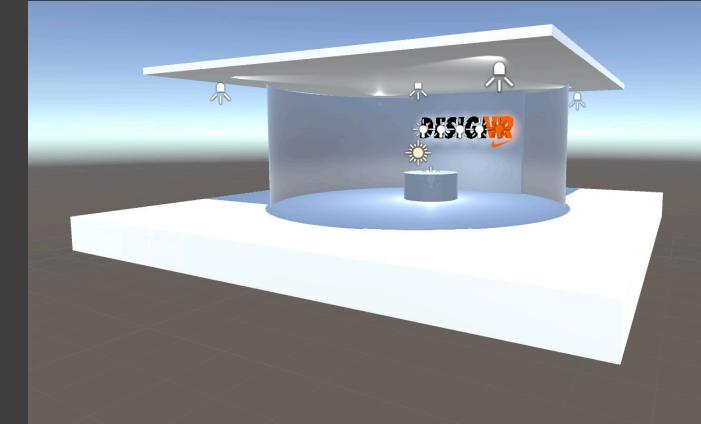
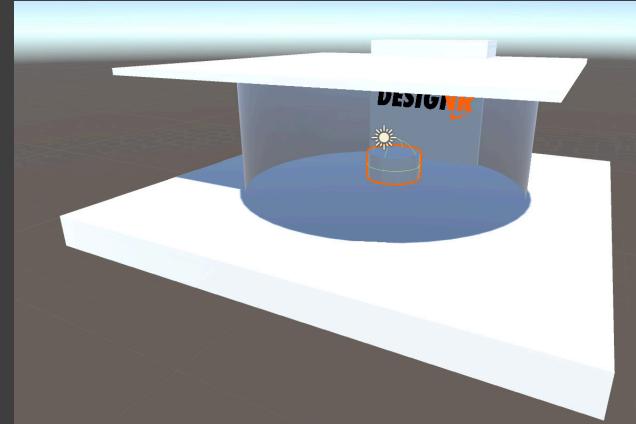
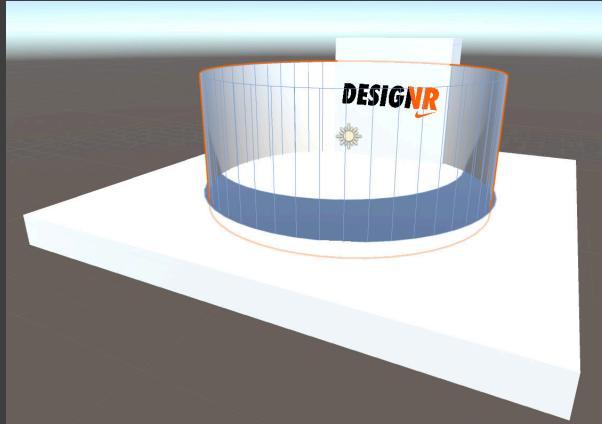
I started by creating a blank project again and added a floor in the form of a large rectangle that I stretched to turn it into a plane to build off.

Now that I had a platform to work on, I started on the exterior walls. However I had a lot of difficulty trying to create the curved wall to go around the outside the area.

It was at this point when I realised I would not be able to place the logo directly onto the outside wall, due to its concave shape. As placing an image on a surface like this would result in it being skewed and facing inwards, which would not look good for the DESIGNR brand. To combat this issue, I added a rectangular back wall with a large, flat surface to place the logo onto

Going back to the curved wall dilemma, I spoke with a peer who was more experienced with Unity than I was, and he recommended a free plugin called 'ProBuilder'.

The plugin allows users to build basic or advanced geometric shapes, directly into Unity. This is something which is notoriously difficult and bad in Unity and many users prefer to build their models elsewhere and then import it into their scenes.



I installed the ProBuilder plugin and was a little overwhelmed with the options available at first. However, through experimenting I discovered an option called 'reverse normals' which when selected for an object, took it's mesh and inverted it. Effectively turning the object inside-out. I was experimenting with a cube at the time but quickly realised it could be the perfect tool for my outer wall if it could be used on a cylinder.

I created a cylinder and inverted it's mesh and I achieved the effect I was after. All I had to do was scale it up to fit the back wall and make sure I had enough room to include the shoe model as well.

I decided to leave the back wall slightly jutting out from the outer wall as it made the logo stand out more, and also having the UI to either side made even more sense.

Although I had the outer wall that I was happy with, I thought the roof looked boring when it was simply the inside of the cylinder. For this reason I deleted the top and bottom faces, leaving me with a tube shape, and decided to make my own.

I created a copy of the floor plane and moved it to above the cylinder. I made sure to leave a slight gap between the top of the outer walls and the roof as I knew I wanted my lighting to appear as though it was bursting through the gap in certain places to look futuristic and tidy.

To create the shoe platform in the centre of the room, I duplicated the outer wall and clicked reverse normals again, returning the object to its original form. I then resized it and moved it to the centre of the room.

At this point I had the room looking how I wanted it to and the only element left to add was the lighting. I started by adding a main light at the centre of the room to provide the majority of the illumination.

The remaining lights I added were either for aesthetic purposes or to highlight certain areas. I added a series of point lights behind the DESIGNR logo on the back wall to make it stand out to the user. I added four spotlights in the roof that shone in through the gap I made that provided lighting and also a modern appearance. Finally I added a point light in the bottom of the shoe platform, to not only illuminate the shoe some more, but also to remove any shadow which may be cast by the shoe.

After this I had finished the area and all I needed to do was transfer the model onto the laptop in university.

DESIGNR VR AREA.

On the right is the finished look I wanted for the VR area of the Nike DESIGNR system. I changed the Skybox to give a different coloured natural light and additional features will need to be added as no user interfacing has been considered yet. But the general structure of the area has been completed.

I am very happy with the design and once the user has the headset on and is immersed in the environment, it will look convincing that they are in a futuristic workshop setting when creating their shoe.



FINAL PROTOTYPE.

As I was convinced my concept was feasible and I had created the environment for the user to be immersed in, I moved on to the creation of my final prototype.

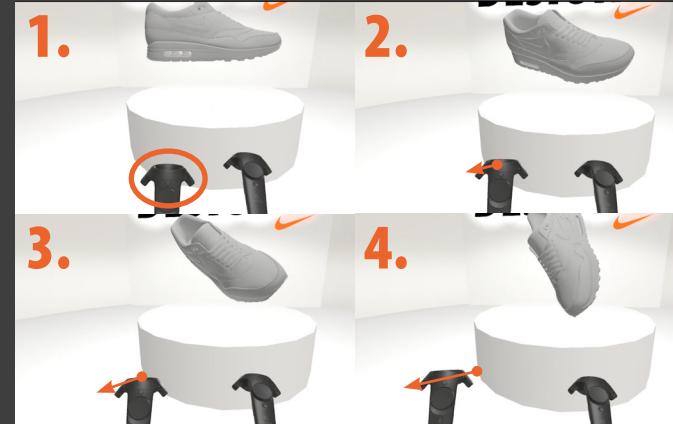
The process took longer than expected as it took roughly 80 hours of work in Unity over the course of 4 months. However I knew that this could be the case, so I allowed myself more time to by starting work early on in the semester.

The following pages showcase the work I did and the decisions I made throughout the process.



<https://boygeniusreport.files.wordpress.com/2017/01/virtual-reality-vr-sign-htc-vive.jpg?quality=98&strip=all>

DEVELOPMENT - FINAL PROTOTYPE



Firstly I created a new project in unity and combined all of the elements I had already made and put them into it.

I immediately discovered that the model for the VR area that I had created was made using a different scale to what the shoe was currently at. Tackling this was fairly straight forward and it only required me to scale down the area slightly to make it a more suitable size to house the model shoe.

