The Mirage Simulator and Virtual Worlds

15-494 Cognitive Robotics
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What is Mirage?

• A virtual environment simulator for Tekkotsu.

• Built on top of:
  – OGRE3D rendering engine
  – Bullet physics engine

• Provides Tekkotsu with simulated camera images and sensory inputs (e.g., bump sensors on the Create).

• Provides the user with a 3D rendering of a simulated robot and its environment.

• See the Tekkotsu wiki for documentation.
Mirage Demo Video
Running Mirage

Make three tabs in your terminal window:

- Third tab:
  
  $ ControllerGUI localhost

- Second tab:
  
  $ cd /usr/local/Tekkotsu/tools/mirage
  $ ./mirage worlds/tic-tac-toe.mirage

- First tab:
  
  $ cd ~/project
  $ ./tekkotsu-CREATE -c mirage.plist
Mirage Command Summary

• Viewpoint motion:
  
  w = forward, s = back
  a = move left, d = move right
  PageUp = climb, PageDown = descend
  Arrow keys = pitch and yaw

• Other basic commands:
  
  r = reload the world
  control-f = follow mode (view follows the robot)
  u = unfollow / view reset
  t = print statistics
  q = quit

• See the Tekkotsu wiki for additional commands.
Mirage Worlds

- World files with extension .mirage are xml files: human readable but ugly.
- Specify world file on the command line and it will be loaded by Mirage during startup.
- Tekkotsu includes a collection of predefined worlds in
  /usr/local/Tekkotsu/tools/mirage/worlds
- Mazegen is a tool for generating maze worlds of various sizes; it outputs the maze as a .mirage file.
Mirage World Builder Tool

- Provides a convenient, simple syntax for constructing Mirage worlds.
- Source files have extension .ian.
- WorldBuilder tool translates these into .mirage files.
- Most Mirage worlds are built using this tool; the source for these worlds can be found in:
  
  /usr/local/Tekkotsu/tools/mirage/worlds/src

- Users can put their own world files in
  ~/project/worlds
World Builder Language

define gridcube cube scale=(20,20,20) material=Pink

gridcube location=(0,0,0)  
gridcube location=(-40,0,0)  
gridcube location=(40,0,0)

gridcube location=(0,40,0)  
gridcube location=(-40,40,0)  
gridcube location=(40,40,0)

gridcube location=(0,-40,0)  
gridcube location=(-40,-40,0)  
gridcube location=(40,-40,0)

There are many other features, such as control of light sources, gravity, mass of objects, etc. See the Tekkotsu wiki for link to the world builder page.