A JACK BAKER PROJECT...

MARS 360°

MARS360.JACKBAKER.UK

| ABOUT ME |

Hi I'm Jack a creative designer from Kent, UK. I am known for pushing the boundaries of my field of study, in particular, experimental design. I absolutely love using new technology, whether it is for websites or even video and animation I like to experiment to see what I can really do.

I have been studying my (BA) Honours in Web Design which has given me new and exciting ways to share my ideas. I am very much into the concept of space and all that revolves around it, which is why my projects tend to feature space or sci-fi themes.

In my own time I like to create YouTube videos, as I feel the shift to online video is still underway. YouTube as a format is completely new and doesn't have a clear cut way of doing things this has given me an opportunity to explore this new area of entertainment.

Mars 360o is an idea that you can educate people of all ages by simplifying how users navigate a website, The idea is to remove the idea of a header and click navigation and to create a form that both engages the user to explore the website how they want to explore. Mars 306o does this by allowing users to interact with a 3D object in the browser, for this project the navigation is both the feature of the website and its navigation system using WebGL and the latest in Web technologies.

Jack Baker

| PROJECT MARS 360° |

Project Mars 360o was designed to change the way users see websites, its focus was looking to create a fun and inspiring environment for new and older users. Through countless case studies, web developers are starting to use less text within a website. This is due to users finding Videos and Images more appealing on a website than the text content. Websites like YouTube, Vimeo, and Unsplash focus on images and videos for their users to watch and view.

Educational websites such as Wikipedia are still using mass text to convey facts and information. Even the NASA website is starting to change to be more imaged based explaining more and more of their projects through video.

For this project I wanted to harness the curiosity of the human mind to explore and the new and more appealing way to absorb information. I started by watching the people around me and how they navigate the most common websites. What I found was the majority of people I surveyed seemed to ignore the traditional navigation bar and use the search bar that those websites provided. I found that older users were more likely to ignore the burger navigation than younger users. This was only down to users not understanding what it was. I also found that burger navigation should only be used for non critical information such as; who made the website and contact information.

Project Mars 360o also pushes me as a designer to my limit, using complex new coding methods project Mars 360o allows users to not only see Mars but to interact with the planet in the browser using WebGL and 3D Transitions all which are new to HTML5 and CSS3. The idea of project Mars 360o was to allow users to navigate using a mouse or finger to rotate the planet and selecting on points on the planet. This new way of navigating can be very successful with companies like Air Emirates' leading the way with View From Above website.
For this project I am wanting to follow in their footsteps and create a website that both young and old can interact with.

WHY MARS?

Mars has been at the forefront of human imagination for centuries, named after the Roman God of war, it is usually called ‘The Red Planet’ due to is Iron Oxidised surface and appears red. Unlike the other planets in our solar system Mars is the only planet where a human can theoretically walk the surface.

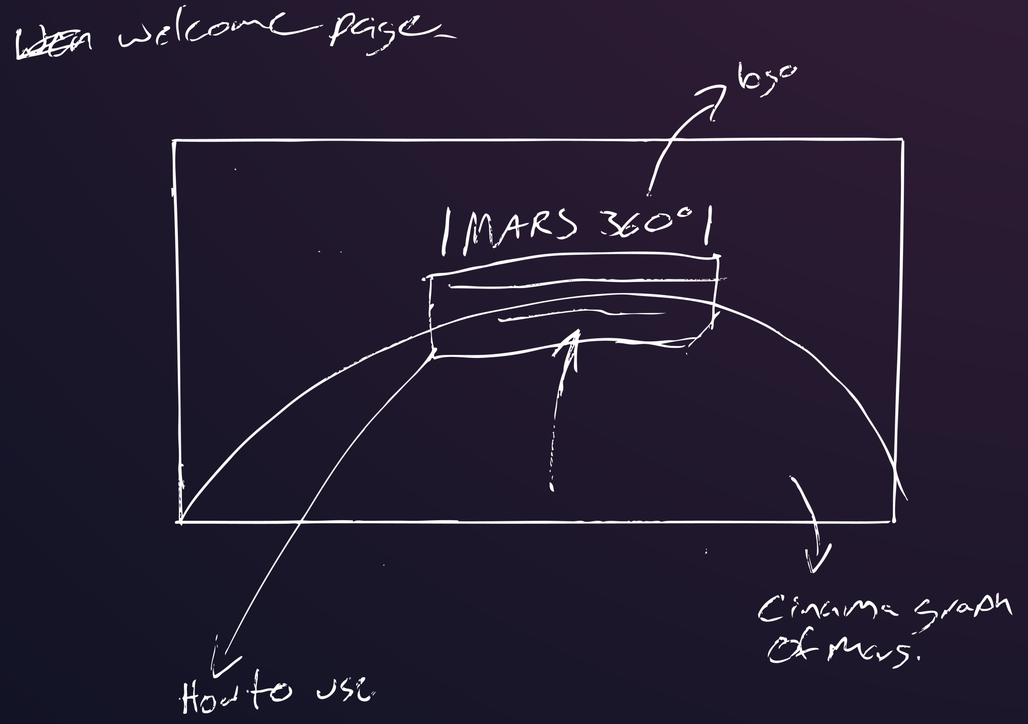
For over 50 years NASA, ESA and Roscosmos have been studying the red planet in the quest for life on another planet. To date NASA has two rovers rooming the Martian surface collecting geographical data and sending it back to earth. Mars is the biggest challenge since man first walked on the moon in 1969, and is the stepping stone we need as humans stepping out of our solar system.

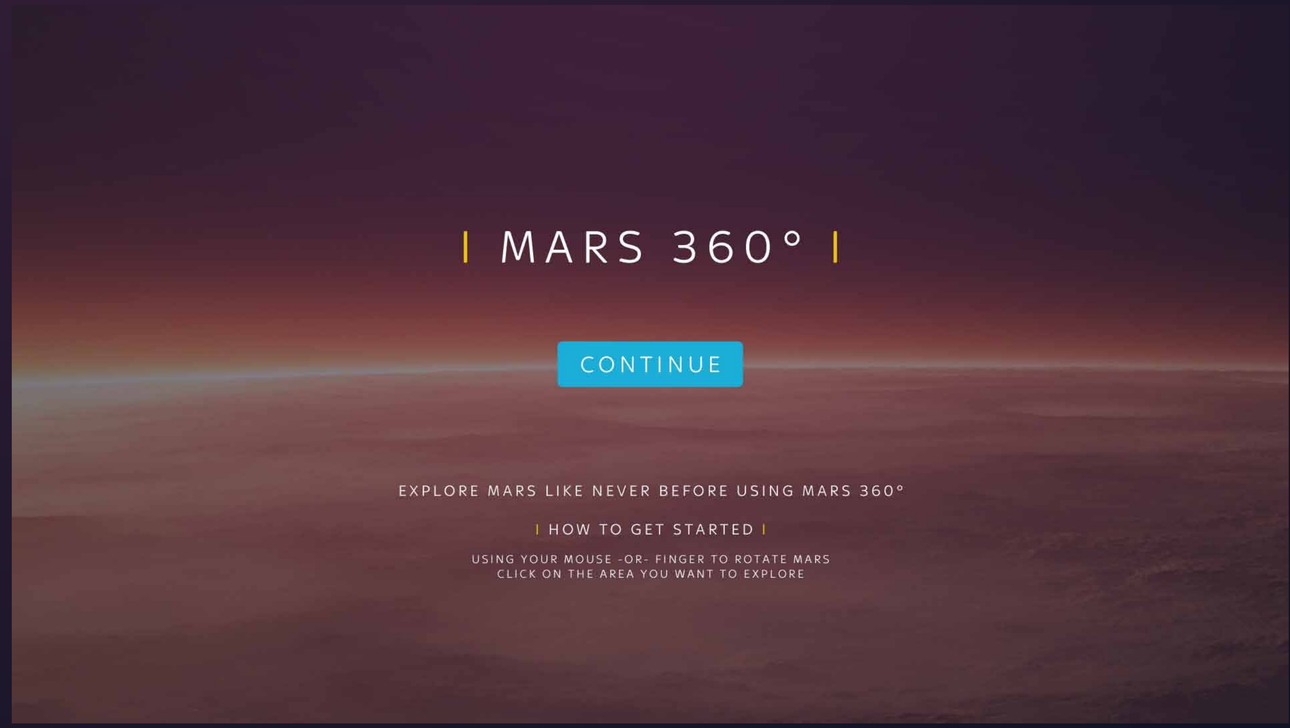
NASA plans to send humans to Mars in 2030, which is within our lifetimes, with the goal of colonising the Red Planet. If successful, it would pave the way for future space explorations to maybe one day send humans out of our solar system to another world. We are in need of a human colony on Mars, this is because our planet will not be around forever. The fate of our race lies on us colonising the planet.