Once everything in the scene was looking correct, I needed to get the project functioning. To do this I simply repeated the steps I took to get it working during my trialling period of Unity. By installing Steam VR and VRTK once again.

Once the setup of the scene was complete and I had the virtual reality functionality working, I decided to go back to the rotation of the shoe.

The way I wanted the user to interact with the model was I wanted it to feel as though the user was grabbing a part of the shoe and then spinning it around a pivot, similar to the way someone would rotate an old fashioned globe (except it would be rotatable on all axes in any direction).

After struggling for weeks to get any sort of rotation possible, I finally managed find a method which used the movement of the controller to rotate the shoe. It worked by centring the controller in front of the user, clicking the trigger and then moving the controller in a chosen direction. It is not perfect, but after a long period of time spent on this aspect, I needed to move on with the build.

After 'solving' the issue of the shoe rotation I decided to add in a secondary method, to fall back on in-case users struggled to get the hang of the primary method.

I decided to make this rotation method a more controlled and slower one, so that it could also be used for finer and defter rotations.

This method did not take long to implement and it worked by following the user's thumb as they moved it around the trackpad, whilst squeezing the grip buttons. Although this technique was relatively easy to incorporate, it was the style of rotation I did not want to function primarily in the system. So having both methods in the system was a compromise.

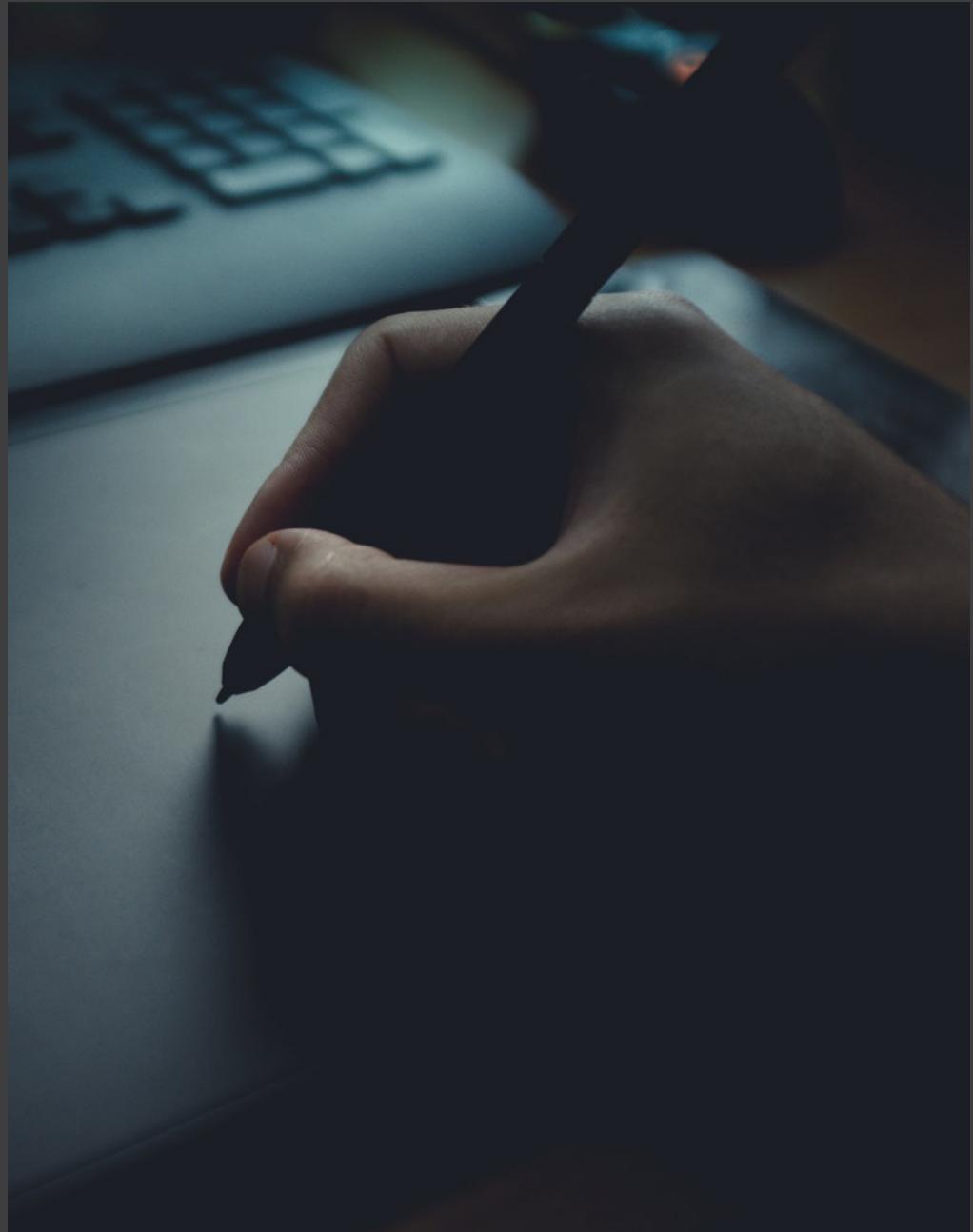
USER INTERFACE CREATION.

An aspect of the final prototype that I had not considered by this point was the user interface within virtual reality. Seeing as the problem of the rotation was solved, it was time to move onto changing the material / colour of the different sections of the shoe.

This meant that I would be needing some form of user interface to allow them to navigate between the various options.

The following page shows my initial ideas on how the user interface could look.

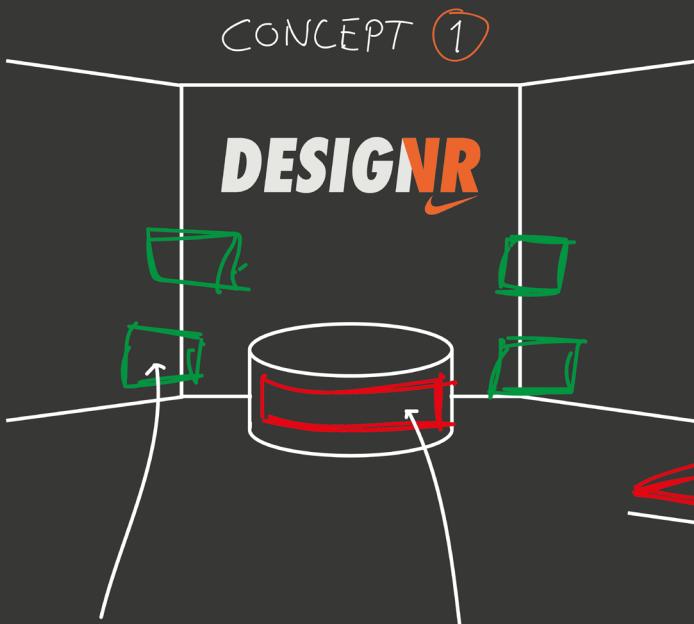
After sketching the various UI concepts, I once again got some feedback from my peers as to which style they think was most suitable for the prototype.



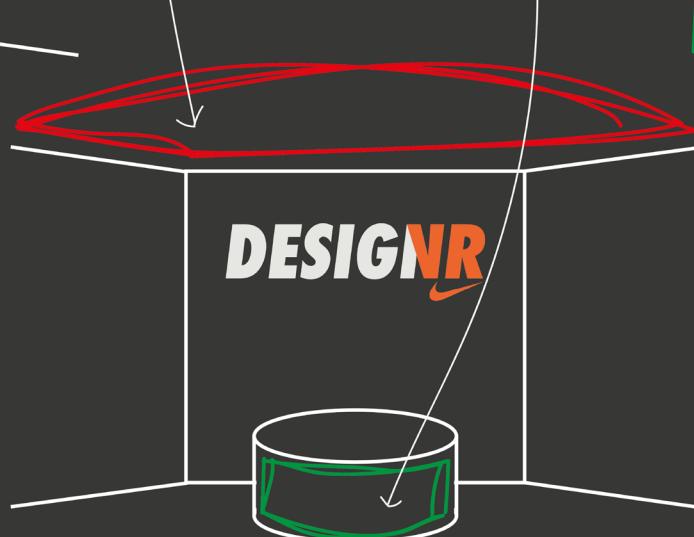
INITIAL IDEAS.

