

BENDIT – AN INTERACTIVE GAME WITH TWO ROBOTS

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The Game Idea

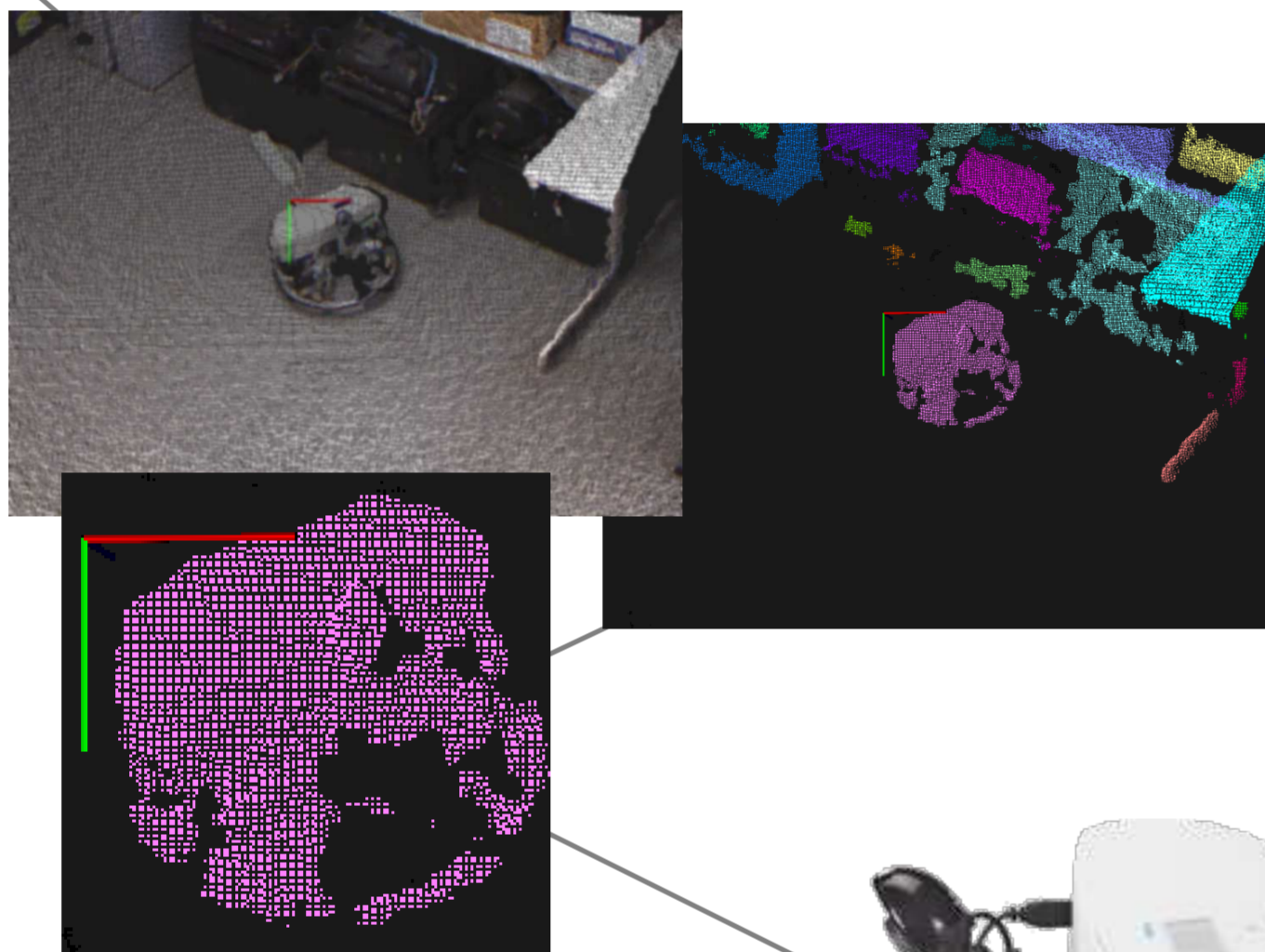
- Human user steers a robot along a course using his upper body movements like a joystick
- Referee robot observes the state of the game autonomously following the user-controlled robot

