RhinoArm

Jeff Caley
XR-3 Robotic Arm
The System

Robot Arm
Controller
Computer
Robot Arm

6 motors

5 Axes

Motor "F" Body Rotation - 350 degrees
Motor "E" Shoulder Rotation - 210 degrees
Motor "D" Elbow Rotation - 265 degrees
Motor "C" Wrist Rotation - 310 degrees
Motor "B" Gripper Rotation - +/- 7

C - .0793 degrees
D - .1145 degrees
E - .1145 degrees
F - .1374 degrees

Friday, December 10, 2010
Goal

- Talk to Robot
- C#
- Inverse Kinematics Problem
- A* Search
Tree Expand

Start

A
Joint Positions A,B,C,D

OpenList = A
ClosedList = Null
Tree Expand

Start

A
Joint Positions A,B,C,D

OpenList = B,C,D,E,F,G,H,I
ClosedList = A

B
Joint Positions A+1,B,C,D

C
Joint Positions A-1,B,C,D

D
Joint Positions A,B+1,C,D

E
Joint Positions A,B-1,C,D

F
Joint Positions A,B,C+1,D

G
Joint Positions A,B,C-1,D

H
Joint Positions A,B,C,D+1

I
Joint Positions A,B,C,D-1

Cost

Estimated Cost to Goal
Heuristic

Straight Line Path

Robot

Cost

Estimated Distance

Goal

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Heuristic

Not Really $A^*$

Estimated Distance($A$) - Estimated Distance($A$-Child)

Average

Estimated Distance

Robot  Cost  Goal

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Robot Control

Serial Communication

ASCII commands

Optical Motor Control

“C1\r”

C - .0793 degrees

D - .1145 degrees

E - .1145 degrees

F - .1374 degrees
Issues

- Heuristic
- Communicating via Serial Port
- Unity to Serial
- Robot HOME
Serial Communication

- **9-25 Pin Adapter**
- **25-25 Pin Null Modem Cable**

<table>
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<tr>
<th>COMPUTER</th>
<th>MARK III</th>
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<tbody>
<tr>
<td>Pin 2</td>
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<td>Pin 8</td>
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Unity to Serial

- Unity can’t talk to Serial
- Export to XML
- Input and Run in Separate Program
Robot HOME

- Microswitches
- Register shift
- "\l r" returns #
The End

Questions?