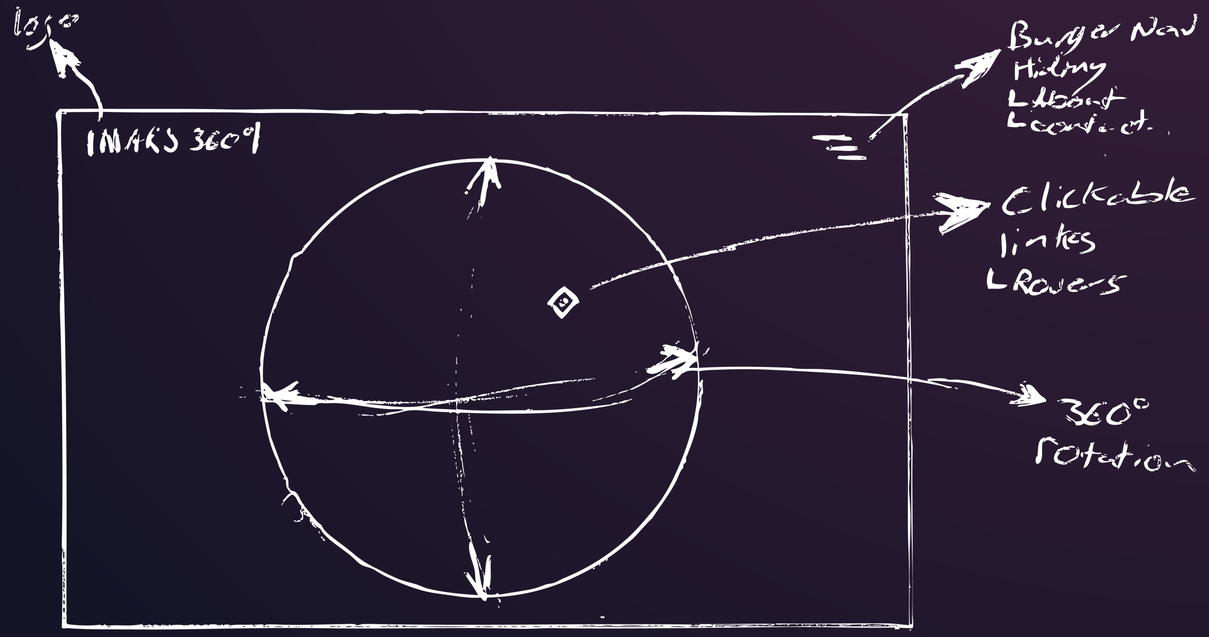
As a web project, Mars is an incredibly hot topic with more and more of us wanting to explore and learn more about the planet. The idea is to pin point where all of our rovers are and the key landmarks on the Martian surface for us all to learn and enjoy.

| DESIGN CONCEPTS |

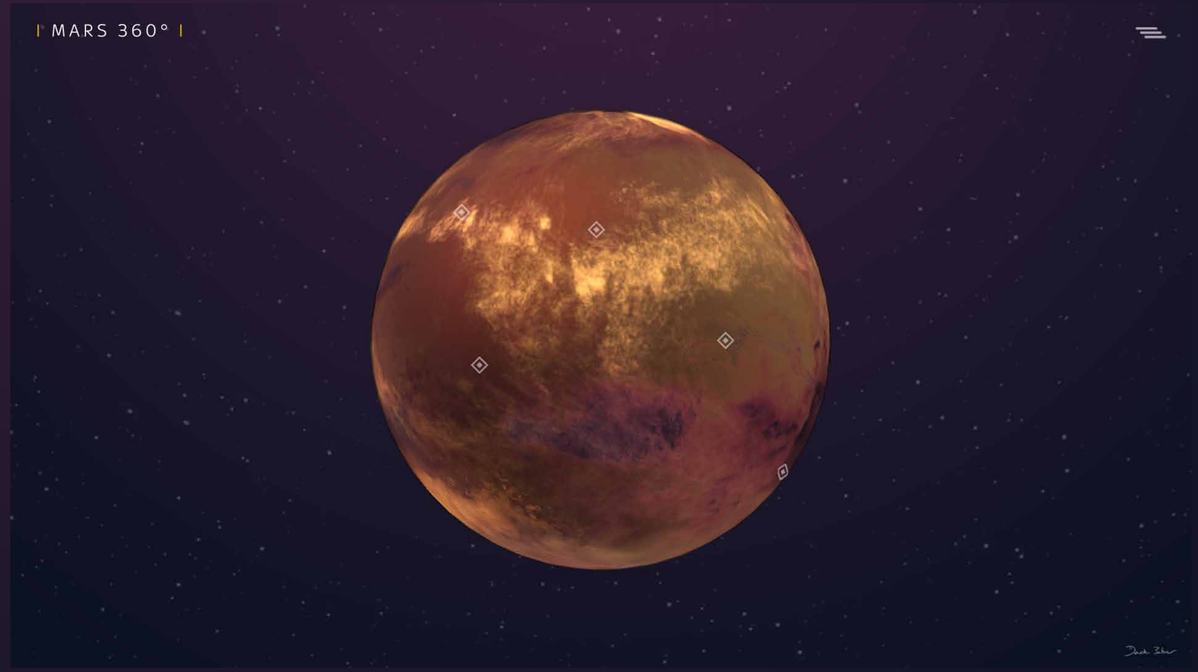
During the initial planning stages of the project, I decided to sketch out exactly what I wanted to achieve from the project. I knew that I wanted to create a 3D object which users can rotate and select points on which will take them to pages on the website. The key was to keep the website as interactive as possible, so I began by sketching out the look and feel of the website.



