Perception – Small Group Discussion

Goals

- What specific sensors (e.g. LIDAR) do you absolutely need ?
- What extra sensors would be nice to have?

Method: Small Group Discussion and Website

- Group 1 Grasping & Software(e.g. cameras on hand) **Dmitry** (lead), Hao, Kris
  Rm. This room

- Group 2 Guidance (e.g. sensors in the legs) **Yuan** (lead), George
  Rm. MEM Dept Main Office

- Group 3 Hand tools (e.g. due to “dynamic event”) **Matt** (lead), and Christopher, Mike
  Rm. Down the hall

Group 1 Grasping & Software(e.g. cameras on hand) **Dmitry** (lead), Hao, Kris

1. Where would we mount the wrist camera/point cloud sensor on the new Hubo if we chose to use it?

2. It seems touch-type sensors are more useful for adjusting grasp than near-range laser/camera. Is this consistent with others' tasks?

3. Are the Force-Torque sensors being considered for the wrists 3 or 6 DOF?

4. If we get rid of the proximity sensor on hand, can we get an encoder on fingers instead? (i.e. does it require similar amount of wires/electronics?)

5. Is there any sensor out there that can operate outdoors which has a minimum range less than or equal to 35 cm?

6. Is it possible to get a telescoping sensor mount for the head?

Group 2 Guidance (e.g. sensors in the legs) **Yuan** (lead), George

1. Our discussion was mainly on how we can identify the contact points (possible footholds).

2. Should we use a MicroCam for rough terrain detection? We could use distance sensors at each edge of the foot to identify the terrain.

3. We may need to have some sensors that works with a motion that circle around initial candidate of the contact point to find out the good location for the feet to land?

4. We can add a layer to the feet that has a pattern of short-range sensors that will make sure the center of each foot will be in full contact with the ground (rungs, rough terrain, and etc.).

Group 3 Hand tools (e.g. “dynamic event”) **Matt** (lead), and Christopher, Mike

1. Should we have a separate “sensor tripod”? Pro: stable platform, good feedback of robot positions, don’t worry about minimum sensing range. Con: More parts…

2. Should we have an API/environment for basic primitive fitting/finding with point clouds?
- plane
- box (ladder rails)
- cylinder (door handle, ladder steps)
- blob (rubble)

If so, who will take point on that?

3. What can we do for outdoor sensing?
- stereo needs texture
- primesense washes out in bright sunlight
- Christopher R. is 2 mos. away from evaluation of sensors for driving

4. Can we initiate communications with PrimeSense/Willow Garage on how they rolled their own structured light solution? Can it be bright enough to work outdoors in direct sunlight?

Group 3 Hand tools (e.g. “dynamic event”) **Matt** (lead), and Christopher, Mike

5. Sensor head alpha (0.1) – Paul: can we get a standard configuration of RGBD cameras and a solution to mount repeatably on current Hubos for each team? Rob & Matt can pick location and figure out how to calibrate.

6. When can we identify a beta (v0.9) suite of sensors for the head?
- DRC “boot camp” happens in late June/early July. What is going to go on that robot?

7. Should we have sensors at the wrists/feet? “Crotch cam”?

8. Pan-tilt for head has singularities. Especially when quadruped walking. Can we get 3DOF gimbal?

9. Can someone take responsibility for teaching tools/software for perception? My first PCL tutorial.

10. Non-perception Q’s:
Driving: How do we calibrate steering wheel/pedals for car?
Driving: Can we make a slip ring for hand yaw? 360deg continuous rotation?