Tower Defence game with MoCap Technology

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Introduction

- Traditional games = hours of sitting → unhealthy lifestyle.
- Motion Capture (MoCap) offers **active gameplay**.
- Goal: design & implement a VR-inspired game with **floor projection and a branch controller**.

Research Question

- How can MoCap be used as a **natural and accessible** input method for games?
- What are the **technical limits** (accuracy, framerate)?
- Can such a system **stimulate physical activity** during play?

Fungods: The Game

- Tower Defense: **Fungi vs. Bacteria**.
- Floor projection → player moves around to interact.
- Branch with 3 markers = controller:
  - Place fungi
  - Start waves
  - Attract spores
- Six fungi types → unique attacks, stats & mycelium growth.

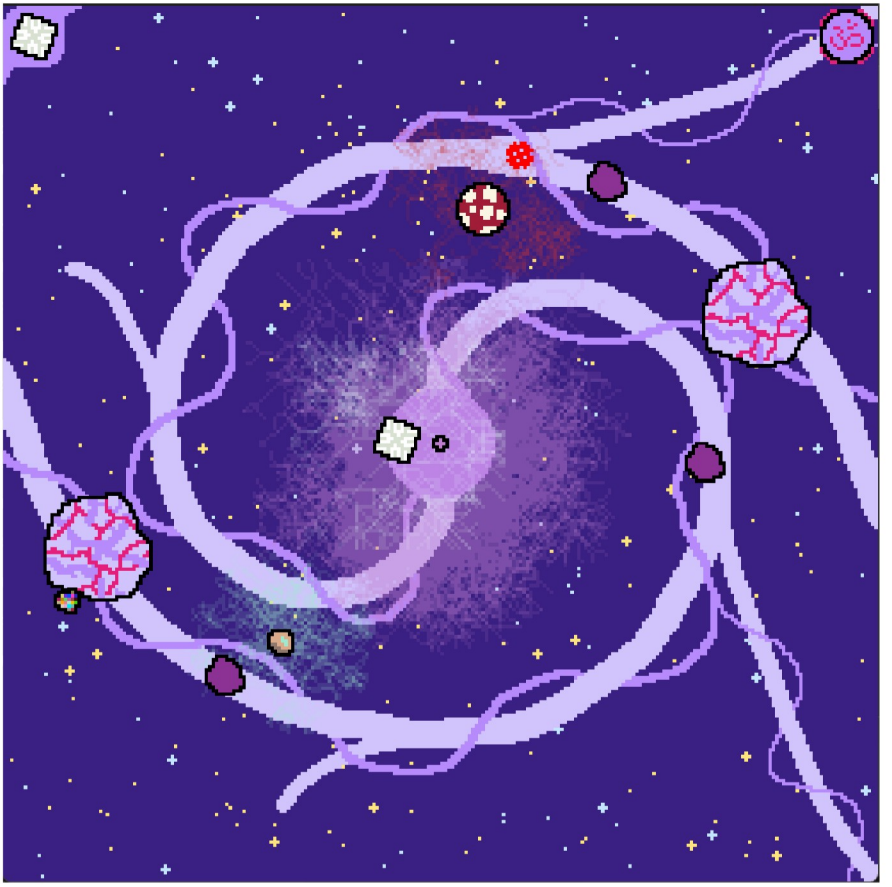

Fig. 1: Active gameplay

Motion Capture Setup

- **8 Qualisys Miqus cameras** tracking reflective markers.
- **Qualisys Track Manager (QTM) + SDK** → sends data to game engine.
- Branch tracked as **6DOF object** (x, y, z + rotation).
- Calibration aligns **physical space with projection**.
- Any object with markers can be used (branch chosen for theme).

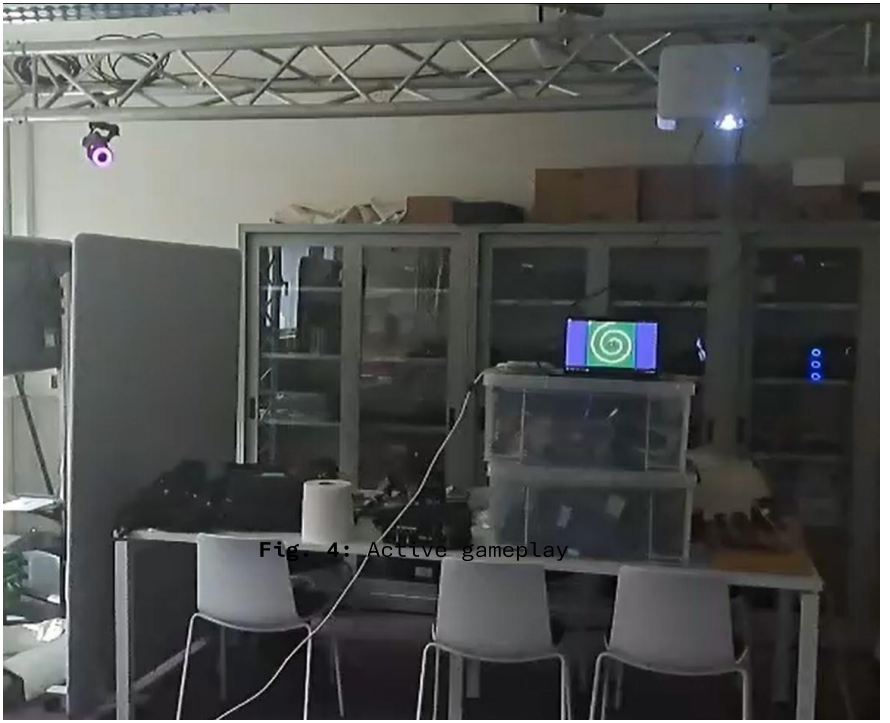

Fig. 4: Active gameplay

Fig. 2: Qualisys physical setup

Future Work

- **Multiplayer** mode with multiple branches.
- **Automatic calibration** inside the game.
- **Endless** levels with increasing difficulty.
- Fungal-inspired **sound & animations** for immersion.

Conclusion

- Fungods demonstrates that MoCap can make games more:
  - **Active**
  - **Engaging**
  - **Experimentally rich**
- Strong potential for healthier alternatives to sedentary gameplay.

Implementation

- Written in **C++** for performance.
- **SDL** for graphics & projection.
- Modular design: game entities and levels stored in **external config files**.
- Multithreading: game & MoCap run in parallel → smooth performance.

Results

- Game runs at **333–1000 FPS**.
- Tracking accuracy: **~5 cm**, acceptable for gameplay.
- All core mechanics functional: fungi placement, wave control, spores.
- **Player must move around → active gameplay achieved.**

Evaluation

- **Technical reliability:** stable input & framerate.
- **User experience:** engaging, physically stimulating.
- **Limitations:** expensive hardware, manual calibration.

Fig. 3: Floor projection