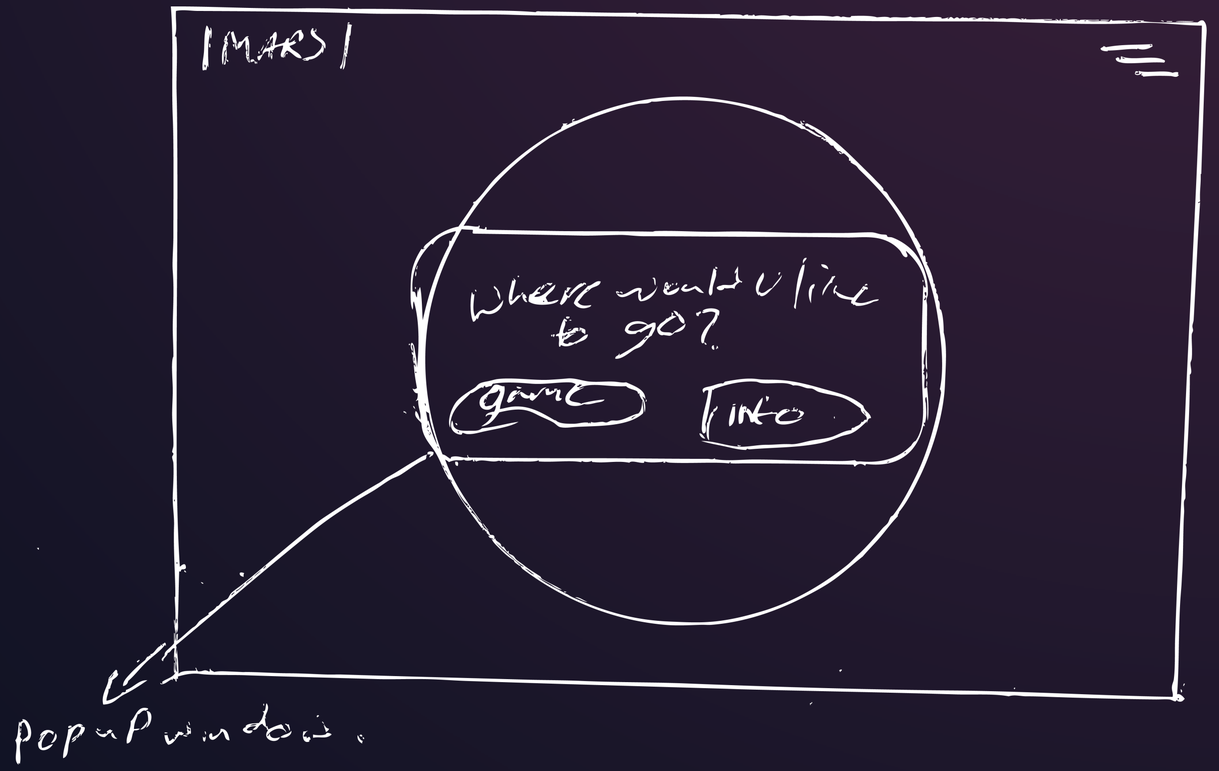


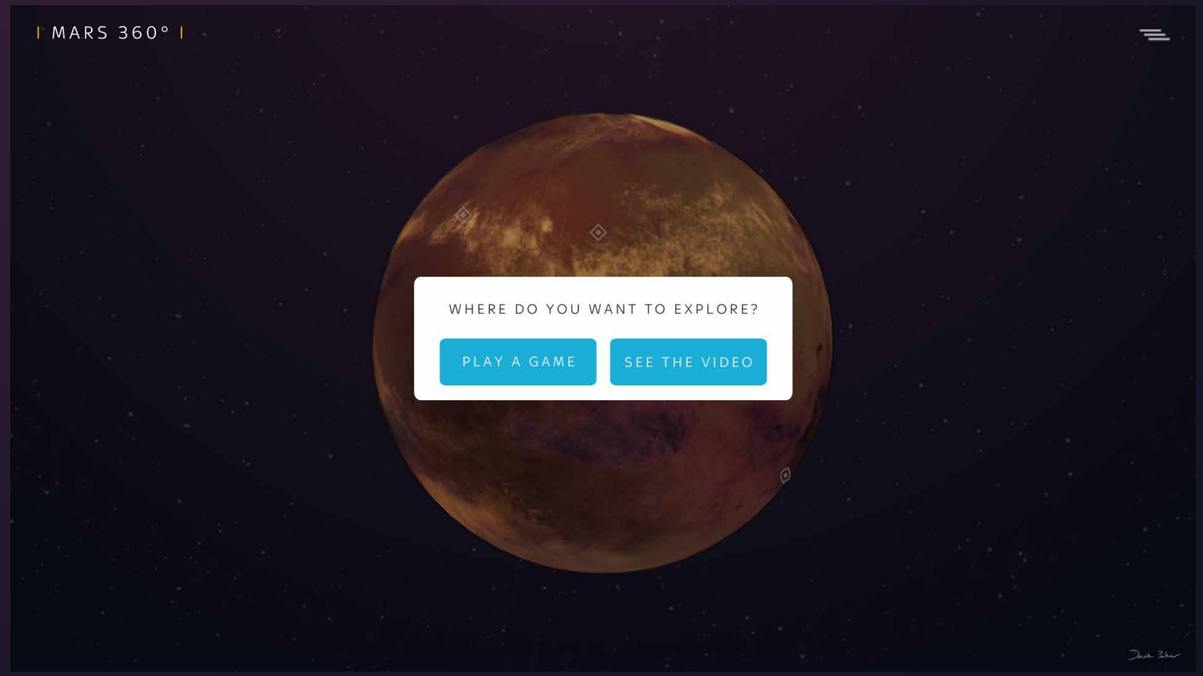

Logo
MARS 360°
Burger Nav
Hidden
Clickable
links
Rovers
360°
Rotation

Home Page

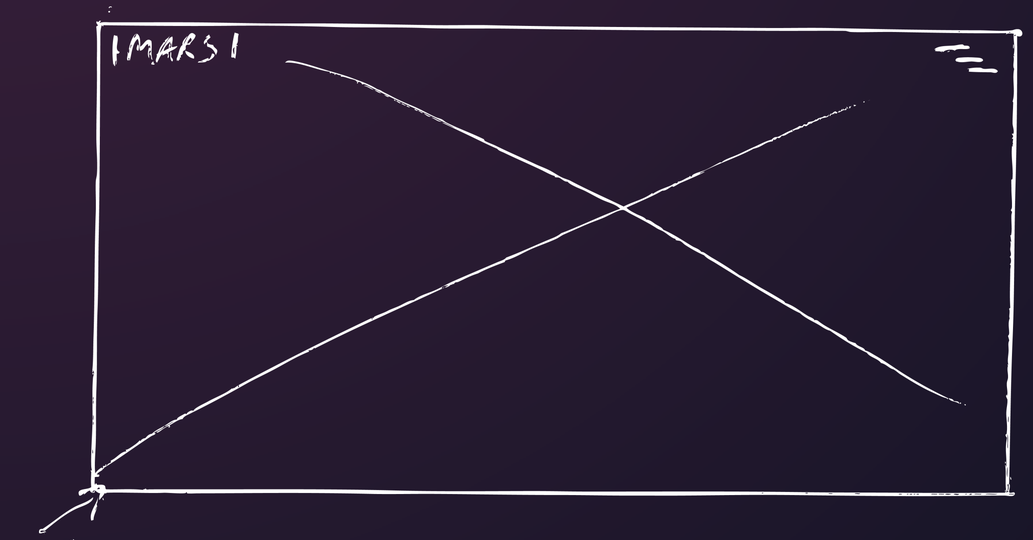

| MARS 360° |

| DESIGN CONCEPTS |

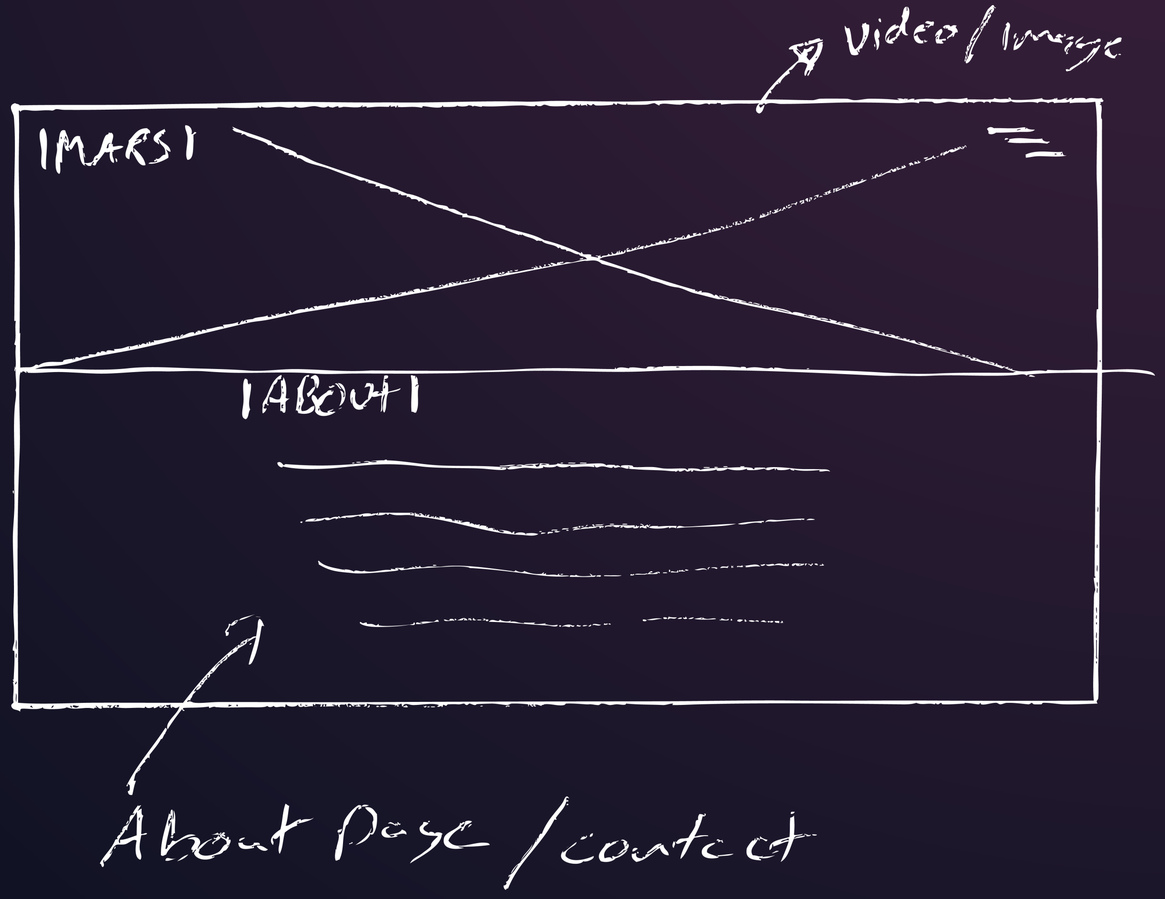


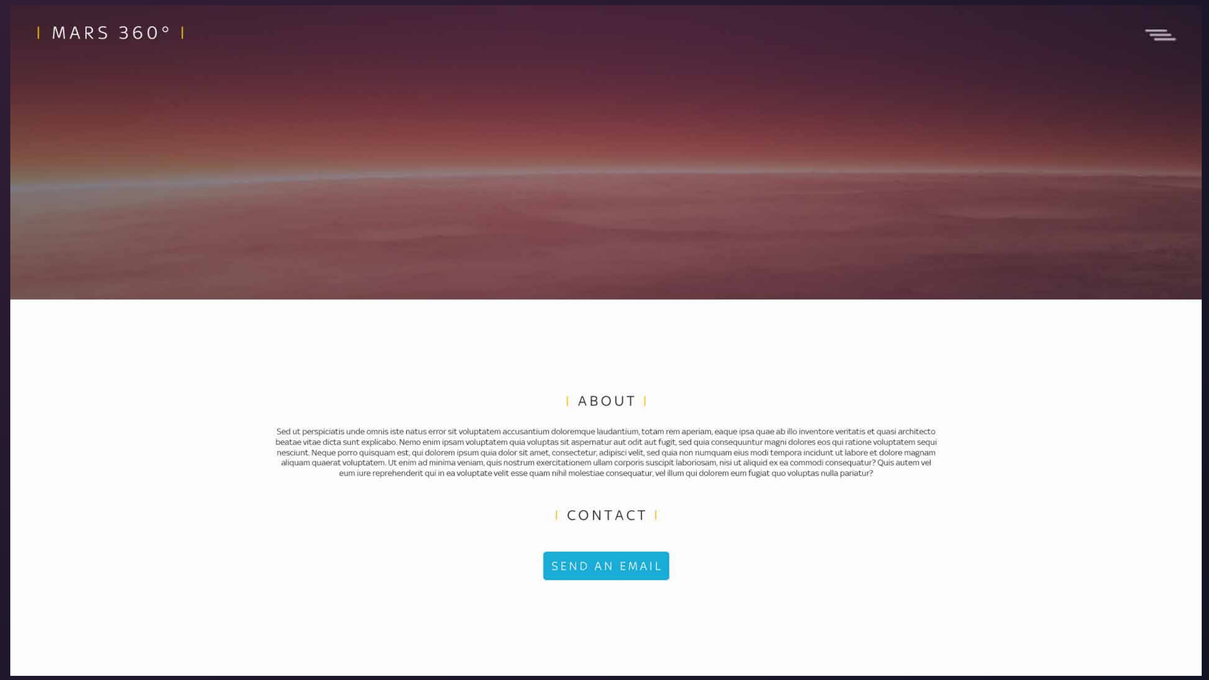


| DESIGN CONCEPTS |



| DESIGN CONCEPTS |





| WEB GL |

WebGL (Web Graphics Library) is a JavaScript API that allows any browser to render 3D Graphics without the need of plug-ins. It is integrated into all the web browsers allowing GPU accelerated usage of physics and image processing and effects as part of the web page canvas (the space that the web browser can display). WebGL elements can be mixed with HTML and CSS elements and can be the page or even the background of a website or web page. WebGL is split into two coding areas which work together to form the bases of the 3D space, JavaScript is the control code used to control the 3D elements and GLSL which is the shader code, this code controls the shading and colours of the 3D object for example; Shadows or a lens flare. GLSL is a similar code to C or C++ and is used on computers GPU (Graphics Processing Unit). WebGL was created by Khronos Group as a non-profit.

For this project I am using elements of WebGL to form the bases of the 3D elements that I am going to be using in the navigation part of the website. This is highly complex coding and will take if not all of my time to do. This is why I have simplified the rest of the website to both fit with my original research and to help focus on this main element of Mars 360.

| PLAY CANVAS |

Play Canvas is an open-source in browser 3D games engine/interactive 3D application alongside a proprietary cloud-hosted creation platform which allows users to create 3D environments inside a web browser. The engine supports WebGL and works in many browsers including Mozilla Firefox and Google Chrome. The engine is capable of rigid-body physics simulations and handling 3D audio and 3D animations. The engine was launched in 2014.

The cloud-hosting ability allows me as a designer to work on any computer in any part of the world as long as I have an internet connection. The engine works by either creating 3D object in the browser engine or by importing them with an .FBX file (a standard packaged file for most 3D programs including 3Ds MAX and Blender 3D). Play Canvas also has a 24 hour support that allows for fast fix's.

| THREE JS |

Three.JS is a cross-browser JavaScript library/API used to create 3D environments and objects in browsers, it uses WebGL to create the physics and look of objects. Like Play Canvas, ThreeJS comes with its own editor that can be accessed online using cloud-hosting or downloaded and used offline.

ThreeJS comes with full written and video tutorials and with examples of projects. The website also explains what each part of the code does which for me is very important. The is only an issue with a community help forum which there is none.

| PERSONAS |

Name: Anna Mc'Callow

Age: 21

Gender: Female

Occupation: (BA) Astronomy Student

Bio:
I have always been fascinated by space ever since I watched a shooting star with my dad when I was about 2-3 years old. By the time I got to secondary school, I had already been reading biographies of astronomers, and had found videos online that showed me things and explained the science. Thanks to the NASA website I was also able to view satellite launches, the best bit about NASA is that they are constantly finding something new and showing us all about it. My dream is to one day explore space as an astronaut. I like to find most of my information online; I would like to be able to explore planets without being guided or in a video. I do most of my searches using my laptop computer; on my phone it's too small to see the detail, I want to see and take in the content from a large screen. I am writing my dissertation on Mars, there is a lot of activity surrounding Mars and I would love a website better than NASA's Mars Trek website.

