

# Detecting Body Movement Patterns Resulting in Deceptive Behaviour in a Virtual Reality Throwing Task

## Introduction

The perception of human kinematics conveys enough information for the observer to successfully recognize the coordinated patterns of body movement and subsequently predict the intended outcome of the observed motion. However, altering some of the movement patterns can affect prediction of the action drastically, resulting in what is commonly known as a deceptive movement.

Frequent deceptive movement:

- ❖ Mismatch between gaze/head motion and body motion (e.g. Kunde et al. 2011)
- ❖ Minimising movements related to intended motion and/or exaggerating movements not related to the intended motion (e.g. Brault et al. 2012)

## Virtual Environment



### Avatar

- Animated via MOCAP data of human throws

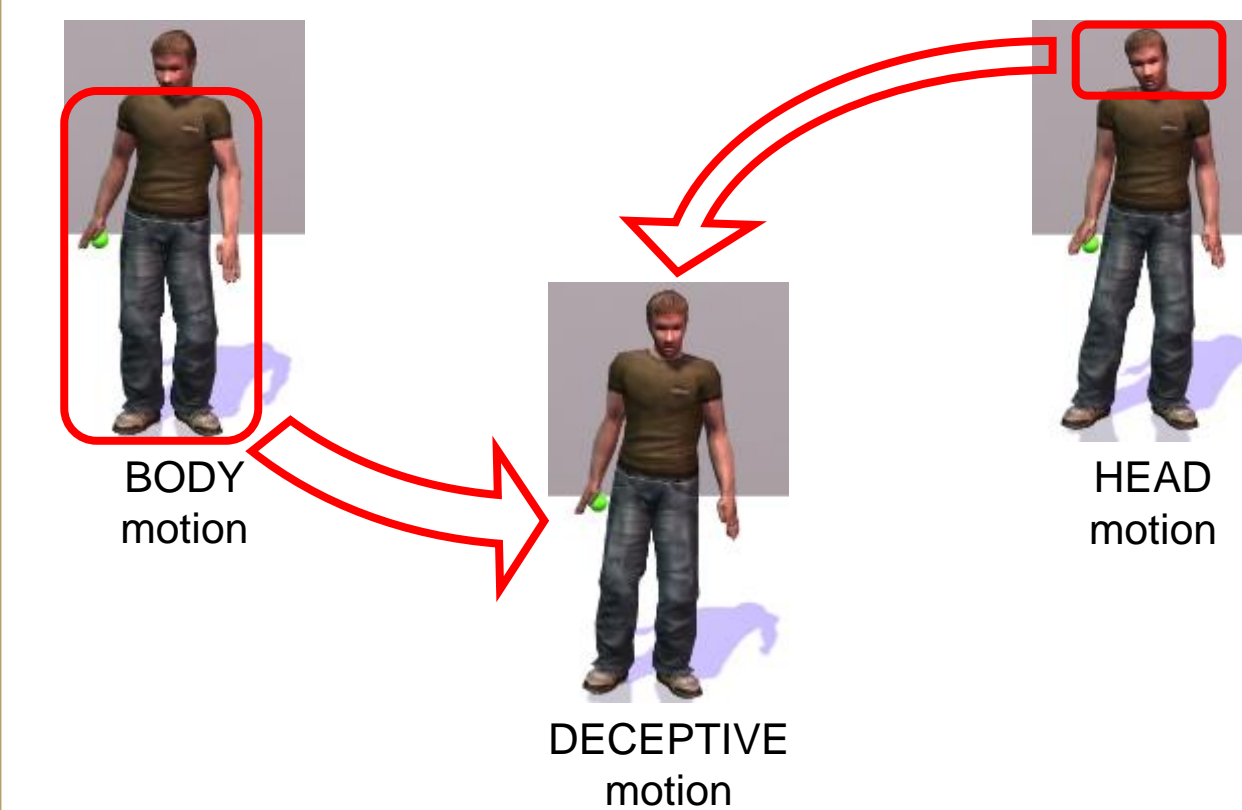
### Ball

- Animated using the recorded ball trajectory
- Trajectory adjusted to hit specific target