 = Colour canvas

 = Menu canvas



Users will have to look up to access the menu. Keeping it out of the way until needed

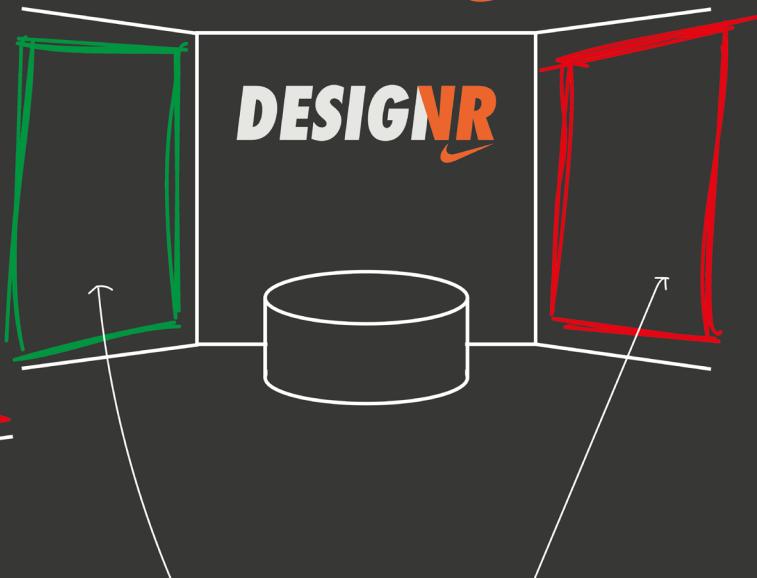


CONCEPT ②

Floating option buttons will appear once a user selects a shoe section.

Menu remains here and will be visible at all times

Colour palettes will appear here. Directly in the users line of sight for simplicity.



The corresponding colour palette will appear here when a user selects a part of the shoe

Menu will be fixed to the back wall and will be able to be turned on and off.

USER INTERFACE FEEDBACK.

The same as with the DESIGNR area, once I had sketched my initial ideas I asked for some peer feedback as to which layout/design they thought would look the best in the DESIGNR system.

From the quick survey I conducted, it was evident that the majority of people preferred concept 3.

The results were:

Concept 1: 5
Concept 2: 2
Concept 3: 9

Before jumping straight back into Unity and creating the UI to the chosen design, I needed to carry out some user testing.



USER TESTING 1.

The first session of user testing that I conducted was to ensure that I did not start creating my user interface only to find that certain people could not read any of the text. I used a total of ten participants and made sure to get a sample of people who had different strengths of eyesight (4 out of the 10 participants wore glasses/contact lenses for example)

To get the results from my users, I created a canvas where the UI will be and wrote a six lines of text, each with a number next to it. I then asked my participants to rate the readability of each line of text by numbering them from 1 to 6. With 1 being the best and 6 being the worst. I weighted the responses and took an average to find the optimum text size for my system. My results can be seen below:

RATING	1	2	3	4	5	6	Weighted Average
TEXT SIZE 1	-	1	2	3	3	1	2.9
TEXT SIZE 2	3	4	3	-	-	-	5.0
TEXT SIZE 3	6	3	1	-	-	-	5.5
TEXT SIZE 4	1	2	4	3	-	-	4.1
TEXT SIZE 5	-	-	-	4	4	2	2.2
TEXT SIZE 6	-	-	-	-	3	7	1.3

With a weighted average of 6 being a perfect score, I could immediately tell the Text size 3 was the clear favourite with a weighted average of 5.5.



DEVELOPMENT - FINAL PROTOTYPE

```
VRTK_InteractableObject

// Interactable Object|Interactions|30080
namespace VRTK
{
    using UnityEngine;
    using System;
    using System.Collections;
    using System.Collections.Generic;
    using Highlighers;
    using GrabAttachMechanics;
    using SecondaryControllerGrabActions;

    /// <summary>
    /// Event Payload
    /// </summary>
    /// <param name="interactingObject">The object that is initiating the
    /// interaction</param>
```



```
// Use this for initialization
void Start()
{
    AB_renderer = this.GetComponent<Renderer>();

}

//render black
public void BlackColour()
{
    AB_renderer.material = AB_ColourMat[0];
    CurrMat = AB_renderer.material;
}
```

Now that my UI had been designed and user tested and I knew the style I wanted to achieve, I returned to my final prototype and resumed the creation process.

The first challenge I had to overcome was getting the colour/material of the individual shoe sections to change. This was difficult as there were 22 different sections to the shoe, some with four possible materials to choose from.

I found that there was a script included within the VRTK plugin that enabled me to turn any physical game object into an interactable button that could be activated with the pointer. So I put an instance of this script on each of the sections of the shoe model.

With my shoe model turned into a multifaceted button each with a different function, I created individual colour canvases for every material on each of the shoe sections. With a ‘material manager’ canvas to allow navigation between materials for the sections with more than one material available. The ‘buttons’ on the shoe model open the corresponding canvases to the selected section. So for the example above, clicking the ‘Air Bubble’ on the shoe would present the user with the appropriate canvas.

Using my user testing feedback to ensure that the text was readable, within the canvases I created a translucent cube for all of the colour/material options. Then, using VRTK, I turned all the cubes into buttons and made them become opaque when the pointer is hovered over them for clarity to the user.

From here I took one section of the shoe and experimented with how to get the colour to change. I started with the Air Bubble section of the shoe.

I created my own code for the colour changing functionality using help from online forums to overcome any problem I encountered. To summarise how the code (see above) works, the particular one above is attached to the AirBubble section of the shoe and the ‘AB_renderer’ is the renderer that dictates the colour of the Air Bubble. When a ‘public void’ is called by selecting one of the translucent cubes (buttons) on the canvases, the renderer changes the colour property to whatever colour has been assigned to the ‘AB_ColourMat’ beforehand. In the example above the colour black was assigned to number [0]. This code was repeated for every colour on the shoe section, most of which had 30 possible colour options.

DEVELOPMENT - FINAL PROTOTYPE

```
void Start () {
    gameObject.transform.GetChild (0).gameObject.SetActive (false);
}

public void aB_Selected () {
    gameObject.transform.GetChild (0).gameObject.SetActive (true);
    gameObject.transform.GetChild (1).gameObject.SetActive (false);
    gameObject.transform.GetChild (6).gameObject.SetActive (false);
    gameObject.transform.GetChild (10).gameObject.SetActive (false);
    gameObject.transform.GetChild (11).gameObject.SetActive (false);
    gameObject.transform.GetChild (15).gameObject.SetActive (false);
    gameObject.transform.GetChild (16).gameObject.SetActive (false);
    gameObject.transform.GetChild (17).gameObject.SetActive (false);
    gameObject.transform.GetChild (18).gameObject.SetActive (false);
    gameObject.transform.GetChild (19).gameObject.SetActive (false);
    gameObject.transform.GetChild (24).gameObject.SetActive (false);
    gameObject.transform.GetChild (29).gameObject.SetActive (false);
    gameObject.transform.GetChild (30).gameObject.SetActive (false);
    gameObject.transform.GetChild (33).gameObject.SetActive (false);
    gameObject.transform.GetChild (34).gameObject.SetActive (false);
}
```



Once I had multiple colours working on the Air Bubble and I was satisfied that it was fit for purpose, I needed to find a way to ‘turn off’/hide a canvas once a colour had been selected. I achieved this by making my own code that deactivated all open canvases on the use of a button. This would be used to turn off all currently-open canvases, ensuring that two canvases would never be opened at the same time, clipping through each other.