Likes:
Science, Space, Planets, Videos, Space Documentaries, Images.

Viewing Preference:
Desktop computers, Laptops, and Tablets.

Dislikes:
Small Screens, Low Res Images, Being Guided, Large Amounts of Text.

| PERSONAS |

Name: Mark Hamel

Age: 36

Gender: Male

Occupation: Secondary School Science Teacher

Bio:
I have been a science teacher for the last six years; I absolutely love teaching the younger generation. The best way my students learn is through interaction, so I make sure to find apps and websites where my students can learn what I am teaching and explore science using the fun technology. The school supplies desktop computers which all the students can use; I love to create a fun environment for learning and like easy to use apps which the kids can pick up fast.

Likes:
Science, apps, websites with interaction, easy to use websites.

Viewing Preference:
Desktop Computers and Laptops

Dislikes:
Hard to use websites, mobile phones, large amounts of reading.

| PERSONAS |

Name: Lucy Amos

Age: 15

Gender: Female

Occupation: High School Student

Bio:
I am currently studying my GCSE's at my High School, I hate having to revise. But I have always been interested in Science, my friends think it's nerdy but I love it! I struggle to read a lot of information, so I try to find websites where I can learn without having to read. I like the idea of space and watch a lot of YouTube Videos about it. I have NASA's website bookmarked and visit almost daily, I have watched so many space launches I can't even count. My dream is to one day see one in person. I use my laptop to watch videos and explore websites; I only use my phone when I want to check my social media.

Likes:
Science, Space, Videos, No Reading, Interactive.

Viewing Preference:
Laptop

Dislikes:
Hard to use websites, mobile phones, large amounts of reading.

| PERSONAS |

Name: John Mathews

Age: 45

Gender: Male

Occupation: NASA Educational Team Member

Bio:
When I was younger I remember my father taking me and my friends camping, we slept in the middle of this desert and watched the stars in the sky. My father taught me all of the star constellations. Though out my childhood we would make the annual trip to camp in the desert, but as I got older I started to take more of an interest in astronomy. Three years after I completed my university degree in astronomy I landed my dream job working for NASA. Now I work as part of the educational team, our job is to teach what NASA knows to the public using websites and apps. I am not a techie person but having resources which users can access and interact with is part of my job. The majority of people use large screens to view websites as you can see more detail than on a mobile.

Likes:
Science, Space, Videos, No Reading, Interactive, large Screens.

Viewing Preference:
Laptops, Desktops, Tablets, Projectors.

Dislikes:
Hard to use websites, mobile phones, large amounts of reading.

| RESEARCH & DEVELOPMENT |

For this project I underwent, copious amounts of research to build a semi successful project. In the next few pages I will show you my mindset when developing my site and the research that went in to creating it.

