

Project Requirements

Project Name

ArachnoTherapy VR - ENSE 400 / 477 Capstone - Team Edentata

Project Problem

VR has demonstrated evidence of being a useful tool for exposure therapy in a research setting, but the same success has not translated to the commercial sector. We believe two factors contribute to this: firstly, the interactions present in most VR therapy experiences are insufficient or unrealistic, and secondly, the experiences usually don't allow for in-game progression or varying levels of intensity. The former is necessary for the VR environment to seem "realistic" or "plausible," while the latter is necessary in order to accommodate patients with different degrees of anxiety, and also different paces of learning. Both plausibility of the VR environment, and capacity to handle variance in patients, are considered to be key factors in the efficacy of VR in treatment of anxiety and phobias.

Project Requirements and Prerequisites

Unity was selected as the game development engine in which ArachnoTherapy VR would be built for three primary reasons. Firstly, it was the most practical choice of all existing game engines in terms of prior experience, as one member of Team Edentata has over three years of experience designing and developing VR projects in Unity. This experience is not shared in any other game development engine. Secondly, Unity's primary backend scripting language is C#, whose class-based file structure is reminiscent of Java. We felt that by rooting our code base in C#, we would have numerous opportunities to showcase our knowledge of object-oriented software design principles. Such opportunities may have been limited by building a C++-based backend in an Unreal Engine project, for example. Finally, for the purposes of Oculus application development, Unity has access to the OVRInput API, which enables straightforward interactions between the project, controllers, and head-mounted display. While similar libraries or APIs may indeed be accessible to Unreal Engine, Godot, or other game development systems, the ease of use of OVRInput combined with the team's prior experience created another advantage for Unity. As a result of these factors, Unity was chosen as the development engine for ArachnoTherapy VR.

Requirements on the software (development) side of the project include an **upper bound of linear runtime**, but **constant runtime whenever possible** (this means avoiding the use of Unity's per-frame Update() function); **compatibility with all types of Oculus VR headsets**, which means a low rendering overhead due to the graphical limitations of the Quest and Quest 2; environments for **arachnophobia and user introduction**, which provides extra versatility for potential clients in psychiatric clinics; and **adherence to OOP principles**, especially with respect to the spider A.I..

Requirements on the psychological (design) side of the project, which were determined through consultation with Dr. Nick Carleton, include **avoidance of flooding / sensory overload** in order

to prevent panic attacks and trauma; **user-controlled safeguards**; **user-controlled manipulation of environmental variables**, such as the amount, behaviour, or intensity of the phobic stimuli; **fail-safe external controls**, which would be operated by the therapist in the event of an adverse reaction; and **variance of environments**, as Dr. Carleton noted that context and setting play a huge role in phobias. For example, an individual may not be afraid of spiders in their office because their secretary can come in and squish them, but they may be terrified of spiders in their basement during the middle of the night.

Prerequisites include configuration of a GitHub repository, a working knowledge of the unintuitive Unity-GitHub pipeline, an understanding of each group member's roles and responsibilities, familiarity with relevant academic literature in the area of VR exposure therapy, and access to Oculus VR headsets.