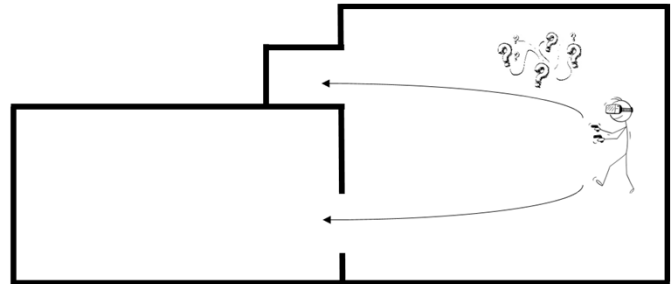


RDW in an Unknown Space

Keywords: Virtual Reality, Redirected Walking, Locomotion

Overview

Individuals can now wear a head-mounted display (HMD) and explore any museum or historical place worldwide from the comfort of their homes. This possibility to dive into virtual worlds allows the user to have a near-real-life experience of visiting these places. However, to achieve full immersion, the user should be able to walk in such spaces. Walking in VR has been extensively studied; however, one significant



problem persists: how can one explore large-scale worlds while being confined to their living space? One solution to this problem is the usage of redirected walking (RDW). These methods allow for the stretching of spatial constraints of physical space, thereby enabling the user to walk indefinitely. However, current redirected walking methods operate under the assumption that the tracking space is well-known. The tracking space is typically limited to either the room where lighthouses are set up or to the HMD's tracking area. In this work, we aim to relax these assumptions by testing RDW with the exploration of unknown and non-convex spaces in a real user study.

Tasks

Your task is to research RDW. Then, you will follow up on a previous project in which RDW was simulated in an unknown space. The objective of this work is to implement the previously simulated algorithms in a real user study. To accomplish this, you will need to integrate the mapping from an external camera to a Unity environment. The external camera is necessary because it is not possible to access the visual information extracted by the head-mounted display. Afterward, you will integrate the generated map into the RDW algorithm. Finally, you will evaluate and compare the performance of the different RDW algorithms and validate the results obtained in a real user study.

You will present your work in an intermediate and a final presentation to the ICVR lab. Additionally, you will summarize your results in a written report.

Work Packages

- Literature research on RDW
- Integrate a mapping camera into Unity
- Implement a complete pipeline that takes the generated map and applies RDW to a user
- Design and conduct a user study
- Prepare intermediate and final presentations
- Write a report summarizing the findings

Skills

- Programming Skills in C++ or C#
- Unity and/or VR experience is a plus
- Strong communication and interpersonal skills

Results

The results of this thesis need to be summarized in a written report and will be presented to the ICVR in a 20min talk.

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