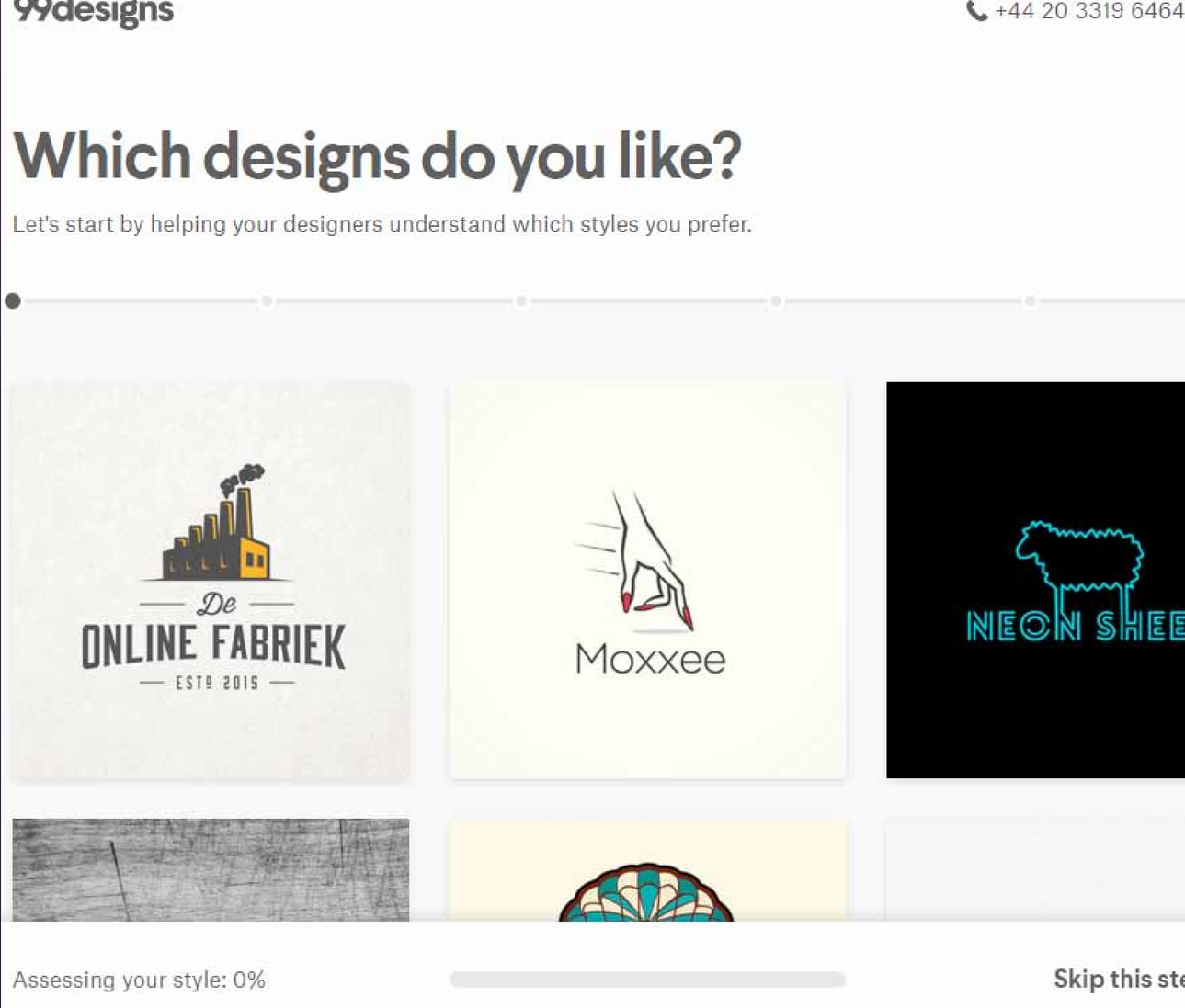
| STUDIO 95 |

Studio 95 was the original idea for my conceptual web project, as me and my friend Nathan had built a new design agency in our university. I wanted to make sure that the extra work from the studio was tied into my university projects. This was why I choose to design a website for a design agency, our design agency.

For this project I wanted to create something that pushed me as a creator to do something challenging, life is about taking risks and the bigger the risk the bigger the payout. I was wanted to make a website that can be the research and testing part of my Major Practical Project – my end of university project, like finals. I visited other agencies websites to see what I could incorporate into my design.

The design agencies that stood out, where - 99 Design and Unit9. The reason I picked them was because both agencies had elements from their websites which I liked. On 99 Designs website, I found a form rather than a portfolio. I discovered that the form asked the user to pick things like, what colours they liked, what styles they liked and this did two things; firstly, it allowed the user to be a part of the design process, it was this inclusion that stood out for me when browsing their site. Secondly, the designers where able to get an idea as to what the client was asking before they even met face to face, this sped up the process which would be helpful for small business that are wanting designs done fast.

Unit9's website was very different to 99 Design's in that they showed there portfolio. Unit9, used the full width of the page to create small thumbnail images that users can quickly see that they did. Unit9 is not just a design agency they also do film production, games development and much more which was exactly what I was looking for when setting up Studio 95. Unit9 used large hero images to showcase their projects of to a perspective client. It interested me so much that I have even applied to join the team.