Initially I used lines of code that found each individual canvas by name and deactivated them. However I read on forums that this was temperamental and is easy to use for beginners but can cause performance issue. As I knew I would have many instances of this code, I searched for a solution. The code above is much more suitable as it relies on using a parent object to deactivate its specific child objects, speeding up my system in the long run.

At this point I had many canvases that had no functionality, but could be turned on and off with the use of the laser pointer on the right controller.

Before I could start mass producing the code and allocating the colours as I did for the Air Bubble model, I had to create my textures for the various materials.

This was a simple but time consuming task. In the end I settled for 5 materials (see above) and I went into Photoshop and made textures for the materials. I made sure to create a lot of colours and materials as a wide selection was something my survey respondents had ranked highly. The fifth texture (not shown above) was my leather/plastic/rubber texture and was simply a plain colour, and there were 30 options.

Now that I had all of my textures sorted, I imported them into Unity and allocated all of the necessary colours to the shoe sections and canvases as I had done for the Air Bubble previously.

The image above shows how the colour picker component looked for the leather material on the inner swoosh for the model. This had to be done for every section and every material, which meant these 30 individual materials needed to be allocated a total of 62 times.

This was by far the most time consuming part of the Unity build as it was just repeating the same steps over and over again until every canvas had code to change the colour of the shoe corresponding to the button pressed. Fortunately, I planned ahead and gave myself plenty of time to complete this task.

DEVELOPMENT - FINAL PROTOTYPE



By this point all the canvases were behaving as expected and the shoe could be fully customised without any issues. However I conducted some user testing and I discovered that although I was able to work through the various sections of the shoe and change the colour of every section without any issues, a user who picked the system up for the first time struggled to find all of the sections or did not know the section I was referring to when I explained.

Obviously I would not be there to assist a customer in the Nike store so I realised at this point that I need to change/add something to make it clearer to the user how far through the customisation they were. So I decided to add a checklist to the wall behind the user. The cubes next to the section name on the checklist also changed colour to remain the same as the sections were altered.

Since everything was working at this point. I moved on to the shoe selection scene that a user would see when they first put the headset on.

This consisted of a short tutorial for new users, that could be skipped for return users to the system, followed by a series of six buttons that all show a different Nike model shoe. For my project, only the Nike Air Max 1 button worked as this is the shoe I chose to use in my prototype.

Once the shoe is selected, the user is be taken to the next scene where they are presented with the 3D model on the platform in front of them which they are then able to customise and rotate.

Finally after completing my introduction scene and my main customisation scene, I moved on to creating the scene where a user would preview their creation. I knew I wanted a scene that not only showcased the shoe, but also looked visually impressive.

After some experimentation, I decided on a scene which transported the user to outer space. I chose this scenery because as soon as I put the headset on I felt as though I was in a sci-fi film from the future. This is an effect I wanted to give throughout the experience and feel as though the preview scene was the icing on the cake.

USER TESTING 2.

With the creation of my prototype now finished, I needed to make sure that my system was as watertight and polished as it could be. As I had been using and interacting with the DESIGNR system since its inception and throughout the creation process, I had developed habits, learnt short-cuts and knew the system inside out. So there could be certain aspects of the build that I might avoid subconsciously.

For this reason I conducted a second lot of user testing, with participants who had never used the system before. This meant that they had no learnt behaviours and had no prior experience that might influence their usage of the system. This made them perfect to test my prototype to identify any errors, typos or bugs that may have existed.

From this user testing I made the following changes in order to improve the overall user experience and make my system as good as it possibly could be before making my final video:

- I added an outline to each section of the shoe when the user hovered the pointer over it. This made it much clearer which section they were actually selecting when pressing the button.
- I added more lights to the exterior walls as my testers said they found it too dim.



VIDEO.

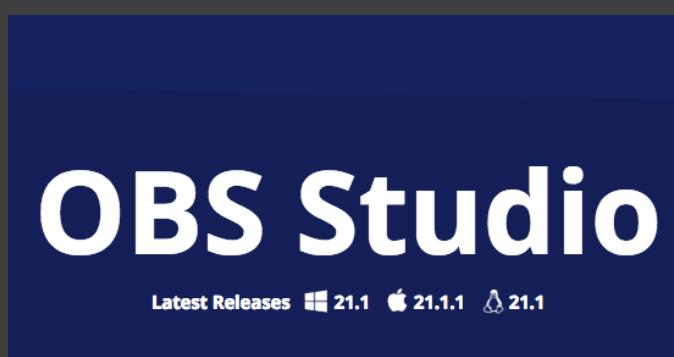
Now that I had completed my prototype and had it working as well as possible, I had to create a video to show it in action.

Originally I planned to make a demonstrative video showing a customer visiting a Nike store, using the system, then leaving and receiving the delivery of their custom shoes. I shot lots of footage of myself, against a green screen, using the VR headset to create a shoe and showed off the numerous features in a very formal manner.

However once I started to put together the video, I realised it was very boring and wouldn't get anyone excited to use the system. For this reason, I changed my idea at the last minute and decided to style my video as a promotional/commercial video. This would allow me to be more creative and would be a far more entertaining video to watch.

The following pages show the developmental process of my video's creation.





As I changed my idea for my video, I needed to record new footage of my concept. However the fact that my concept was entirely in a virtual reality environment, I knew it would not be as simple as hiring a tripod and a camera and getting to work.

I started by looking to see if I could find any free screen recording software that was able to record in high definition. One piece of software that was at the top of most tech-website lists I saw was a program called OBS (Open Broadcaster Software) Studio.

I downloaded the software and after a short while I got it set up and working. I discovered that I was able to record a screen in 1920x1080 resolution at 60fps. I would not necessarily use these settings as it would put a lot of strain on the CPU whilst running my prototype as well.

Now that I had my screen recording software sorted, I began by recording lots of footage of myself using the system in virtual reality.

I achieved this by using a second monitor alongside the laptop which I casted the video coming out of the HTC Vive headset to, and then used OBS Studio to record the screen.

This worked very well and made it easy to see what was going on from the point of view of the user of the system.

A slight problem with this method was one I had not anticipated. When wearing the VR headset, the footage you are seeing is very smooth and is perfectly central to what you are looking at.

However, when the footage was taken from the vive in the form of a video, it became clear that every little tiny movement of the headset was picked up in the video. This made the video jittery and difficult to watch at times.

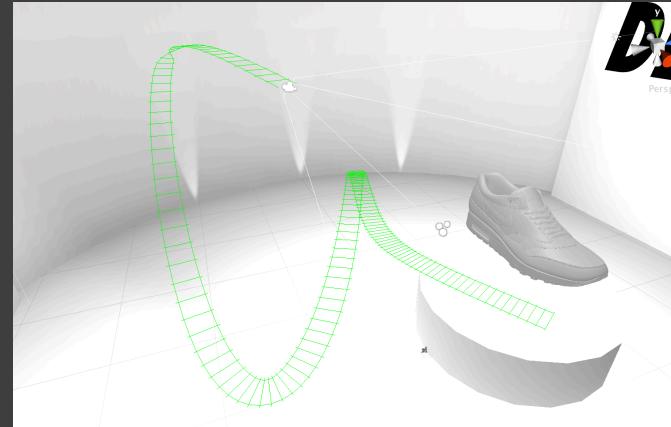
Unfortunately, there was no way around this issue as it is not possible to keep your head completely still, and also this is against the point of using virtual reality in the first place.



