

22.04.09







- Topic: Space Trash
 - Hot topic, doable, easy to transport the message
- Game Play
 - 2 teams of 3 players each have to collect trash in space against time
 - Different designs (input devices, avatars and installation)
 - Two groups Hackers and Old Men





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Concept and Game Play



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- Player Tasks
 - Each team consists of three players with a different task for each player
 - Control of the space ship (navigation 2 players)
 - Aiming and collecting trash (interaction 1 player)
- Rules
 - Game area filled with trash and satellites
 - Separate sectors available
 - Sectors have to cleared in a given time frame
 - After given time a new satellite is launched (bonus score if sector is cleared, danger of collision if thrash in the sector)
 - Collection of trash gives positive score
 - Collision with active satellites gives negative score

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Physical Interfaces



- Concepts
 - Intuitive input possible
 - Immediate mapping of user movements into the game
 - Use of real trash and used parts
 - Input measured by potentiometers and processed by Arduino boards



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Physical Interfaces



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• 3 users with 3 different physical interfaces per site





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Inverse Kinematics •

- Originates from robotics
- Typically used for simulation
- Robot arm of the space ship is controlled by IK simulation
- Finding of the position of the joints of the arm with information of base position and orientation as well as end effector transformation
- Two common approaches were implemented
 - Cyclic Coordinate Decent (CCD)
 - Jacobian Transpose



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Software Implementation



- Physics ٠
 - Implemented as an inVRs module
 - Wrapper using Open Dynamics Engine (ODE)
 - Simulation of Rigid Body Dynamics in general
 - Collision detection, Simulation, Result
 - Additional representation of simplified objects necessary to reduce needed processing power
 - Typically objects are represented by spheres, boxes and cylinders or a combination of these geometries



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Software Implementation



- Physics Problem Modelling ٠
 - Manual specification of physical representation
 - Finding an ideal representation is often complicated
 - · Inside of the objects is modelled
 - · Instability through proportions of length, width and height





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Software Implementation

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- Network •
 - Hybrid architecture
 - TCP for events, UDP for geometrical transformations





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