

NASA Sample Return Challenge

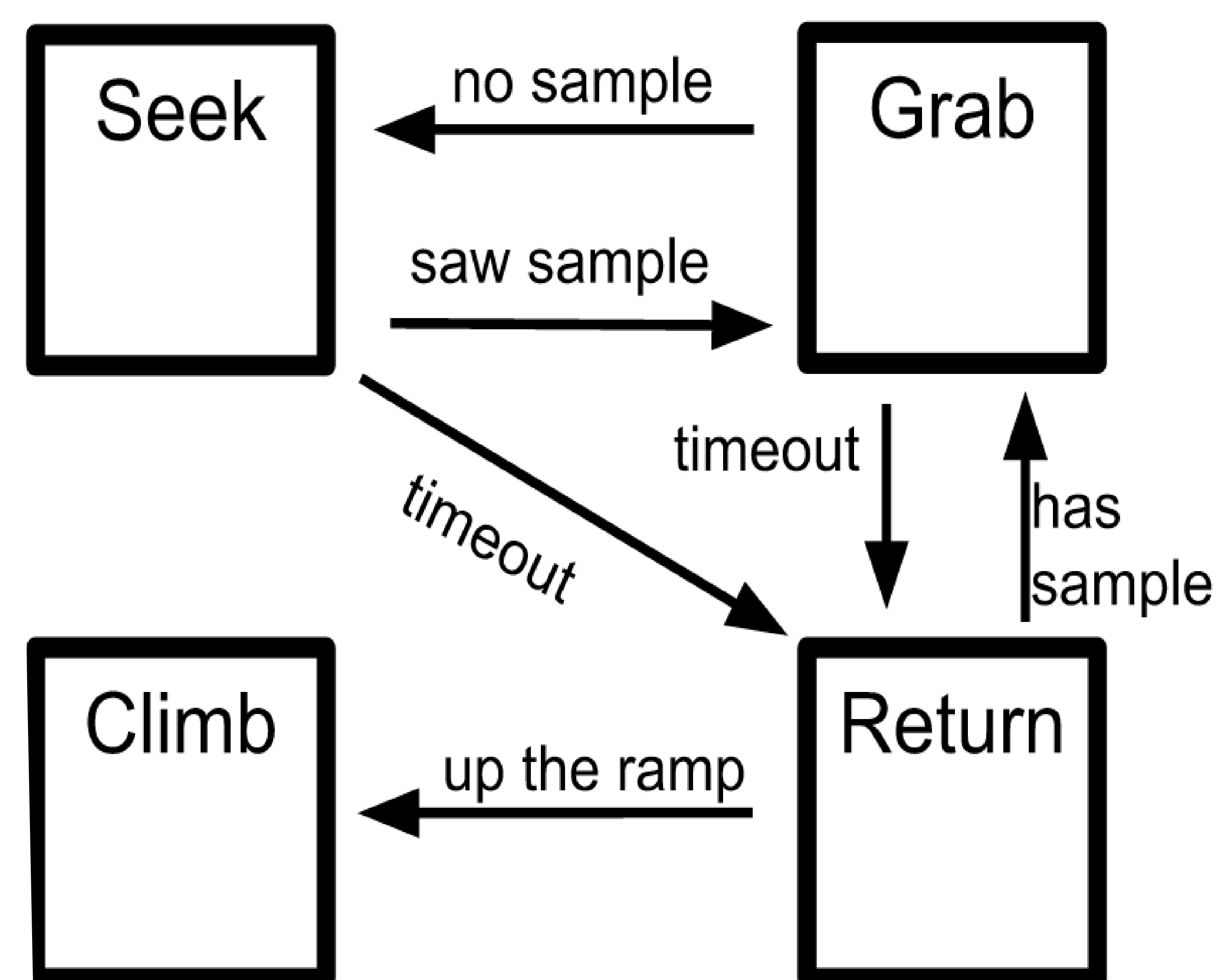
About the challenge

- * Leave a base, identify samples, grab them, return to base
- * No Earth-only sensors (GPS, compass, etc)



Testing field with fiducials

Finite State Machine!



