# Project Brief – Telepresence System Project

This document will outline and describe the Telepresence System project I will be undertaking as my final year project.

## Background

“Natural Process” – Noun. A Process existing in or produced by nature (rather than by the intent of human beings) [1]

In the Telepresence System project, I will aim to create a method of interacting with a system using a process which will feel natural to the user. I will aim to minimise the amount of knowledge required to use the system, whilst still retaining a level of practicality within the system.

For as long as I can remember, we have depended on and have widely adopted a “binary” means of working; in that we are very dependent on switches to enable us to interact with computers. This simplification of potential interactions has allowed us to streamline this process and while it has become incredibly defined over the years, it can’t be defined as a “natural” process.

As an example, users are able to interact with a computer through a keyboard but they must build up knowledge of the layout of a keyboard in order to be able to efficiently use it. This can be observed through the fact that the more experience a user has using a keyboard, the quicker they are able to type thus the more they can interact with a computer in a given time. However, that requirement of a base level of understanding of the keyboard prevents this being a natural process for users; we as humans have created the keyboard as a tool for translating our words, thoughts and languages into a series of zeros and ones which the computer is able to represent.

The use of biometrics for security is rapidly growing; in a recent report, Juniper Research says that “more than 770 million biometric authentication applications will be downloaded each year by 2019.” [2]. This is a good example of a natural process being used for a task and I believe that it is recognition that a natural process is more efficient and desirable than the use of a man-made and sometimes laborious method.

I believe that virtual reality being released to the consumer market this year is a sign which can be taken to mean that the wider industry believes that we finally have the technology to project ourselves into a virtual workspace, which is a huge step to moving towards a natural process for interacting with a computer. In order to maximise immersion, natural processes are essential in order to trick the brain into thinking that what the user perceives is actually real.

[1] - www.thefreedictionary.com

[2] - <http://www.csoonline.com/article/2891475/identity-access/biometric-security-is-on-the-rise.html>

## Project Outline

The following is the technology I have available to incorporate in this project.

* Nao Robot – a humanoid robot developed by Aldebaran Robotics. The robot can be programmed to carry out a wide array of tasks.
* Myo Armband – a gesture recognition armband developed by Thalmic Labs. The armband uses a combination of multiple EMG sensors, a gyroscope, an accelerometer and a magnetometer to detect gestures and motion.
* Leap Motion – a small panel which uses motion detectors to create a “field” above the panel which the user can interact.
* Oculus Rift DK2 – a head mounted virtual reality device which requires extensive graphics processing in order to simultaneously stream two feeds to high-tech lens for each eye. This device comes with a desktop based motion sensor which is able to capture 3d movement of the device.
  + Depending on hardware availability, I may be using the Oculus Touch controllers with a consumer Oculus Rift device. This will allow for a richer experience than the DK2 can provide, with updated sensors and integrated motion controller. The consumer Oculus Rift device was released in March 2016 and the Oculus Touch controller currently has a December 2016 release date.

The aim of this project is to develop an interface with the following features:

* The user will be able to have some degree of control the limbs of the Nao Robot through hand gestures and/or motion control
* The user will be able to have some degree of control of the head of the Nao Robot through head tracking
* The user will be able to instruct the Nao Robot to move around the room using simple voice commands
* The user may be able to access a camera on the Nao Robot through the Oculus Rift device

Initial research has shown that each device has libraries available in C++ so the bulk of the project will likely by written in this language. I would also like to explore 3D development and will be doing some work using Unity, possibly for prototyping and exploring options with the input devices. Leap Motion have recently released a new dev kit labelled “Orion” that I will be exploring.

## Project Timeline

As I have a limited amount of experience in this field, a large amount of time will be spent learning understanding each individual device. I anticipate that using the devices collaboratively will be a challenge but doing this will ultimately improve the overall user experience.