### Virtual arm

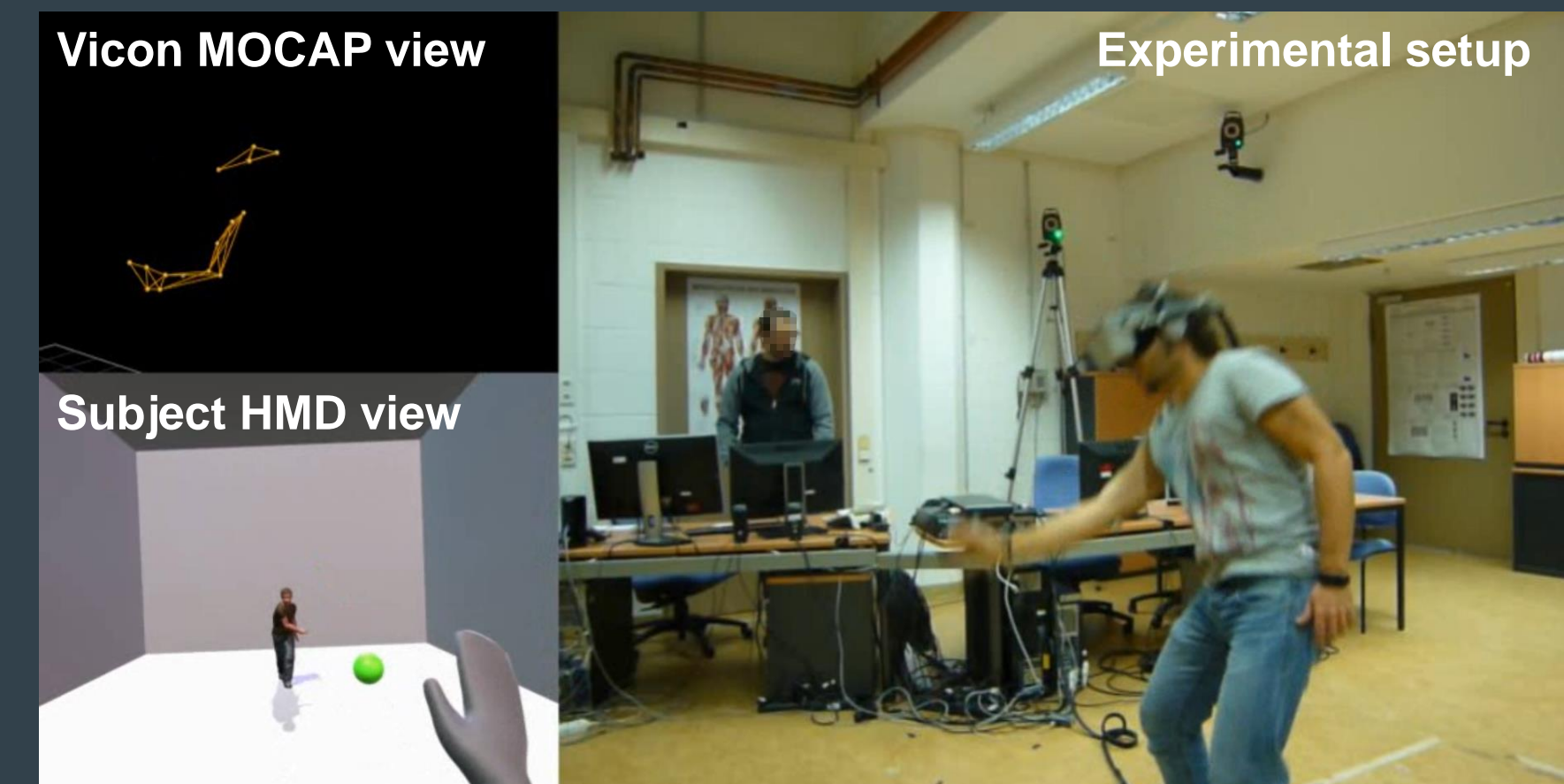
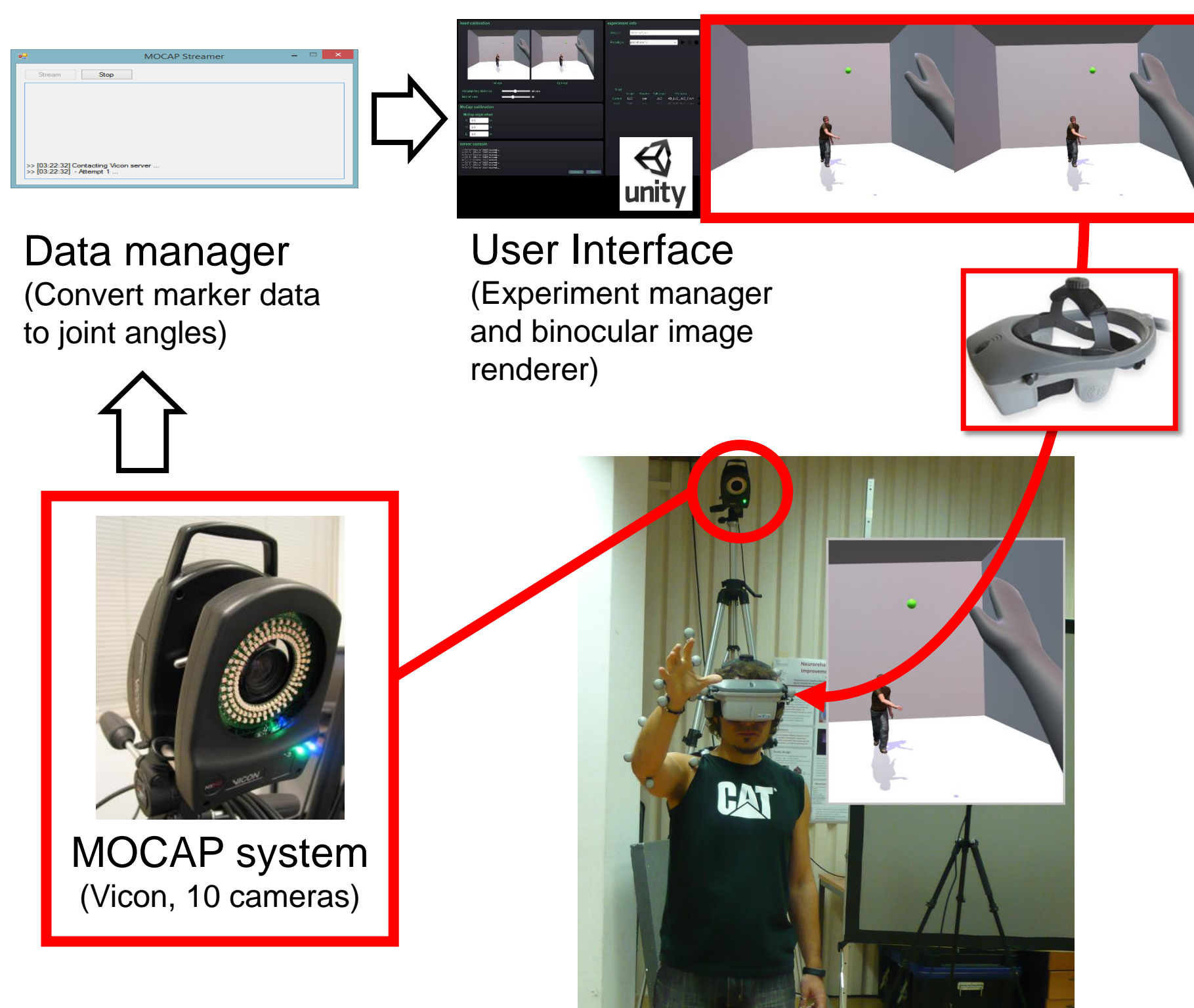
- Controlled real-time by Vicon MOCAP