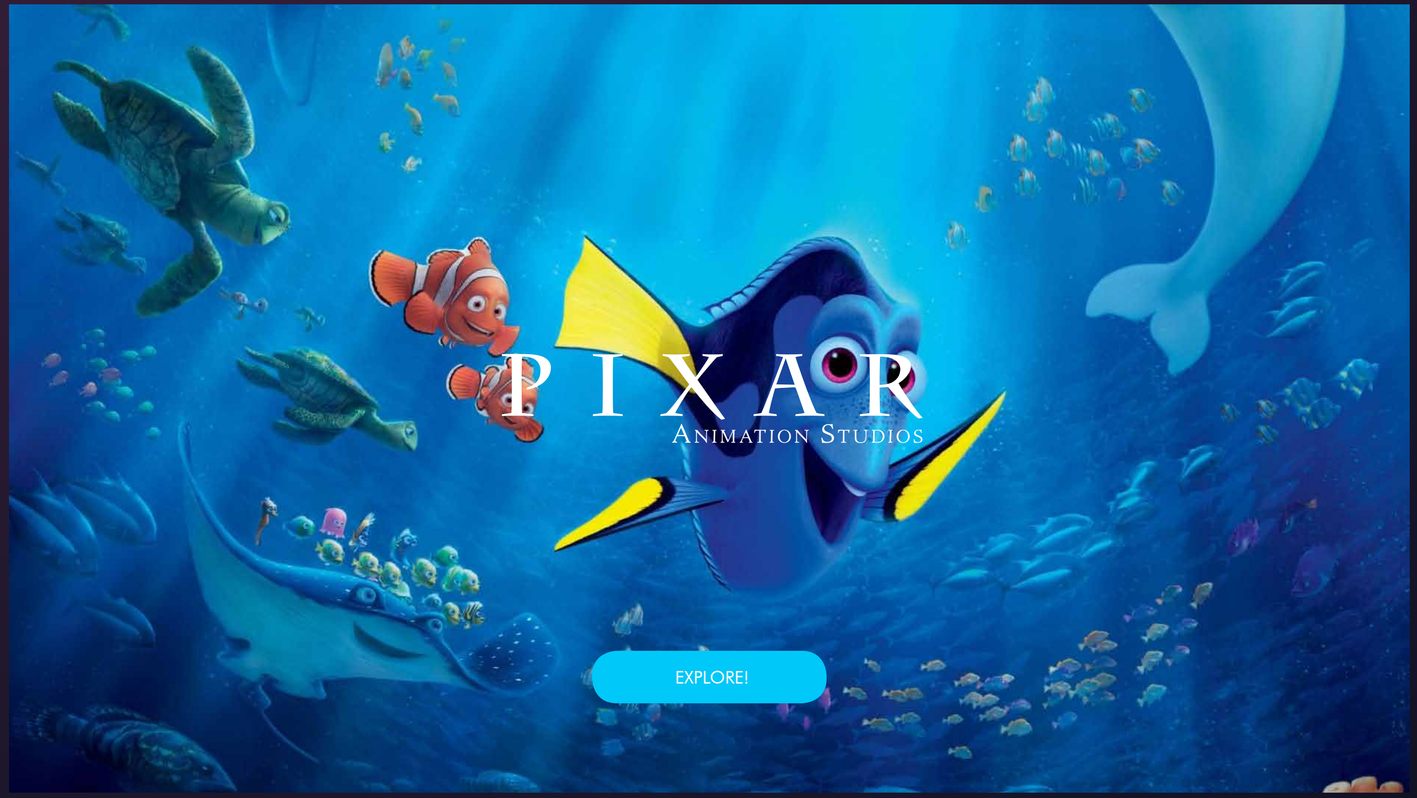


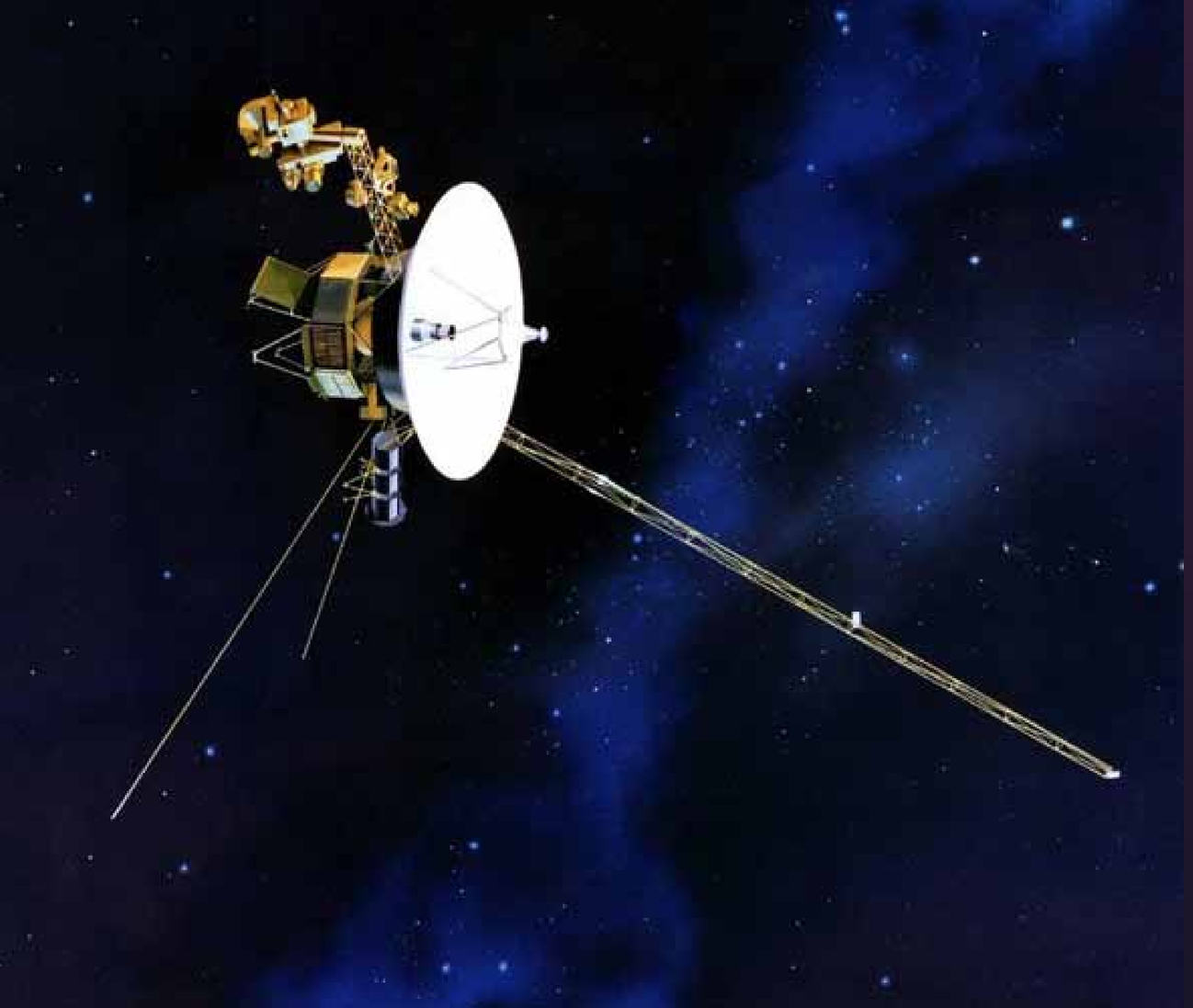
| EXPERIMENTAL WEB |

From the start of the project I was wanted to truly challenge myself as a creator, so I began to look for a cool pull in for perspective clients of my own design agency. I found that having interaction on the home page played a key role in a successful marketing strategy – the longer the user is on the website the more memorable it becomes.

The brief I was given specified that I must incorporate new and existing technology, so I began to research experimental websites. Companies like Google, Facebook, Unit9 and many more designers have been developing technology that incorporates the web from; Drones controlled by websites in Web Bluetooth to websites built for VR (virtual reality) in mind. This excited me because I knew that if I could build a website using one of these experimental technologies that I would have a better chance with that in my portfolio. I am bored of the same old websites so I want to be different which is why I picked WebGL. (Discover more on page 10)

After three weeks of the project, the idea for a website for my design agency was slowly taken away with the news that our studio would be taken away. This sad news had a knock on effect in all of my modules as I have tied the studio into my other projects. This change of plans forced me to change concepts, moving from a design agency website to a website for PIXAR. However, this was short lived as I found while re-reading my brief that I had to create the images. This was mixed in with the idea that I wanted to still use WebGL and I just could not figure out a way it could work in the time that I had. I rejected this project as it was forcing me back into building similar websites to everyone else, and I wanted to be different.





MARS 360°

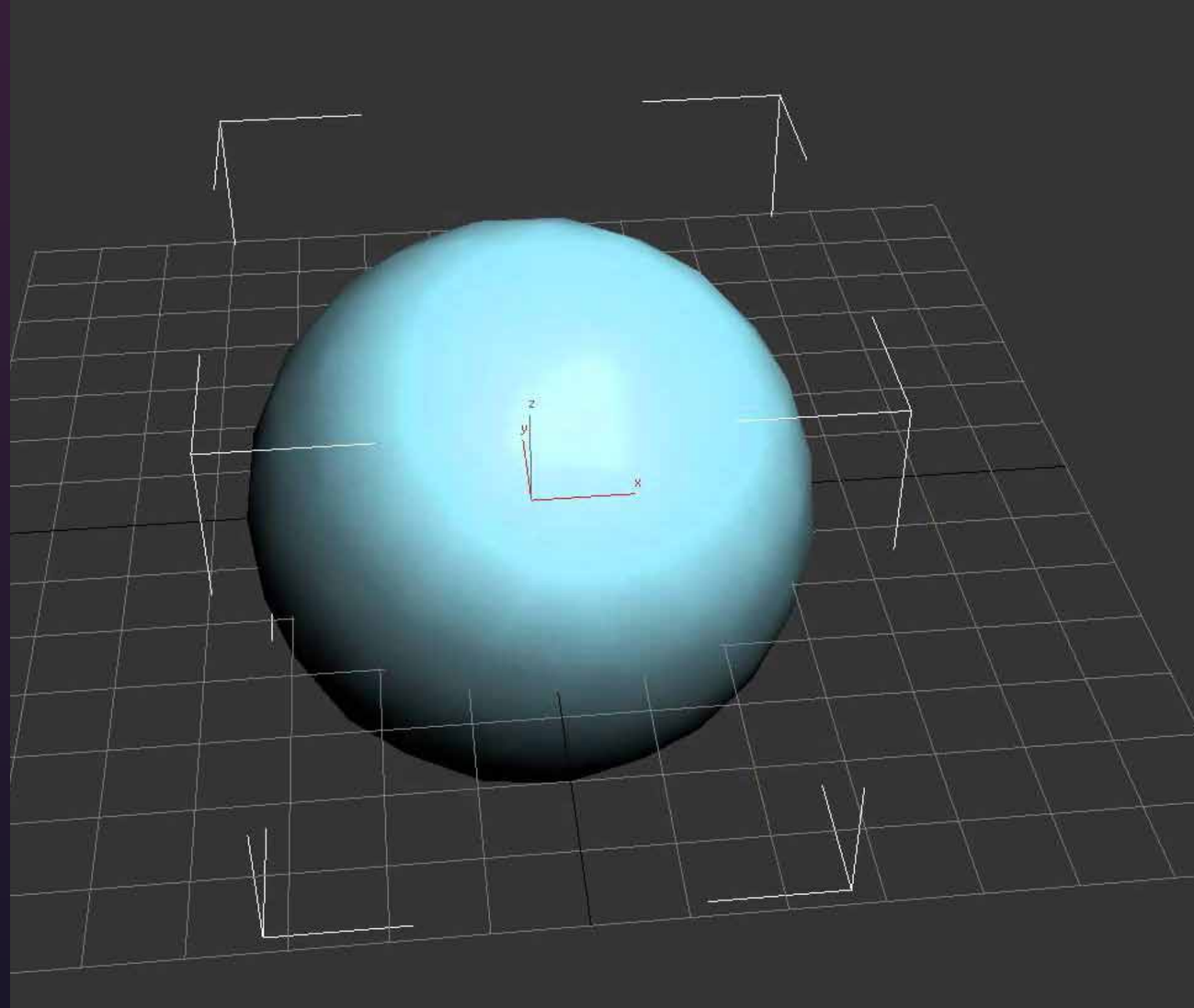
Mars 360° was my last idea; I was actually looking through my old work when I found my project Voyager. Voyager was a website that I created in my second year and followed the journey of Voyager 1 NASA's probe that has just exited our solar system. Voyager was a flat based design that used parallax scrolling to navigate through the website, for Mars 360° I wanted to replicate the same idea of travelling through space but using 3D objects rather than 2D images.