Required Components

- Means to detect and follow Robotino robot
- Body posture estimation for Robotino control
- Integration with localization & motion components

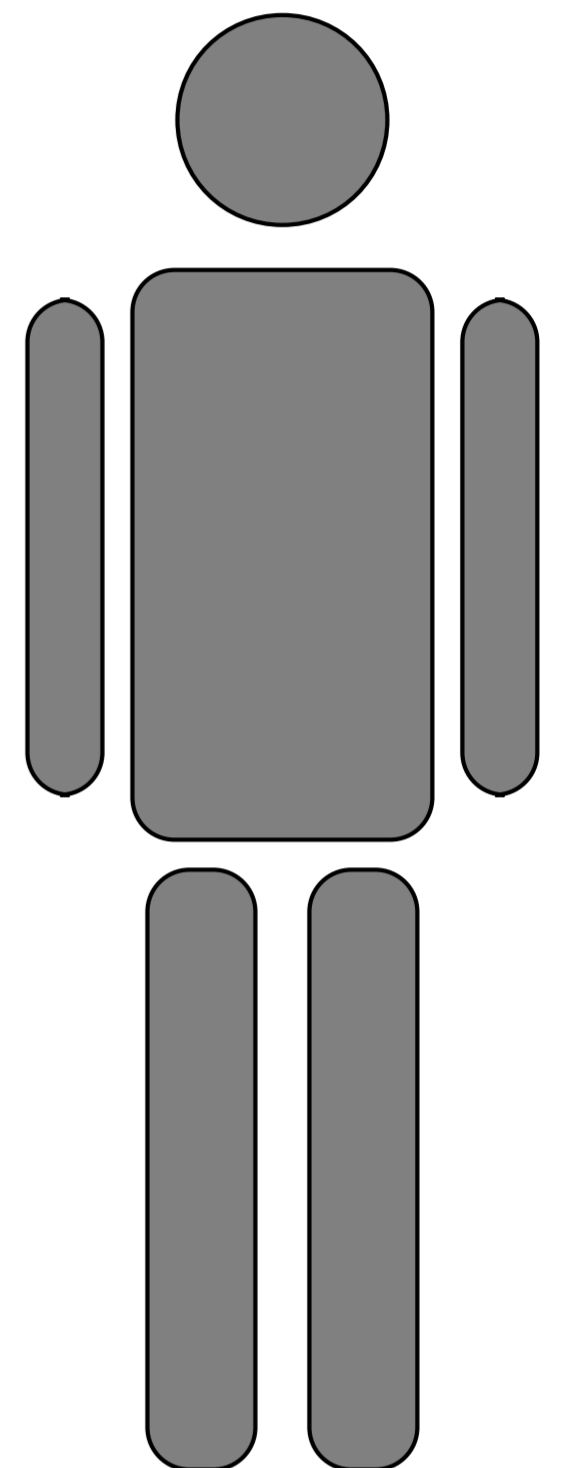
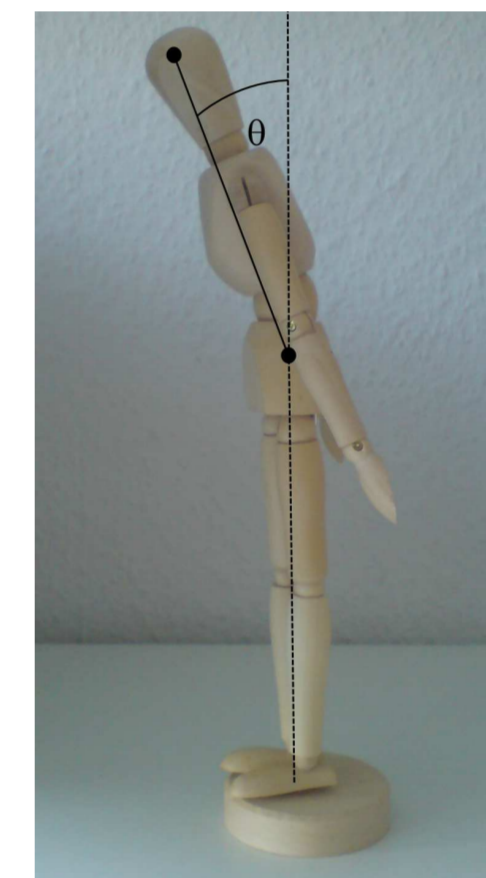
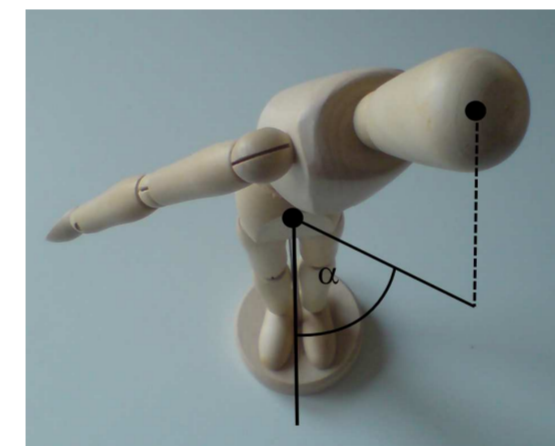
Robotino Detection