## Generating Deceptive Throws

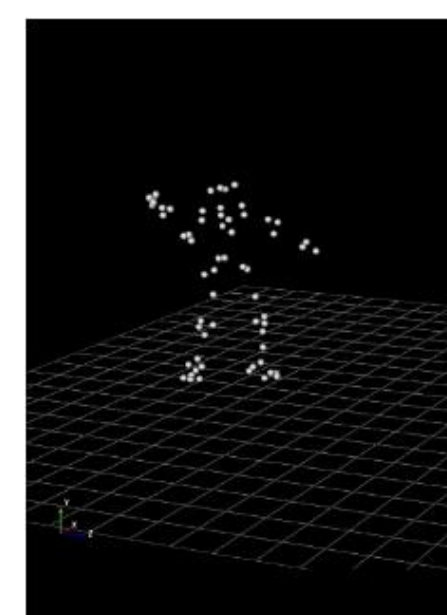


Deceptive throws are generated by using body motion of one particular throw and combining it with head motion from a throw to another target.

## System Architecture



## Animating the Avatar



### Step 1: Processing of MOCAP data

- Markers' labelling is verified
- Missing markers are fitted
- Ball is remodelled as single marker
- Extraction of relevant motion segments

### Step 2: Avatar animation

- Recorded motion is retargeted to avatar using MotionBuilder
- Ball trajectory is adjusted to hit specific target



## Ball Catching Task

- Six subjects were asked to intercept a virtual ball thrown by the avatar.
- The generated avatar throws were a mixture of genuine and deceptive throws to four different targets (240 trials in total)
- Audio cue indicated successful catch of the ball.

## Conclusions

- ❖ We have successfully created a virtual reality environment for interaction with an avatar and tested it with a series of experimental tasks
- ❖ Analysis of the acquired data is ongoing

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## References

Kunde et al. (2011) Trust my face: Cognitive factors of head fakes in sports. *J of Exp. Psychol: Applied*, 17(2), 110.  
Brault et al. (2012) Detecting Deception in Movement: The Case of the Side-Step in Rugby', *PLOS ONE*