To overcome the problem of the shaky VR recordings, I decided to look into a way to create my own footage by making use of in-game cameras to capture record whilst I used the VR headset to customise the shoe.

I asked a peer who was more experienced with Unity if there was anything that could be of help to me. He told me about a plugin called Cinemachine. This allows users to pre-program cameras on dolly's that can intelligently follow and track GameObjects.

Initially I thought this would be perfect for me to set up dolly tracks for the camera to follow and record footage of the model shoe whilst I customised it. Sadly though, as is quite often the case with plugins, the Cinemachine cameras conflicted with the VRTK plugin and could not be used in conjunction with one another.



This was not the end of my use of Cinemachine however as it definitely solved my issue with the imperfect VR footage.

I decided to use the dolly tracks and cameras to record close-up footage of the shoe and the VR surroundings from angles and perspectives that could not be seen in my system. The plugin was easy to use I got the hang of it and I captured lots of footage which I could use in my video.

The issue with this was that there was no clear evidence that the system used virtual reality as it never showed the Vive in use.



To combat this issue I revisited the clips I had recorded from the headset and looked for any particularly good quality and steady video that I could use in-between my Cinemachine footage.

I found lots of short snippets that I could make use of and chopped them into small individual clips, ready for use when I put the final video together.



Now that I had all of my footage collected, I wrote myself a script for a voiceover for the video. It was crucial that I included a voiceover due to my feedback from my video for semester one. My script was relatively short but it got across all the information I needed.

From here I used Ableton to record my audio which I did in a professional recording studio on university campus to give me the highest quality audio possible. Now that I had all the elements of my video collected, I needed to put them all together.

For this I used Adobe After Effects, a piece of software which I am confident using due to my experience with it. As with all projects, I started by importing all of my footage and audio into a new project.

In contrast to last semesters video, this was far quicker and easier to put together. This was due to the vast amount of editing that was required in the previous video. As it was conceptual, nothing was actually working and every interaction needed to be mocked-up.

With this video I just needed to arrange my footage and add transitions etc.

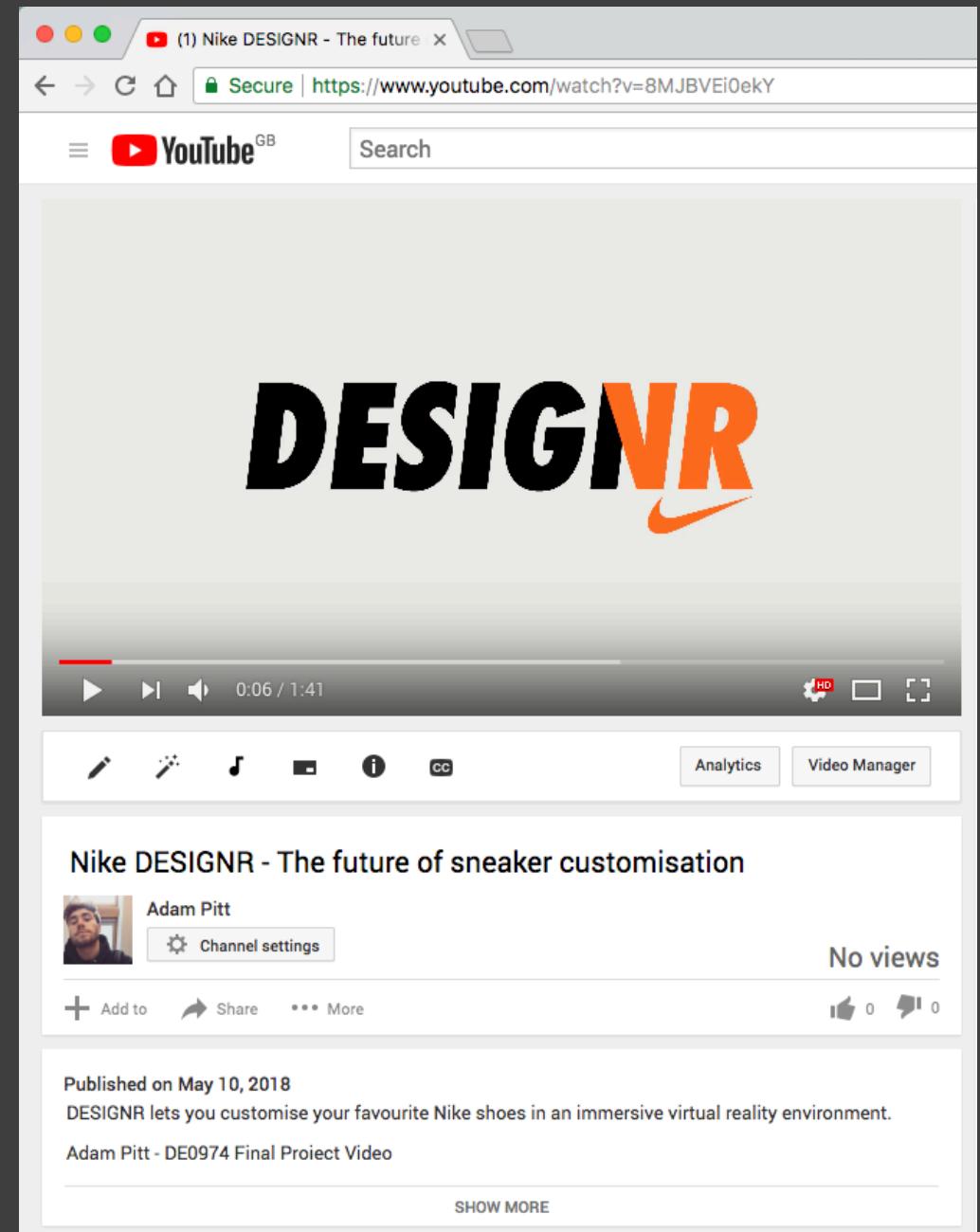
To add an additional layer of depth to my video and to keep viewers engaged, I added text over the top of certain sections of the Cinemachine footage. I made the text appear as though it was moving with the dolly camera. I was very happy with the effect this had on the video and it was a nice finishing touch to the video.

Once I'd added an introductory logo and an outro to the video, it was complete. I rendered the video using Adobe Media Encoder in 1920x1080p for a very high quality final product.

FINAL VIDEO.

My final video can be found at the following link:

<https://youtu.be/8MJBVEi0ekY>



CONCLUSION.



CONCLUSION

To conclude this project, I will ask myself the same four self reflective questions from semester one. This will help me to evaluate my performance and how I feel the project went over the course of this semester.

WAS THE DESIRED OUTCOME ACHIEVED?

Looking back to the brief, I feel as though I have met what was asked of me for this project. I have clearly identified a specific area of technology that is on the rise. With huge globally known brands such as Audi making virtual reality product customisers for their cars as a concept, I think it is perfectly reasonable to think that other companies will follow suit in the future. In terms of my project as a prototype specifically I am confident in saying that I have achieved the desired outcome. Over the course of the semester I have produced a system which allows a user to walk up, put a headset on, and customise a product within a virtual environment, without any prior knowledge of how it works. This is what I set out to achieve with the product being one which I am interested in for my own enjoyment sake.

WHAT SKILLS HAVE I DEVELOPED?

Throughout my time at university I can safely say that this project has been the one in which I have developed the most skills, or at least certainly developed one skill greatly that I did not have before. Coming into this semester I had never used the Unity software before and over a matter of months I have been able to produce a system that is fully functional and responsive to user interactions within the software. I now feel confident that I could use the program well. A second skill I have developed is my ability to design a service. I have done this before in previous projects, however I feel as though I have never had to design the entire process from scratch prior to this project. For my DESIGNR concept I had to essentially create a service for a product that did not exist and turn it into something that was both feasible and possible in the world of today. Both of



CONCLUSION

which I feel as though my service is. This shows that my experience and skill in designing service has improved through the course of this project.

