**Calibrate Cameras**

1. Same as Minibot’s calibrate cameras, except there’s one camera

**Locate Origin**

Set camera facing north = 90 degrees

3. Run locate cameras from Minibot vision.

**Locate Tags**

4 & 5 & 7. Run locate tags from Minibot vision.

Implement Unordered\_map\_tags (O(1) complexity) with viewers <tag id, x, y, z>

If (tag id != any tag id in unordered map){

add <tag id, x, y, z> to the unordered map

}

If picture of origin and wall tag, <x,y, z> = <x, y, z>

Have another variable that tracks rotation of R2 (can communicate with encoder) (in radians)

If picture of existing wall tag (a) and new wall tag (b), <b.x, b.y, b.z> = <a.x, a.y, a.z> - <(apriltags.x\*cos(rot) + sin(rot) \* apriltags.y), (apriltags.x\* sin(rot) - cos(rot) \* apriltags.y), a priltags.z>

**9. Find\_Location**

Set camera facing north = 90 degrees

Have another variable that tracks rotation of R2 (can communicate with encoder) (in radians)

If (camera detects tag){

Find location of tag (a) in unordered\_map

Find location of camera (b): <b.x, b.y, b.z> = <a.x, a.y, a.z> - <(apriltags.x\*cos(rot) + sin(rot) \* apriltags.y), (apriltags.x\*sin(rot) - cos(rot) \* apriltags.y), apriltags.z>

}

If (told to get to location of object with tag ID){

Finds location of tag ID in unordered\_map

}

**Instructions to User:**

1. Calibrate the camera (calibrate cameras)
2. Put the origin tag facing what you want as “north”
   1. X (- towards workstation), Y (towards stairs), Z (towards ceiling) coordinates
3. Take picture of origin tag
4. With camera still on, take picture of origin tag and another tag on wall (closer the more accurate)
5. Take picture of another tag on wall or origin and a new tag on the wall
   1. Repeat 4 until all tags on walls are taken.
6. Place tags on objects in the lab space.
7. Take pictures of tags on objects and a tag on the wall.
   1. If you want, give a name to each tag (“hockey table” = tag ID 7)
   2. Repeat 7 until all tags on objects are taken on the lab space
8. Remove tags on objects. Now we are done with the setup.
9. Tell R2 to go to hockey table. It will get there
10. Calibrate\_cameras
11. Setup\_tags
    1. Add unordered map
       1. Add origin tag inside unordered map
    2. Define rotation with the algorithm (maybe)
    3. Combine locate\_cameras and locate\_tags
       1. origin tag = tag id in unordered map
       2. Add algorithm to make XYZ constant (maybe)
       3. NewTagXYZ = OldTagXYZ – result
    4. If (tag id != any tag id in unordered map){

append <tag id, x, y, z> to the unordered map}

1. Find\_location
   1. If (camera detects tag){

Find location of tag (a) in unordered\_map

Find location of camera (b): <b.x, b.y, b.z> = <a.x, a.y, a.z> - <(apriltags.x\*cos(rot) + sin(rot) \* apriltags.y), (apriltags.x\*sin(rot) - cos(rot) \* apriltags.y), apriltags.z>

}