Mobile VR application to reduce fear, anxiety and reduce pain for patients during injections.

Many adults have a moderate to extreme fear of injections. In some cases the fear has to be managed by putting the patient to sleep. Injections can be distressing for the patient and this distress is worse with children. We suspect the fear and anxiety associated with injections could prevent people from seeking medical help (yearly flu jabs for example).

VR already has a proven track record in Pain relief, which will help in this situation.

- https://www.fau.edu/newsdesk/articles/virtual-reality-study.php
- https://www.bbc.co.uk/news/health-12297569
- http://www.holosphere.co.uk/case-studies/forest-of-serenity/
- http://www.vrpain.com/
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3138477/ 2012 research paper (it's easy to read)

https://www.guysandstthomas.nhs.uk/resources/patient-information/all-patients/overcoming-your-fear-of-needles.pdf

What are the signs and symptoms?

For many people, fear of needles is linked to fainting or feeling faint. When the fear is triggered (for example by seeing blood or thinking about an injection), heart rate and blood pressure increase (as with other kinds of fears), but then rapidly drop. It is this fall in blood pressure that can cause fainting.

Many people do not confront their fear because they are embarrassed. Other people do not feel faint or actually faint but do feel panicky when their fear is triggered.

Trypanophobia is an extreme fear of medical procedures involving injections or hypodermic needles

We have to make a decision on the type of application it will be. Either a relaxing game or a relaxing environment. Either way, as long as the user is immersed, they should feel less or no fear, anxiety, and pain.

This application will make injections a more bearable experience for patients, especially children. It can reduce the psychological barriers to blood donation as well as important injections (such as tetanus shot). In general provide a more positive experience for patients whether in a GP, Hospital, etc...

Focus on removing the fear of injections first, blood transfusion is a later goal outside the scope of this project. Blood transfusions take around 15 minutes, whereas all injections should take less than a minute.

Type of application ideas:

- can only support 3 degrees of freedom as it is a mobile VR app
- Requires minimal interaction, (easier for us to make the app - a short amount of time)
- All experiences should last at least 1 minute (enough time for the injection, insertion of needle and removal of the needle)

Game (uses Mobile VR controllers)	Animated Environment (no controllers needed)
Bubble Popper	Cartoony colorful Forest
Guide a ball through a 3d maze	Cartoony beach
Find butterfly	Do arms become pillows?

All the assets we need for the experience are available in the Unity asset store. No navigation is needed inside the VR experience, the patient would normally be sitting or lying down. Interaction is minimal, so it should be easier to build the app.

Why mobile VR?

- Lower power requirements
- Every doctor/nurse has a smartphone
- Patients also have a smartphone
- Very cheap - low entry barrier

VR application to provide possible pain relief and reduce fear for patients during acute wound treatment in A&E

- Newer idea is more novel

Normally, if you get an open wound from an accident, you go to get treated in A&E or an ambulance takes you there. When the nurse eventually sees you they will clean and cover the wound, before you can be transferred to another specialist nurse. This procedure of cleaning the wound, moving the limb and removing debris as well as covering the wound is painful and it is not possible to provide any painkillers. Moreover some people have a fear of blood and open wounds, not everyone has the same pain tolerance. It makes things worse if the person who has the wound is a child or a vulnerable person.

VR already has a proven track record in Pain relief.

- https://www.bbc.co.uk/news/health-12297569
- http://www.holosphere.co.uk/case-studies/forest-of-serenity/
- http://www.vrpain.com/
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3138477/ 2012 research paper (it's easy to read)

We design a mobile VR app which the patient can use while their wound is being treated. In the VR experience they can either be transported into a peaceful, calm natural environment (such as forest) or play a relaxed game with the mobile vr controller (samsung and google have this).

The patient should feel less pain and be more calmer (possibly no pain - I don't think anyone has tested this before on A&E patients). At the moment they cannot provide painkillers so this is better than nothing.

All the assets we need for the experience are available in the Unity asset store. It should be even easier to make than the exercise app. No navigation is needed inside the VR experience, the patient would normally be sitting or lying down. Interaction is minimal, so it should be easier to build the app.

Mobile VR exercise app (deprecated)

- **We need clearly need head tracking which is not available with Mobile VR**

Get around this would require weird hacks, such as calculating pitch using the smartphones gyroscope.

We have to abandon the AED simulator, we lack experience in VR and unity as a whole and at the same time, the required 3D content for AED simulator is beyond the scope of this course.

We can take advantage of the pain-relief aspect of VR and apply this to exercise pain and endurance. With VR you should be able to have a longer endurance when exercising, less exercise pain and exercise should be more entertaining.

The types of exercise we can target in this timeframe would ideally be safe bodyweight exercises such as push-ups, star jumps etc..

This application is much easier to build, we only need assets from the asset store, we can even use free assets provided by unity. The scenes are small and there will be minimal or no programming needed.

We can create one mini-experience each (this is feasible for all of us), or we could split the group have two or three experiences.

What are the experiences ?

There basically unity scenes, the user puts on their mobile VR handset and gets transported to these “experiences”/scenes, where there do exercise in these environments, they should have less pain when doing these exercises and have greater endurance.

- Cycling through clouds
- Pushups but looking at relaxing scenery
- Etc…

proven track record of VR for chronic pain relief:

· http://www.vrpain.com/

· https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3138477/ 2012 research paper (it’s easy to read)

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WE ARE NO LONGER DOING THE AED SIMULATOR - KEEP THIS AS RECORD
We will get more marks in presentation for considering the difficulty of this project and changing - this is what normally happens in real life industry.

AED simulator

AED = Automated External Defillabtrator

SCA = Sudden Cardiac Arrest

Concept:

Users will be placed in realistic emergency SCA situations, users will need to find the AED and apply it on the patient. There is a time limit of course, the patient is in SCA.

Most people do not know that AED's exist or what they are, they do not know where they are located and how to operate them.

AED are the most effective intervention for sudden cardiac arrest.

This VR application is designed to reduce anxiety, promote awareness and prepare the user for a real life SCA situation.

Please read this:
https://www.sja.ca/English/Safety-Tips-and-Resources/Pages/aed/why-aeds-are-important.aspx

https://www.resus.org.uk/faqs/faqs-defibrillators/
[There is a downloadable guide on the site too]

How to operate an AED [professional advice- these are exact steps]
https://www.youtube.com/watch?v=UFvL7wTFzl0

"each passing minute before AED application, the probability of survival declines by 7-10%"

Plan:

- Start off with a simple scene, street outside train station (all train stations should have AEDs)
- Someone is already giving chest compressions correctly, you are the bystander.

- find AED in station
- brings AED to patient, follow along instructions in video [https://www.youtube.com/watch?v=UFvL7wTFzl0]
- Use VR controllers to open chest and place AED pads
- Press button on AED
- Follow along professional advice in video
- Different outcomes - AED may not be enough, tell the first aider to keep providing chest compressions

https://www.reallusion.com/character-creator/download.html

PURPOSE:

- Supplement classroom training for first aid trainers.
- keeps first aid skills fresh.
- Increases awareness of AEDs.
- Learn how to use AEDS for casual users.

Aiming at high-end HMDs, only move onto mobile when concept is iron out with high-end HMDs.

Entire experience should take approx 5 mins.

https://assetstore.unity.com/packages/3d/environments/urban/nyc-block-6-16272

Oculus rift, other group members are using the vive