Through the research of this project I discovered multiple versions of software that enabled me as a designer to incorporate webGL. The first was Play Canvas. Play Canvas was a games engine for the browser – in simple terms it allowed you to add and create 3D scenes and add them to your website either by an iFrame or by adding the code direct. The second was ThreeJS, much like Play Canvas it too had its own engine but most designers preferred to use the base code like you would for plug-in like Bootstrap. The last was Celesta 3D, shown to me by my web design lecture. Celesta was a 3D program which can be downloaded as a program for your computer. It allowed users to explore our galaxy, it was also said to be able to be embedded into a website, but I could not find any evidence for that.

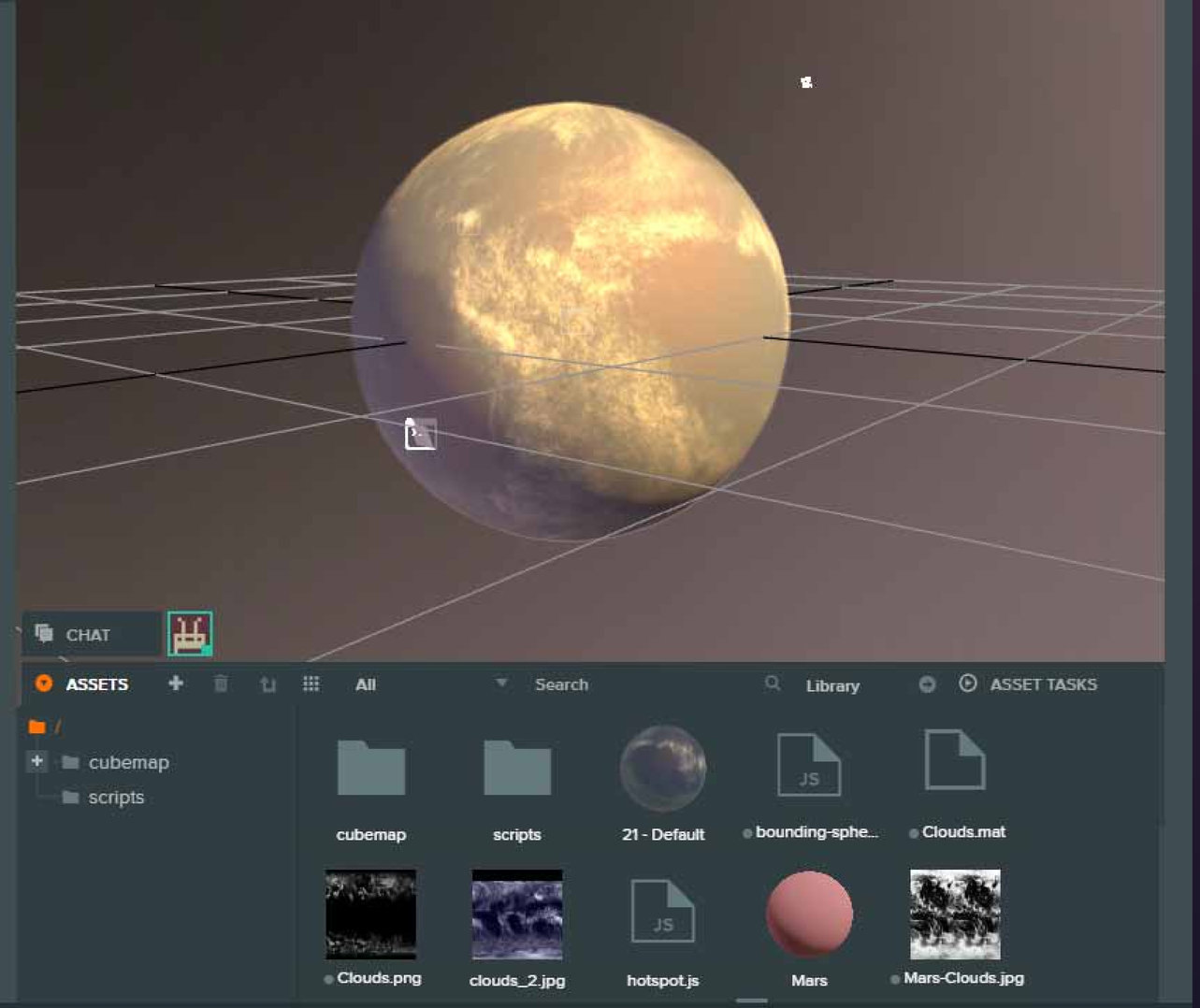
| 3DS MAX |

I began the project by creating in 3Ds MAX, I created a sphere object which I was going to be using for the website. I used the texturing tools to texture the object in 3D. In order to get the clouds effect I had to replicate a second sphere and scale it up. I textured the clouds using an alpha map and started on the animation.

3Ds Max is a modelling program that allows users to create 3D objects in a 3D space, I have used the program before within my college projects which were based on games development. For the planet Mars I created a material map – the texture in colours that you see, Bump Map – adding texture to the object without having to model it, and spectral map – the glossiness of the object. For the clouds I used an alpha map which removed the black from the clouds. I then used the animation time line to rotate the clouds with a 1-500 seconds timeline. For this I had to add an anchor to the starting position and to the ending position allowing the clouds layer to rotate 360o. I then saved the file as an FBX – this should save the materials, animation and objects in the 3D space.



I IMPORTING TO PLAY CANVAS I



After setting up a new scene with the Play Canvas logo in, I began to remove the logo model from the dashboard. Like 3Ds MAX the website allowed me to create objects and texture them within the website window. Next I imported my FBX file onto the website, it was then when I discovered that my models textures didn't copy across. This was a minor setback as the software allowed me to re-texture the object in the window. From what I have learned from learning 3D was that games engines sometimes break much like a websites code does from time to time. After 3 hours I had fully replaced the textures and added the model to the scene. When I loaded it in the live preview, I was able to rotate and move around the object, this was because I had used the pre-sets of the builder to keep the camera, and the code allowing it to rotate.

In order to tell the camera what to do or how to light up an area you had to code using JavaScript. JS was new to me, I had never learned it in depth before and for the most part tried to avoid it, but for this project I had to create a new JavaScript sheet for each element and command.

