NOVEL
Weekly Progress Report #5
Raphael Norman-Tenazas, Thomas Keady, Austin Shin
5/1/2019

Weekly Meeting with Project Advisor

Date and location: 4/30 Hodson 210
Members present: Thomas Keady, Austin Shin
Members absent: Raphael Norman-Tenazas
Topics discussed: progress update, updating map for move_base node, how to prevent re-detecting same objects for LIDAR, prioritization between LIDAR detected objects and marker-detected objects, how to prioritize multiple objects detected by LIDAR

This Week's Goals

Based on our previous weekly report, the goals for this week were:

- **Raphael**:
  - Improve localization
  - HARDWARE TESTS
- **Thomas**:
  - Identify and if necessary fix possible bug in real-world navigation launch file
  - Integrate other nodes into real-world navigation launch file
- **Austin**:
  - Test ArUco marker detection on hardware
  - If we construct a map of the room we plan to use, then also test the action node on hardware
    - Need to especially test if path will change if new marker detected while executing a path

This Week's Progress

- **Raphael**:
  - **Week's Goals Accomplished:**
    - Tested and bugfixed lidar object detection on hardware -- works, still a few false positives.
    - Wrote dumb but good enough phase matching (minimizes error between expected and real scan over all possible angles)

        - Rewrote launch files to simplify them
    - **Week's Goals Not Accomplished:**
        - N/A
- **Thomas:**
    - **Week's Goals Accomplished:**
        - Bug in launch file is not a bug (I think)
    - **Week's Goals Not Accomplished:**
        - Action node is mostly working in hardware, still some issues though
- **Austin:**
    - **Week's Goals Accomplished:**
        - Marker detection using onboard Kinect works
            - Approximate error in simulation seems to be 2 cm in depth translation for every meter the marker is from the robot
            - Not sure what approximate error is on actual hardware
        - Basic testing of action node seems to be functional
            - Robot runs away to different point on map when detecting "run-away" marker
            - Robot approaches and orients itself towards marker if it wants a better view
    - **Week's Goals Not Accomplished:**
        - Probably need to do more in-depth testing
            - Does the robot perform expected behavior for multiple markers in the map and for when it detects both a marker to run away from and another marker to get a better look at in the same frame

Changes in Project Scope/Goals

We believe that detecting / tracking moving novel objects will not be something we can accomplish.

Lessons Learned

- **Raphael**:
    - Maintaining port names is harder than expected. Sometimes the mobile base would go to ttyUSB0 and the lidar to ttyUSB1 but sometimes it was flipped.
- **Thomas**:

    - Garbage in, garbage out (but I already knew that lol)
- **Austin**:
    - Dynamically updating map through code for move_base node seems to be a mystery, git issues seem to say node needs to be shut down and restarted. A naive solution that may work is just to directly publish to /map topic, but don't know if global and local costmaps will also be recalculated

<u>Next Week's Goals</u>

Slightly altered from our project proposal and incorporating our lessons learned, next week's goals are:

- **Raphael**:
    - Write a node to unify measurements from the lidar and from the ar detection node using a GMM
- **Thomas**:
    - Continue hardware integration
    - Try out idea to prevent repeated detection of the same novel objects
    - Assist Raph with GMM idea
- **Austin**:
    - Perform in-depth testing of action node mentioned in "This Week's Progress" section
    - Integrate all that is launched in action node with rest of system

These goals have been updated due to missing a few testing goals this week. The changes have been *italicized.*