- Uses data from RGB-D camera (Kinect)
- Combines existing methods readily available in Point Cloud Library (PCL [1])
 - (1) learn a VFH model of the Robotino
 - (2) cluster points in scene (remove planes)
 - (3) use model on clusters to detect Robotino



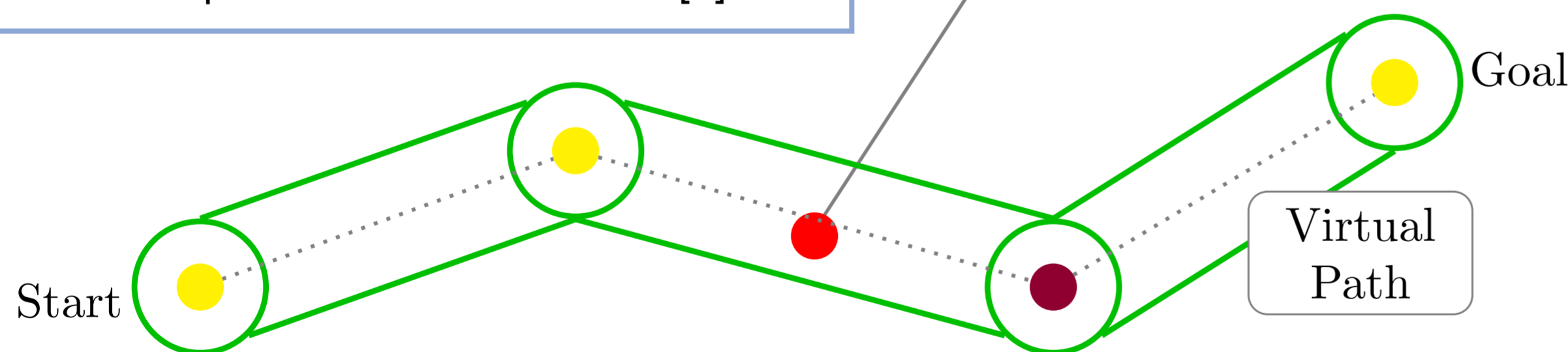
Body Posture Estimation

- Use point cloud but discard planes
- Find & verify human cluster by using Viewpoint Feature Histograms (VFH [2])
- Find hips and shoulders by clustering [3]
- Compute movement commands from
 - bending vector to upright
 - turning angle to front



Referee Robot CAESAR [7]

- Announces start and end of the game
- Autonomously follows Robotino [8]
- Checks position with localization [9]



Festo Robotino®

- Holonomic educational robot platform
- Controlled by player's torso movements

Control Software

- Component-based **open source** robot framework Fawkes [4] (<http://www.fawkesrobotics.org/>)
- Lua-based behavior engine [6] (available for Fawkes & ROS)
- Visualization using ROS' rviz [5]

Virtual Path

- Starting position, waypoints, and goal
- Move from point to point within tolerance corridor
- Levels of difficulty with tolerance width & length

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