

# CSE 165: 3D User Interaction

Lecture #10: Travel Part 2

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# Announcements

- Homework Assignment #3
  - Due this Friday at 2pm

# Travel Techniques

- Physical locomotion (“natural” metaphors)
- Steering techniques
- Route planning
- Target-based techniques
- Manual manipulation
- Viewpoint orientation techniques

# Physical Locomotion Techniques

- Walking techniques
  - Large-scale tracking
  - Walking in place
- Treadmills
  - single-direction with steering (Gait Master)
  - omni-directional
- Bicycles
- Other physical motion techniques
  - Magic carpet
  - Disney's river raft ride



# Large Scale Tracking



# Omni-Directional Treadmill

- Video:
  - [http://www.youtube.com/watch?v=BQw1t\\_sgrJOs](http://www.youtube.com/watch?v=BQw1t_sgrJOs)



# Omni

- <https://www.kickstarter.com/projects/1944625487/omni-move-naturally-in-your-favorite-game>



# Gait Master

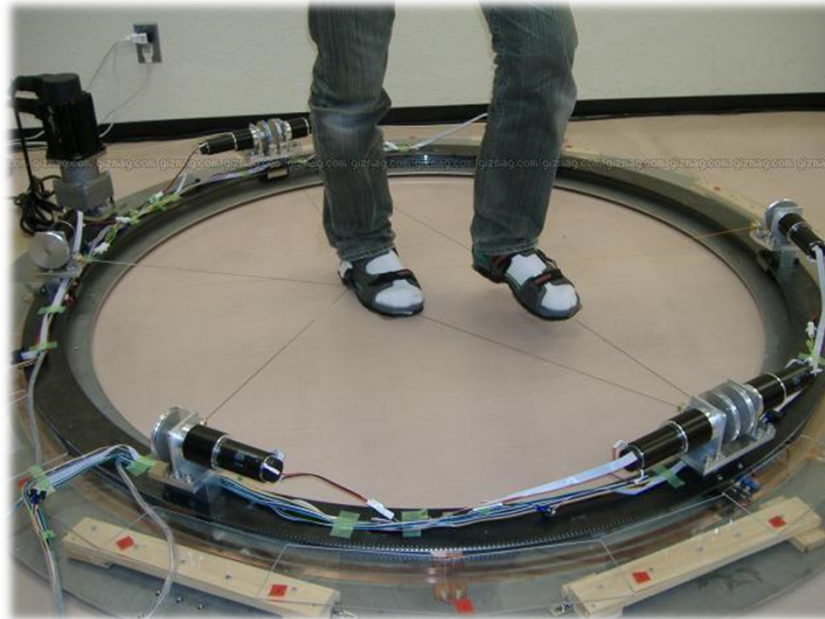
- Video
  - <http://www.youtube.com/watch?v=RDDH1iqoDzU>





# String Walker

- Video from Emerging Technologies, SIGGRAPH 2007
- <http://www.youtube.com/watch?v=hyLKjyL-Dw8>



# Steering Techniques

- Steering:
  - Continuous specification of direction of motion
- Techniques:
  - Eye gaze
  - Head direction
  - Hand pointing
  - Torso-directed
  - Physical device (steering wheel, etc.)

# Steering by Eye Gaze

- Move viewpoint in direction of eye gaze
- Gaze direction determined from eye tracker
- Cognitively simple
- Doesn't allow user to look to the side while traveling



# Steering by Head Orientation

- Move viewpoint in direction head is pointed
- Direction determined from head tracker
- Cognitively simple
- Allows user to look to the side while traveling, but hard to decouple eye gaze and head direction

# Steering by Pointing

- Similar to steering by head orientation, but uses hand tracker instead of head tracker
- Cognitively slightly more complex than steering by eye/head
- Allows travel and eye gaze in different directions

