

## **PROJECT SUMMARY: Virtual Reality and Its Applications to Train Individuals in Physically-Oriented Challenges**

**Overview:** In the 21st century, Virtual Reality (VR) is an aspiring niche technology with endless potential use cases. One of the most significant and undervalued aspects of VR that has yet to be fully taken advantage of is its ability to help teach users skills by putting them into simulated situations inside of synthetic worlds. Psychological phobias are an exemplary widely developed issue that have been proven to be aided by exposure therapy in virtual reality. As such, psychiatric and many other forms of research institutions could benefit from this type of technology. Computational 3D rendering is an efficient way to manufacture an entire world centered around specific ideas and or obstacles.

**Intellectual merit:** This project proposes to add to the ever-expanding list of skills that virtual reality has been able to train by teaching users how to walk across a tightrope. The intended learning outcome of this project is for a VR application to not only successfully teach a user how to walk across a tightrope digitally, but to be able to do it in the real world under intense conditions. A combination of hardware and software tools would be used to achieve this goal; a pair of VR goggles, a set of pressurized plates and foot sensors, and a 3D rendering engine. A tightrope-like, hard physical object would be installed on a flat floor, with sensors mounted underneath it and onto a consumer's shoes. A 3D rendering engine would be used to simulate an immersive digital world by which the users' interactions would be digitally replicated. By means of a custom hardware to software communication application, the aforementioned pair of sensors would transmit data to and from this 3D rendering engine to map a users' footsteps. Upon receiving this data, the 3D rendering engine would continuously gauge the consumers' skill level and progression. This methodology allows consumers to receive continuous feedback on his/her progression to improve tightrope skills and overcome any clinical fear of heights.

Virtual Reality is an ingenious and innovative way to help individuals understand situations and a vast array of subjects through an immersive simulation. This project will add to the ongoing innovation with this technology to make simulations feel even more realistic while also enhancing the currently underwhelming accuracy of virtual reality training tools. It could even act as a framework for more complicated situation experiments whether it be for training or any other form of data analysis.

**Broader impact:** While this project intends to aid already existing research on psychological phobias such as fear of heights, it also provide a means to train consumers with its applications such as walking across a tightrope in a risk-free environment. A successful commercialization of this application would result in a framework that could provide the market an accurate, data-driven training simulations for skills such as the tightrope simulation. With fierce lifelike environments, individuals could purchase this application to overcome their own fear of heights or even train for sporting events if more physical challenges are implemented. Psychiatric research institutions could be fielded massive amounts of data from this application to further educational development. The fact that this product would provide statistics towards one's progression in a certain applied skill grants consumers trust that they are being proactively and properly trained and will be able to reach their goals.