Robotic Grasping and Manipulation Competition @ IROS2016

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Organizing Committee Chair
Organizing Committee Members

• Yu Sun, University of South Florida
• Nadia Cheng, RightHand Robotics
• Hyouk Ryeol Choi, Sungkyunkwan University
• Zoe Doulgeri, Aristotle University of Thessaloniki
• Erik D. Engeberg, Florida Atlantic University
• Kris Hauser, Duke University
• Joseph Falco, NIST
• Nancy Pollard, CMU
• Maximo Roa, DLR
• Zeyang Xia, Shenzhen Institutes of Advanced Technology
Tasks

• Pool: 18 manipulation tasks, 20 objects
• 9 tasks and 10 objects were published 2 months before the competition
• 10 tasks and 10 objects were randomly selected from the pool one month before the competition
• All tasks in the competition were released to the contestants one week before the competition
• All setups and objects in the competition were available for test 2 days before the competition
Rules

• Track 1: Hand-in-hand grasping
  • Stage 1: Pick-and-place, 10 objects from a shopping baskets
  • Stage 2: Manipulation, 10 manipulation tasks

• Track 2: Fully autonomous
  • Stage 1: Pick-and-place
  • Stage 2: Manipulation

• Track 3: Simulation track

The total scores earned in both stages are accumulated and used to rank the contestants. If there is a tie, the contestant using the least amount of time has the advantage.
Support from IROS2016

• $5,000 for competition setup

• Travel support
  • $2,000 for out of Asia
  • $1,000 for out of South Korea, in Asia
  • $500 for in South Korea

• Venue, 30 desks, 60 chairs, and 30 power supplies

• 14 volunteers
Prizes and Sponsors

• Full automatic:
  • First place, 2 Robotous 6-axis F/T force sensors + $500 (From Robotous)
  • Second place, 1 OptoForce 6-axis F/T sensor

• Hand-in-hand:
  • First place, 2 Robotous 6-axis F/T force sensors + $500 (From Robotous)
  • Second place, 1 Robotous 6-axis F/T force sensor
  • Third place, RightHand Robotics One TakkTile Starter Kit

• Simulation:
  • First Place, 6 months loan of the ReFlex TakkTile robotic gripper
Preparation -- Layout
Venue
Schedule

- Oct. 10, 8:30am-12:00pm, Dry-run
- Oct. 11, 1:30pm-3:30pm, Manipulation, track 1
- Oct. 11, 4:00pm-6:00pm, Manipulation, track 2
- Oct. 12, 9:00am-9:30am, pick-and-place, track 3
- Oct. 12, 10:00am-10:30am, pick-and-place, track 2
- Oct. 12, 11:00am-11:30am, pick-and-place, track 1
Objects and Tasks
Team: Dorabot&Cobot
Team: Northeastern University (China)
Team: UNIPI-IIT-QB
George Mason University
Team: SungKungKwan University
Team: Tsinghua University
Team: University of Colorado at Boulder
Day 1 -- Manipulation
• Use a spoon to pick up peas
• Hang towel on rack
• Use a spoon to stir water in a cup
• Shake salt shaker
• Plug into a socket
• Hammer a nail
• Transfer straw into a to-go cup with lid
• Putting on or removing bolts from nuts with a
• Extend and press syringe
• Cut paper
Track 1 – Hand-in-Hand
Track 2 – Full Autonomous
Day 2 – Pick-and-Place
Track 3 -- Simulation
Track 2 – Full Autonomous
Track 1 – Hand-in-Hand
Volunteers

Scorers

Hand-in-hand volunteers
Decision Process

- Scores given by the volunteer scorers
- Reviewed videos by the Organizing Committee members
Scores for Winning Teams

• Track 1 (total 300 pts)
  1. UNIPI-IIT-QB: 300 pts, Time: 22.28+1.08 min
  2. University of Colorado at Boulder: 300 pts, Time: 32.12+11.04 min
  3. Tsinghua University: 299 pts

• Track 2 (total 300 pts)
  1. Tsinghua University: 165 pts
  2. Dorabot&Cobot: 155 pts

• Track 3 (total 45)
  1. Duke University: 26 pts
Full Score Board

• Track 1
  1. UNIPI-IIT-QB: 300 pts, Time: 22.28+1.08 min
  2. University of Colorado at Boulder: 300 pts, Time: 32.12+11.04 min
  3. Tsinghua University: 299 pts
  4. Dorabot&Cobot: 296 pts
  5. George Mason University: 259 pts
  6. Northeastern University: 225 pts

• Track 2
  1. Tsinghua University: 165 pts
  2. Dorabot&Cobot: 155 pts
  3. University of Colorado at Boulder: 100 pts
  4. SungKungKwan University: 55 pts
  5. George Mason University: 20 pts

• Track 3
  1. Duke University: 26 pts
  2. Dorabot&Cobot: 15.53 pts
  3. UNIPI-IIT-QB: 15 pts
  4. KGPGMR: 6 pts
Awards