WHAT WENT WELL?

Overall I am extremely happy with the work I have produced for this project. If I had been told to imagine what I wanted to achieve before beginning this semester I don't think I could have pictured a product that works as well as the system I produced does. Obviously there are aspects that I have had to leave out of my prototype but I can say that they have not been left out due to time constraints, but I will go into more detail in the next question. Nonetheless, I can say that I am proud of what I have achieved with my prototype. To be more specific though, I feel as though one of the highlights of the project as to be the vast range of colours and materials I was able to incorporate into my system, allowing users to personalise their shoe exactly how they want to. A second feature that I am pleased with is the feature to add a custom image to the shoe, as this was a feature that was suggested to me by a lecturer in semester one as a bit of a challenge and it is one I was able to incorporate into the final prototype.

WHAT COULD BE IMPROVED?

As mentioned earlier, an aspect that I feel could have been improved was if I was able to get the tangible element of the material swatches folder ready for my prototype. It was not a design choice to leave this out, I simply did not have the time to put it together whilst also working on the prototype. I feel as though having the ability to feel the materials you are looking at within the headset would give an additional level of immersion whilst making the shoe. Ultimately I suppose this equates to poor time management. However the amount of time I spent in Unity took up a large proportion of most nights as it was. Additionally from

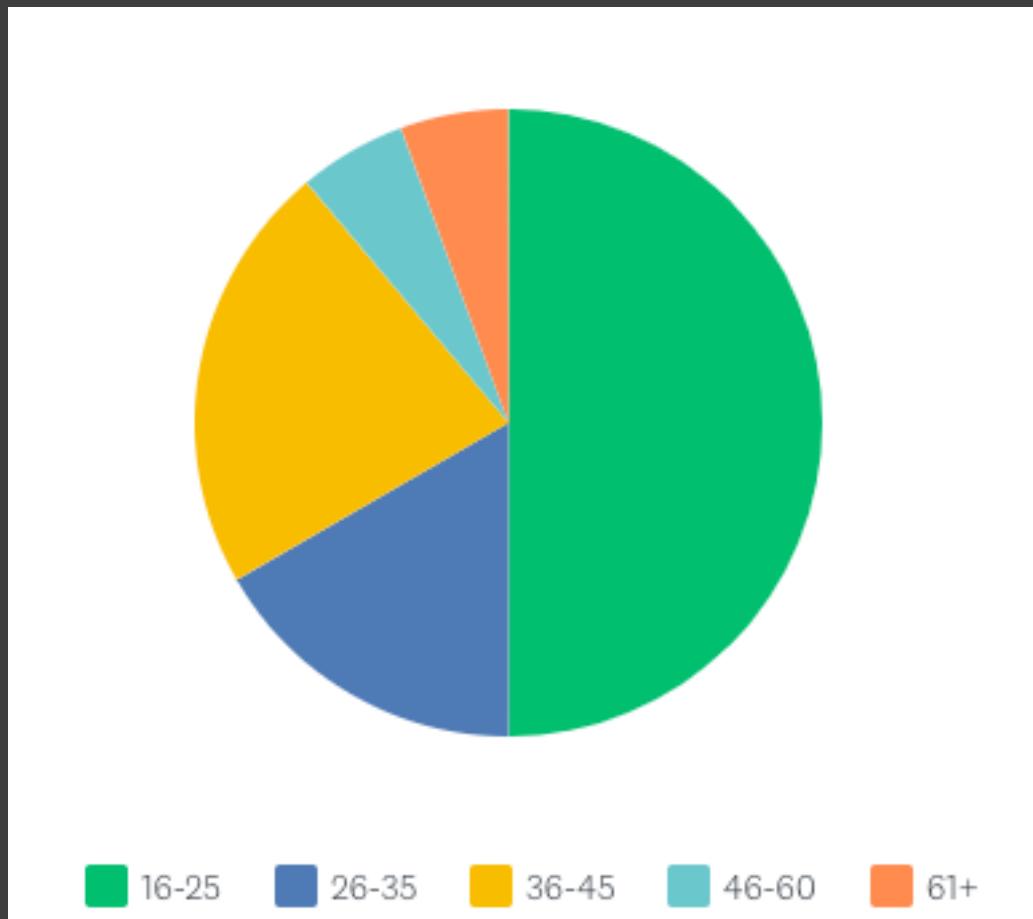


CONCLUSION

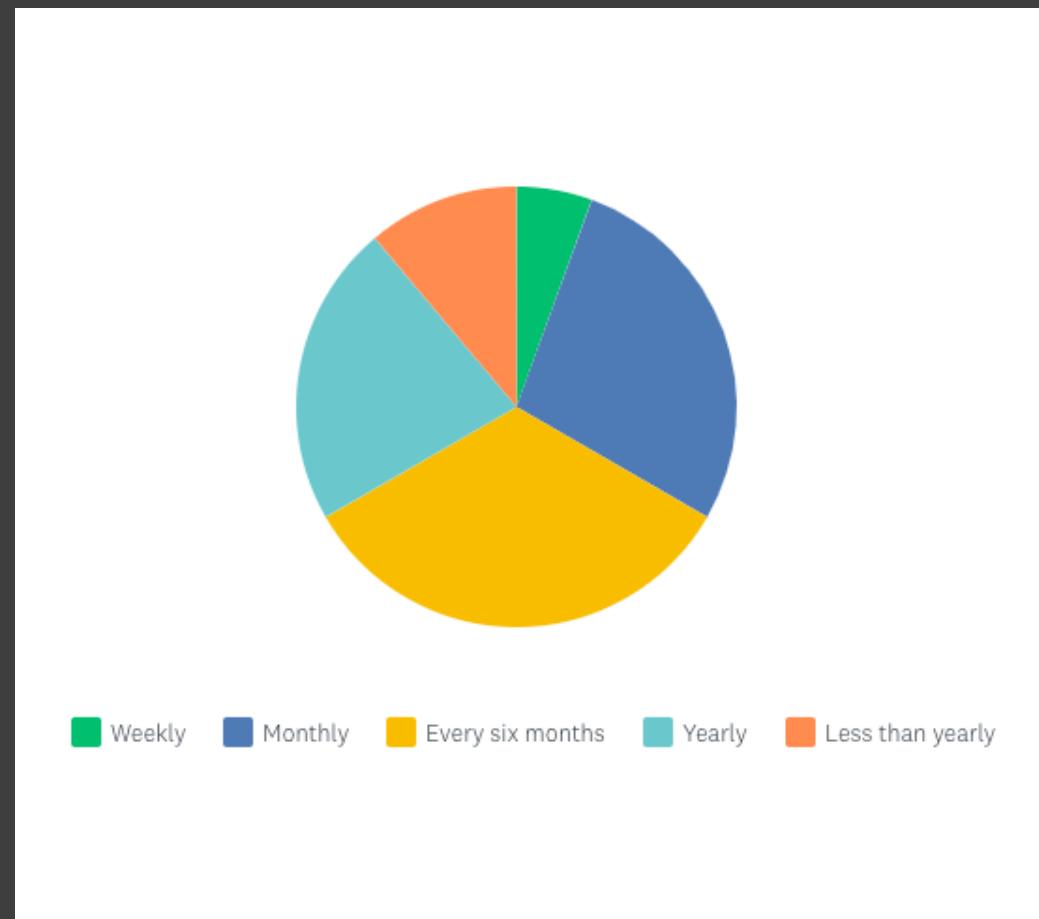
feedback I received after presenting my concept to the course and my lecturers I discovered that although the text was readable, some of the wording of my tutorial section was over-complicated and with more time I would revisit this and reword it to avoid confusion in the future.