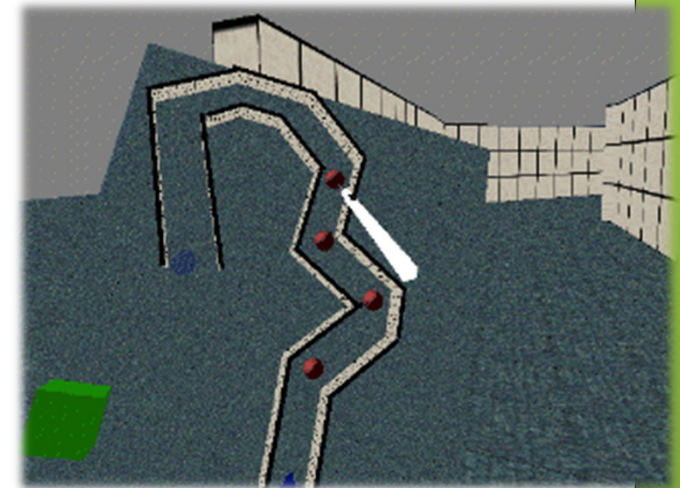
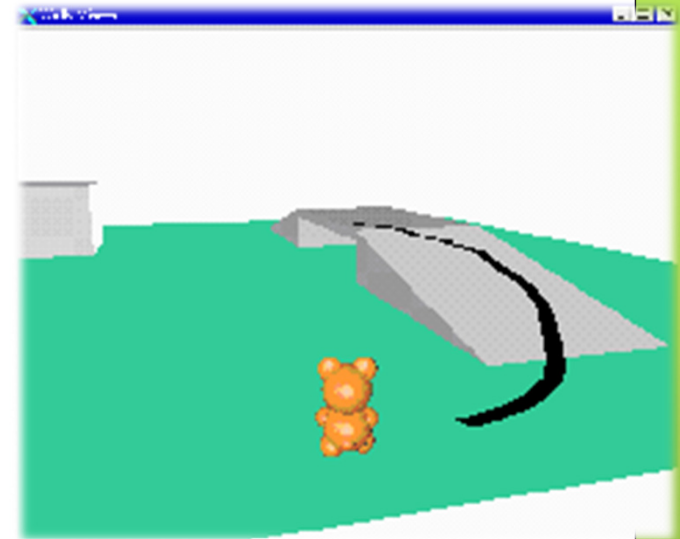
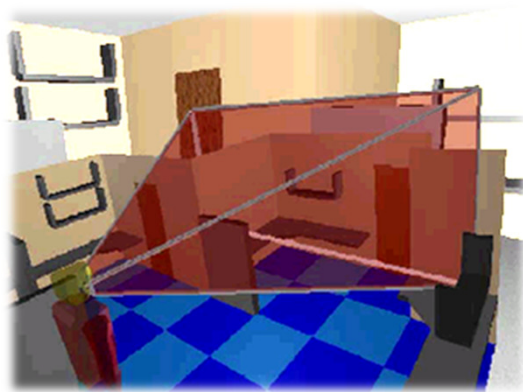
# castAR

- <https://www.youtube.com/watch?v=hL1qT0TK6aw>



# Route-Planning

- One-time specification of path
- Implementation:
  - Draw entire path
  - Specify points along path
  - Manipulate user representation



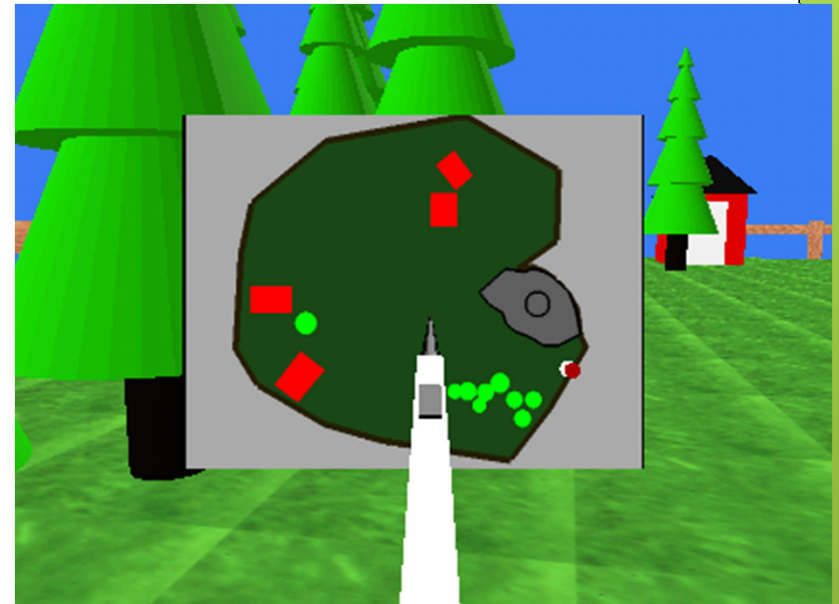
# Target-Based Techniques

- Direct specification of destination
- Techniques:
  - Point at target object
  - Choose target from list
  - Enter coordinates
  - Use Map/WIM



# Map-Based Travel Techniques

- User represented by icon on 2D map
- Drag icon with stylus to new location on map
- When released, viewpoint moves smoothly to new location



# Manual Manipulation – Grabbing the Air Technique

- Use hand gestures to move yourself through the world
- Metaphor of pulling a rope
- Can be one-handed, but often a two-handed technique
- Works well with Pinch Gloves or Razer Hydra

# Viewpoint Orientation Techniques

- Head tracking
- Orbital viewing
- Non-isomorphic rotation
- Virtual sphere (trackball)