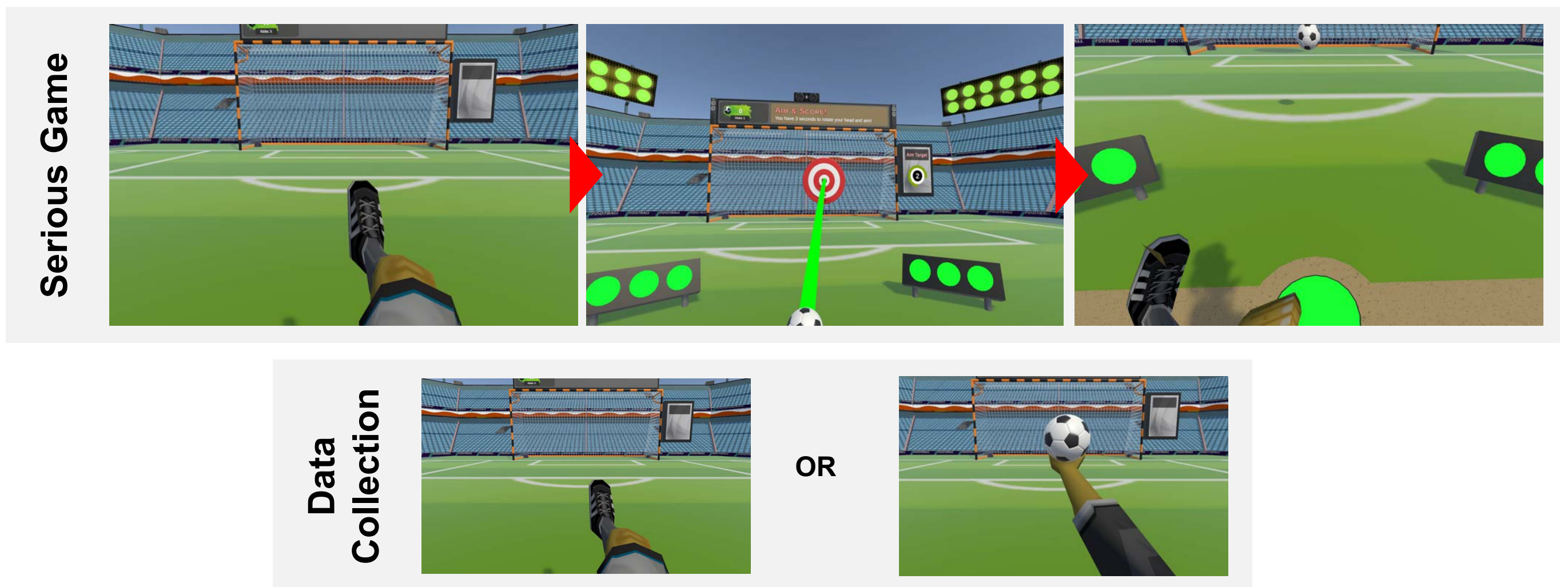


# Novel VR MI-BCI System

## Facilitating Gamified Lower-Extremity Rehabilitation

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### Project Objectives:

This project aims to create a Serious Game using Virtual Reality (VR) and Motor-Imagery Brain Computer Interface (MI-BCI) technologies, to serve the highly impactful use case of lower-limb rehabilitation in post-stroke patients. Using this system, severely physically impaired patients can reap the benefits of rehabilitation using only Motor Imagery (MI), where they imagine specific movements without any physical motion. The system developed in this project also serves as a data collection interface, to create a highly versatile dataset consisting of both Lower-Extremity (LE) and Upper-Extremity (UE) MI Electroencephalography (EEG) data, in VR and 2D environments. This facilitates the additional investigation of (1) the effectiveness of a novel LE- vs. UE-MI Classification approach, as well as (2) the specific effects of VR on BCI performance.



### Description of Game System:

The game system, developed using Unity3D software, is soccer-themed, where users will be able to aim and kick a soccer ball at a moving target, upon successful completion of an Ankle-MI task. The overall game design accommodates natural, intuitive feedback through an anthropomorphic avatar, as well as simple, yet engaging gamification elements for efficient use in a clinical rehabilitation setting.