SURVEY RESULTS

1. HOW OLD ARE YOU?

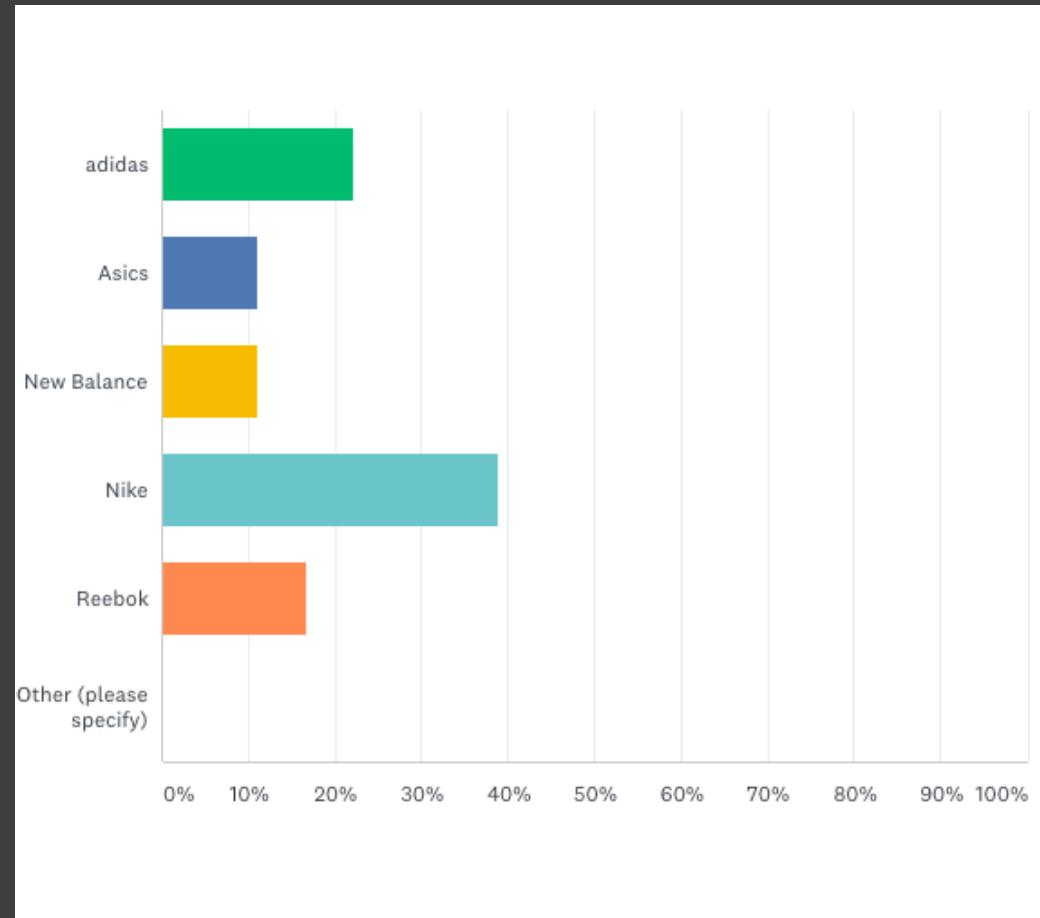


2. ROUGHLY HOW OFTEN DO YOU BUY A NEW PAIR OF SNEAKERS/TRAINERS?

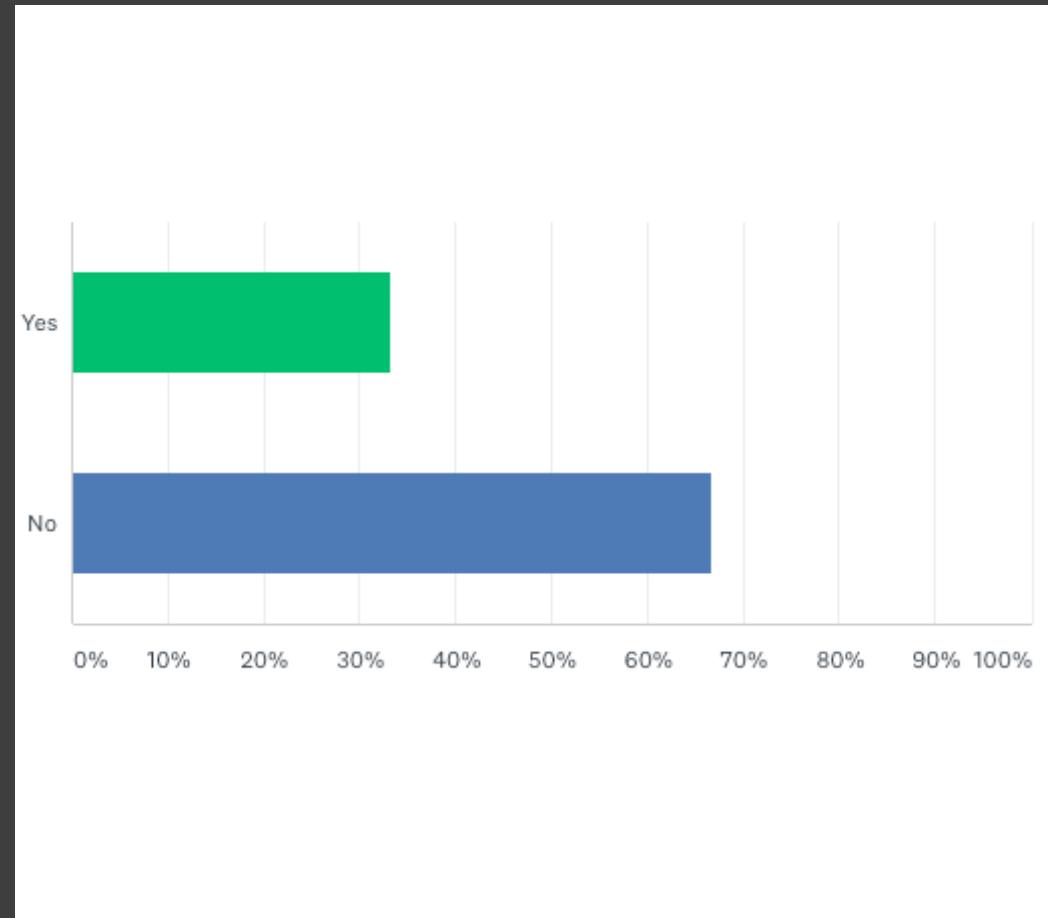


SURVEY RESULTS

3. WHAT BRAND DO YOU PREFER TO BUY YOUR TRAINERS FROM?

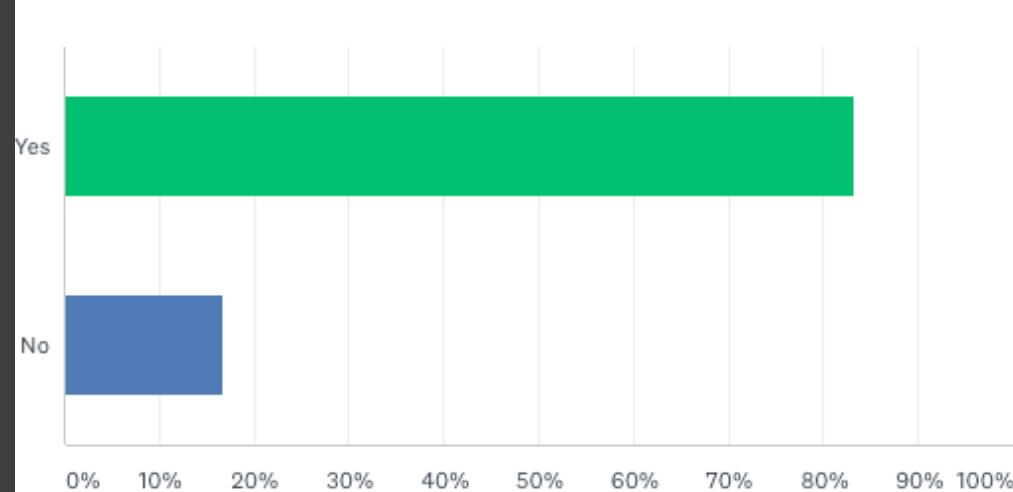


4. HAVE YOU EVER USED A SNEAKER CUSTOMISATION SERVICE BEFORE?

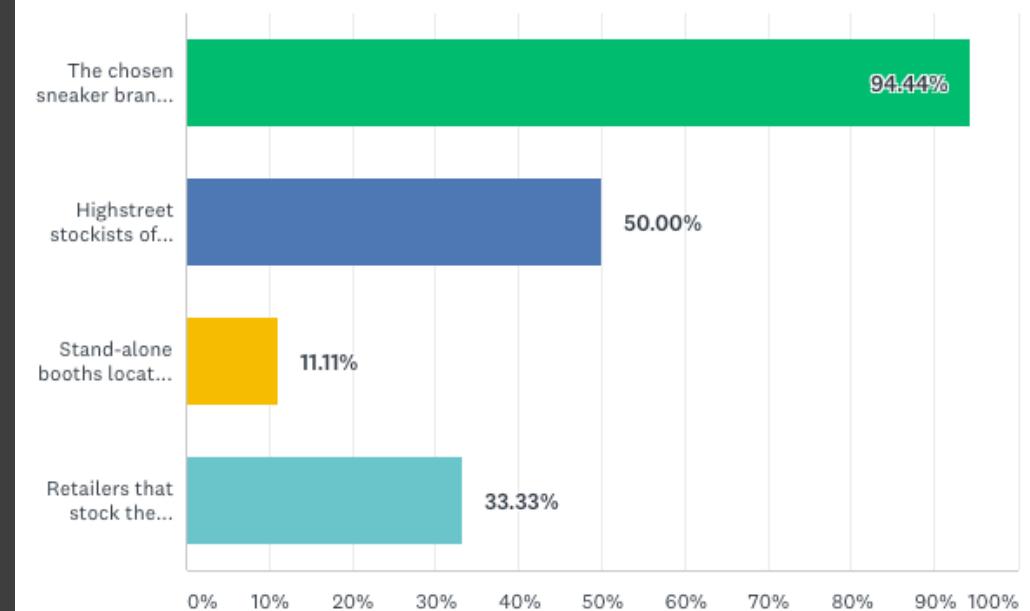


SURVEY RESULTS

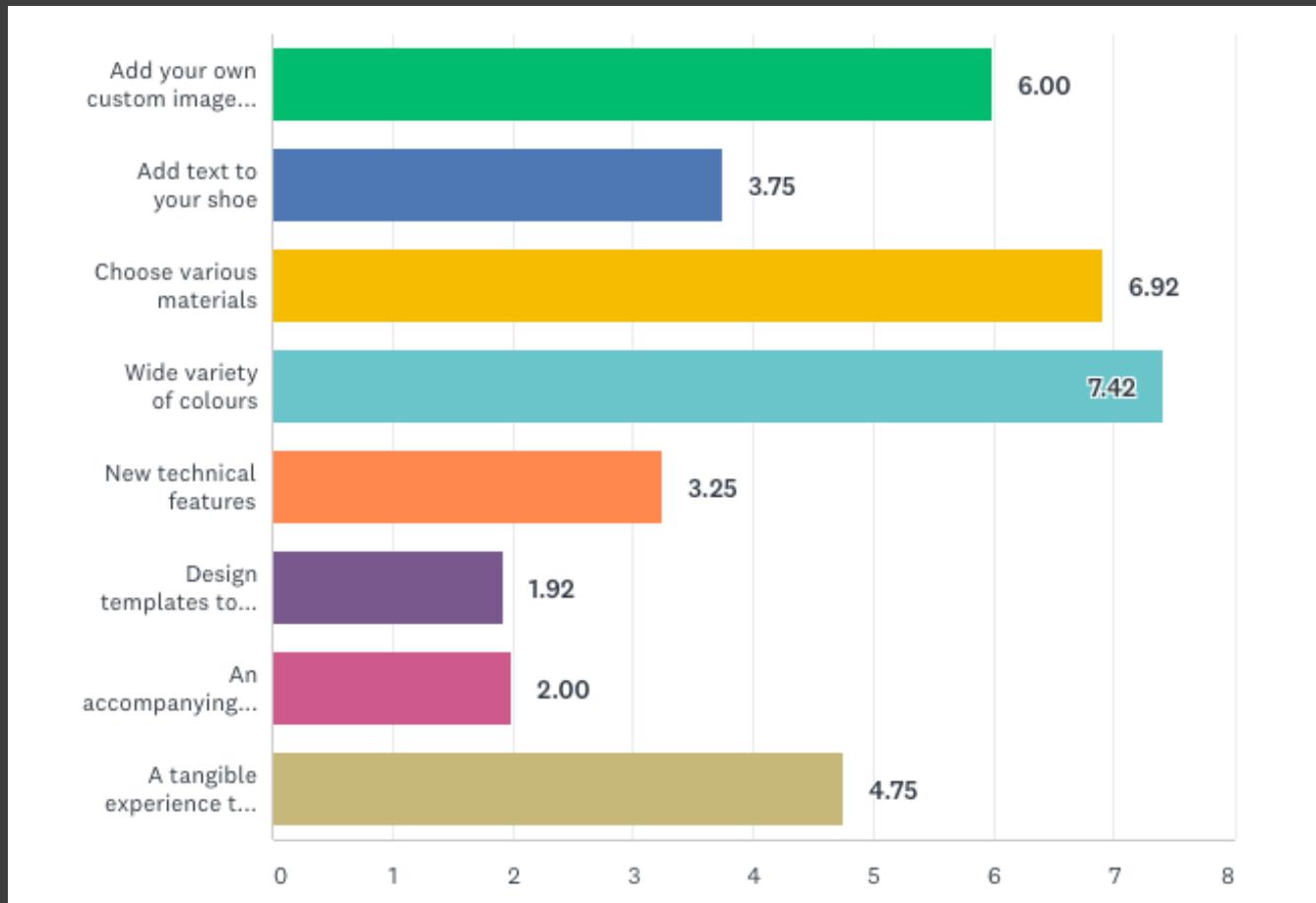
5. IF YOU ANSWERED 'YES' TO THE PREVIOUS QUESTION, WOULD YOU USE THE SERVICE AGAIN? IF YOU ANSWERED 'NO', PLEASE GO TO QUESTION 6



6. IF A NEW SERVICE EXISTED THAT ALLOWED YOU TO CUSTOMISE SHOES IN A MORE IMMERSIVE ENVIRONMENT, WHERE WOULD YOU EXPECT THE SYSTEM TO BE LOCATED? (SELECT ALL THAT APPLY)



7. WHICH OF THE FOLLOWING FEATURES WOULD YOU LIKE TO SEE INCORPORATED INTO A SNEAKER CUSTOMISATION SERVICE? - RANK THEM WITH 1 BEING THE FEATURE YOU WOULD MOST LIKE TO SEE, AND 8 BEING THE LEAST.



the graph to the left is showing the weighted average of the responses. So 8 is a perfect score and 1 is very poor.