Computational Robotics Final Project
Fall 2014 | Olin College of Engineering
Franz Schneider & Emily Wang

Grab a sample

- * Drive towards where the sample was last seen (where it's been placed on the map)
- * Try to re-orient the robot so that it's lined up with the fiducial, drive over the sample
- * We placed a focus on running over samples head-on because in the actual competition you might need to approach the sample in a certain way for grabbing

Seek for samples

- * Drive out along the x or y axis for a given radius. At the radius, spin a full 360°. If a sample was seen, grab the sample
- * If a sample was not seen, return to base and choose another axis. Repeat with increasing radii

Return to base

- * When the arbitrary timeout is reached, head back to base (point 0, 0)
- * Grab times out after Seek to give the robot a little more time to grab an object

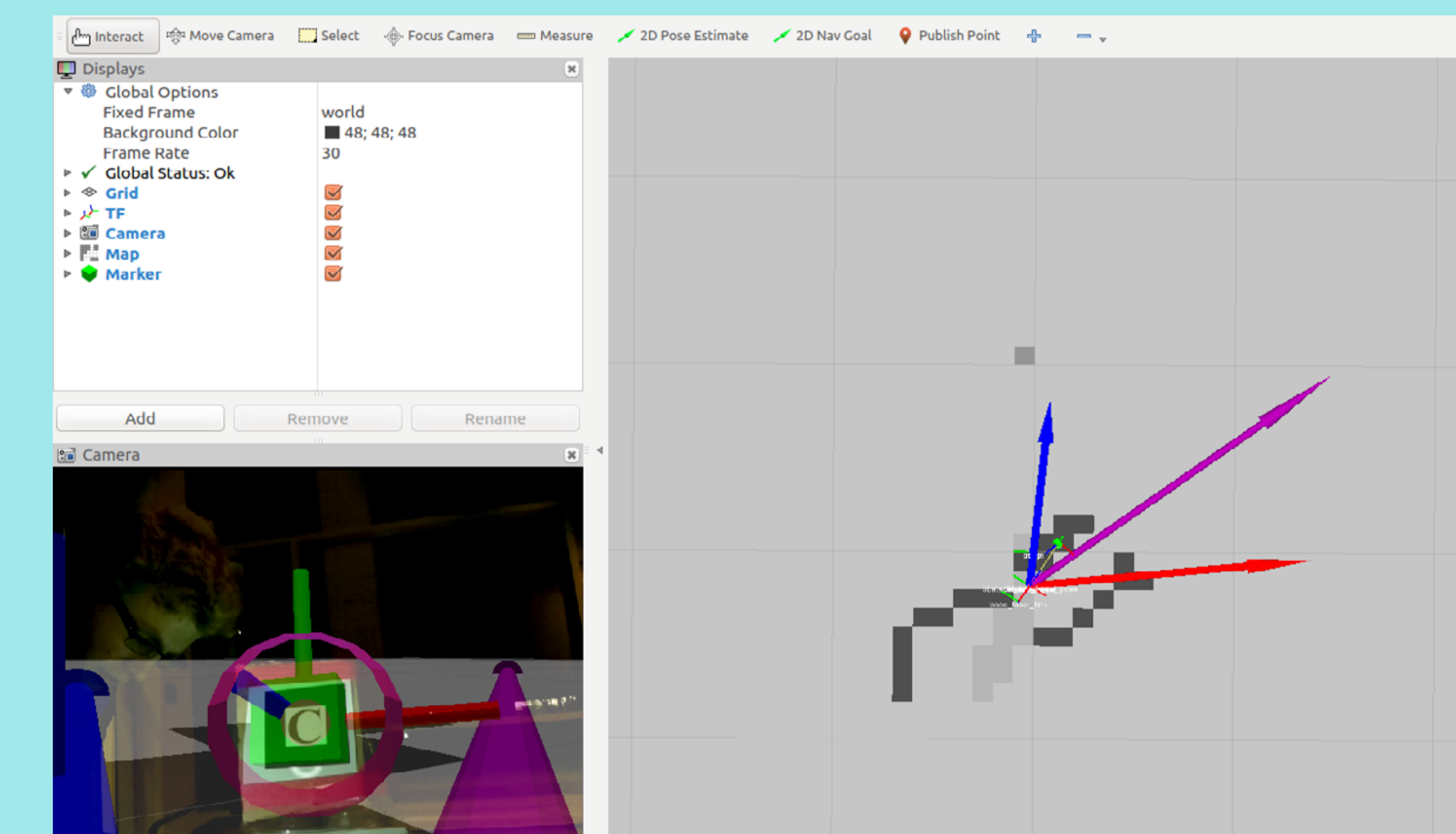
Climb ramp

- * Unimplemented. In the competition the robot needs to place itself on a base ramp

MVP

A simple, integrated implementation of everything:

- * Search for samples
- * Drive over samples when lined up head-on
- * Record grabbed samples
- * Return to origin at timeout



RVIZ tools for debugging

Future Work

- * More sophisticated path planning
- * Return to base along previously travelled, "safe" paths
- * Do a better job of sensor fusion for position - Kalman filter?
- * Try more sensors, like an accelerometer