CSCI598A: Robot Intelligence

Jan. 15, 2015
Objectives of THIS RI Course

• **Motivation:** my students motivated!!!
• **Theories:** Introduce my students the state-of-the-art research on robot intelligence
• **Application:** Instruct my students construct a working intelligent robotic system
• **Skills:** Improve my students’ other skills, including paper writing, presentation, and teaming working
Theoretical Topics We’ll Cover

• Robot perception
• Object recognition and pose estimation
• Grasping, manipulation, and motion planning
• Time reasoning
  • Motion trajectory learning
  • Task abstraction

You will have the opportunity to implement the algorithms on real robots
Practical Objective

http://amazonpickingchallenge.org/
Amazon Robot Picking Challenge

• Motivation:

• Currently, Amazon's automated warehouses are successful at moving and searching for items within a warehouse.
Amazon Robot Picking Challenge

https://www.youtube.com/watch?v=Fdd6sQ8Cbe0
Amazon Robot Picking Challenge

• Motivation:

  • Currently, Amazon's automated warehouses are successful at moving and searching for items within a warehouse.

  • However... Picking up and sorting the items are still manually performed by human works; commercially viable automated picking in unstructured environments still remains a difficult challenge.
Amazon Robot Picking Challenge

• Procedures:
  • Contestants' robots will be placed in front of a stationary Kiva shelf.
  • The contest shelf will be relatively lightly populated, with many of the bins holding only a single item,
  • A few holding multiple copies of the same item.
  • A few bins may hold multiple different items.

Competition shelves and products will be provided from Amazon
Amazon Robot Picking Challenge

http://rll.berkeley.edu/amazon_picking_challenge/

Competition shelves and products will be provided from Amazon
Amazon Robot Picking Challenge

• **Procedures:**
  • Bin Stocking
  • Robot Workcell
  • Shelf

• **Objective:** Move items from the shelf into the order bin in the robot workcell

Competition shelves and products will be provided from Amazon
# Amazon Robot Picking Challenge

<table>
<thead>
<tr>
<th>Task Description</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td>Moving a target item from a multi-item shelf bin into the order bin</td>
<td>+20 points</td>
</tr>
<tr>
<td>Moving a target item from a double-item shelf bin into the order bin</td>
<td>+15 points</td>
</tr>
<tr>
<td>Moving a target item from a single-item shelf bin into the order bin</td>
<td>+10 points</td>
</tr>
<tr>
<td>Target Object Bonus</td>
<td>+TBD (0 to 5) points</td>
</tr>
<tr>
<td>Moving a non-target item out of a shelf bin (and not replacing it)</td>
<td>-12 points</td>
</tr>
<tr>
<td>Damaging any item or packaging</td>
<td>-5 points</td>
</tr>
<tr>
<td>Dropping a target item from a height above 0.3 meters</td>
<td>-3 points</td>
</tr>
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Robot to use: The Baxter Robot