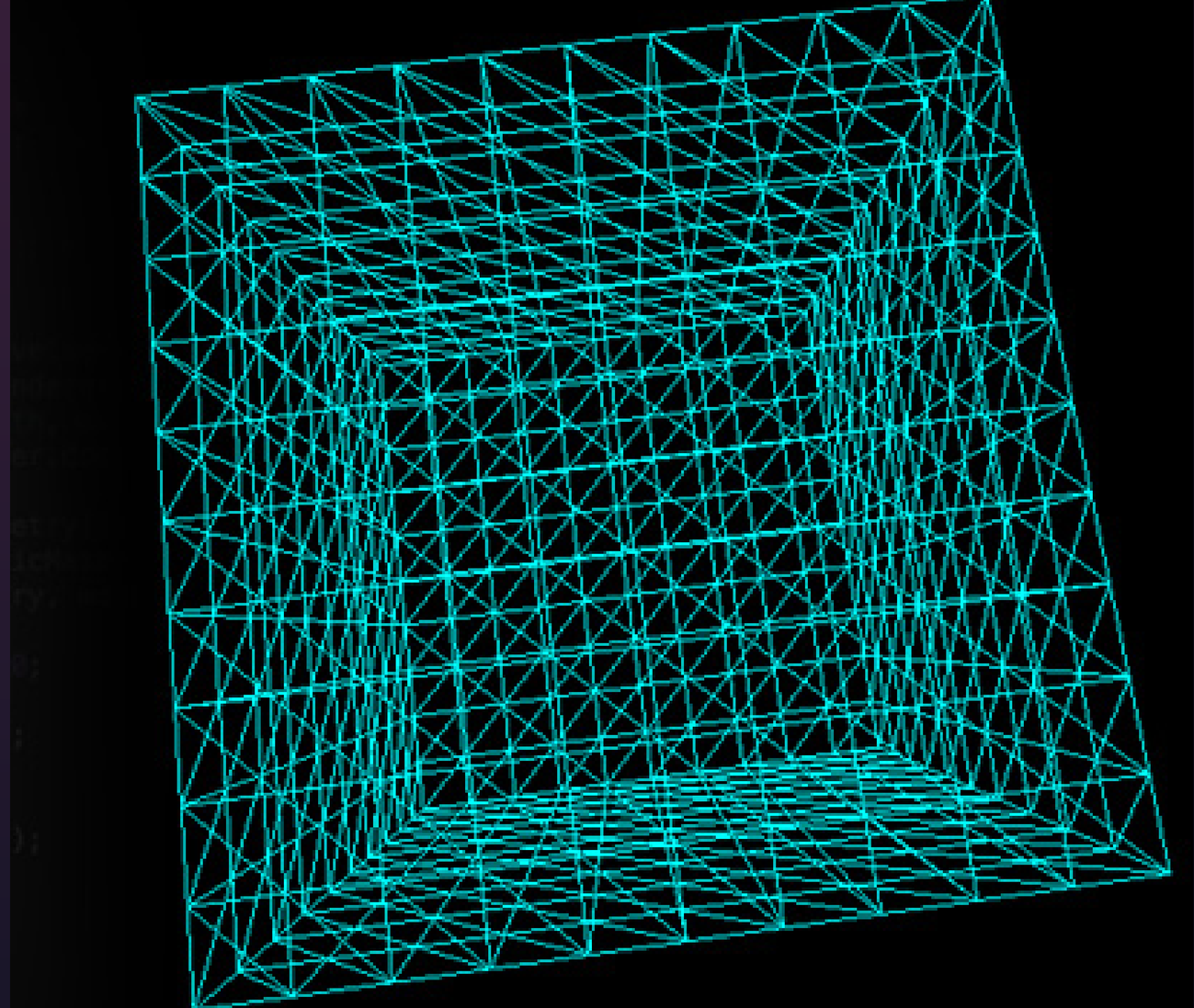
Following the guidance of helpful people on Play Canvas's website I was able to add hotspots to my object. Hotspots, was their term for pins or markers, links to other pages of the website. However, much as they tried to explain how I could make them link I just could not understand. What let me down was the fact I didn't really know JavaScript that well. I imported what I had into my website a found that because I was using a free version of Play Canvas that the iFrame came with a footer that linked back to Play Canvas. This was easily avoided but I didn't want to add a footer to my site.

Prototype: https://playcanv.as/p/4mvejhET/

| LEARNING THREEJS |

After I abandoned Play Canvas to host my 3D Mars I wanted to find a way to create it fully in brackets, this was when I came back to Threejs.org. I would describe ThreeJS as a Bootstrap for 3D, in other words a plugin that allows me to code a 3D scene. At the very start it had its problems, with many of the tutorials that I was following ending up being a dead end because it was not free or the code was out of date, this lead to me creating at least 5 versions before finding my saviour in Bjørn Sandvik.

His tutorial followed from a tutorial I had followed before but ended defiantly, the problem with the original tutorial was the camera control. It followed the mouse so that when you moved the whole planet would move. Now for my project I couldn't have this, it would impede on how users would interact with the website, with them not being able to click on links that where on the globe. In this add-on Bjørn Sandvik, allowed for the camera to be click and drag and cleared out allot of the code making it easier to read.



| CREATING THE GLOBE |

I started by adding a new div to my index.html;

This would be what I used to call in the WebGL element. I created a new javascript file and named it earth.js – as I was following a tutorial I was unsure if the js where all linked and didn't want to try and find and change the base code.
In the new js file I started to code the 3D space which included the Camera, Renderer and the Scene I also had to make sure the script ran okay and added the detector – basically an error message in the user can't see webGL elements. I made sure to call the js to the div.

From this the scene was created, I headed back into my index.html and linked the earth.js script. The full script can be found in my js files. On his GitHub I downloaded TrakerballControles.js, detector.js, and the images files. At the bottom of my html page I linked all the js files.

To control the size of the globe I had to create replicas on the earth.js js sheet this was because it was the 'var camera = new THREE.PrespectiveCamera(45, width / height, 0.01, 1000);' that control the viewing size. Changing 45 either increased the size or decreased the size. To add new textures was the same as you would in 3Ds MAX but coding it example;

Once the globe was in it worked perfectly using only JS sheets, I would have wanted the globe to be responsive but it worked within the window it was given and no matter how I tried to do it the globe refused to be controlled with CSS.

```
<div id="webgl"></div>

(function () {
    var webglEl = document.getElementById('webgl');
    if (!Detector.webgl) {
        Detector.addGetWebGLMessage(webglEl);
        return;
    }
    var width  = window.innerWidth,
        height = window.innerHeight;
    // Earth params
    var radius   = 0.5,
        segments = 48,
        rotation = 6;
    var scene = new THREE.Scene();
    var camera = new THREE.PerspectiveCamera(45, width / height, 0.01, 1000);
    camera.position.z = 1.5;
    var renderer = new THREE.WebGLRenderer();
    renderer.setSize(width, height);


function createSphere(radius, segments) {
        return new THREE.Mesh(
            new THREE.SphereGeometry(radius, segments, segments),
            new THREE.MeshPhongMaterial({
                map:       THREE.ImageUtils.loadTexture('images/Mars_Map.jpg'),
                bumpMap:    THREE.ImageUtils.loadTexture('images/Mars_Maps.jpg'),
                bumpScale:   0.005,
                specularMap: THREE.ImageUtils.loadTexture('images/Mars_Maps.jpg'),
                specular:    new THREE.Color('grey')
            })
```

| PANORAMA |

For one of my pages I wanted to add a panorama taken by one of NASAs rovers, I downloaded scripts from GitHub and began to implement them into my website. For the panoramas to work I had to copy in the CSS, and JS sheets and link them into the html file. I added the image I wanted to use using image tags in HTML. The images were taken from NASAs website. The issue which this was that adding the CSS scripts to my CSS sheet stopped the panorama from working this forced me to duplicate the CSS of the panorama and add it to the CSS directory.

| MARKERS |

At the very beginning of this project I wanted to create links on the globe to each page. Taking into account that my personas liked to have interactivity on the website, Markers where known as so many things on the internet as WebGL is still fairly new. They were known as Markers, Hotspots, Pins and Points. The idea is that you take a 3D plane and you stick it to the object, as the object rotates the planes move around the object too. Making them linked proved to be too much for me at the level that I am with JavaScript.

One idea was to use the earth.js sheet to call in the markers using longitude, latitude. But the placement never seemed to work. The next idea was to use CSS with Transform: Translate3d (000,000,000) using X, Z, Y axes but that too didn't work. I then found a plug-in called Leaflet it allowed you to put points onto a 2D map but couldn't me placed on a 3D map. I will still be looking even in the future to make this website 100% complete.

| EVALUATION |

At the start of the project I had some idea as to what I wanted my website to look like, and when it came to creating Mars 360o I was able to re-imagine what the website looked like. I found that talking with my friends, family members and lecturers that having a good way to navigate the website was key. People had become bored of long navigation bars and the hidden burger nav. So I decided that I was going to take a risk, and make the interaction with the globe the navigation. Unfortunately this didn't payoff due to time and my slow learning of JavaScript, that said many of the elements still remained.

The welcome screen was designed and using Adobe Premier and Photoshop, creating a cinemagraph for this little bit of movement made the website stand out, entering the website to be met with the WebGL Mars. The logo was inspired by the National Geographic Channel with their introduction to programs; this was mixed with Sky's typeface that was seen in the adverts for WestWorld. Picking a text logo helped me to easily add it to the website and allowed me to create a custom burger nav using the capital 'i' of the sky font.

The website was originally meant to be responsive, but was later changed to adaptive because the webgl elements could not be edited using CSS. Although, my personas do not want a mobile friendly website, Google did which forced me to create a small js script for that size. However, it was extremely buggy.

Throughout the project I have encountered many bugs which I had to solve, moving from one way of doing things to another. This actually benefited me and helped me to learn webgl and JavaScript. Although the website is not 100% complete it will be my continuous project in the near future. I have learned a great deal in this project and it is quite difficult to put it into this document. I hope that I have explained what you wanted and here is to the future of web.