C23 – Object Recognition Module.

What's new :

1. Better and improved detection.
2. Tasks now always return with success or failure. And if success, they continue to publish the robot coordinates.
3. Added learnObject task
4. Changed the task names according to conventions:
    1. searchObject(target=<>)
    2. trackObject(target=<>)
5. Working with higher resolution (80% of original camera resolution) which allows better detection.

Known issues:

1. Might not detect the objects from all angles, move the object around and it will be detected.
2. Does not gives the contour of the object.
3. searchObject doens't move the head, instead, it just waists a few seconds in a loop ...

Development plan:

1. Using SVM Classifiers with sift or other features extraction algorithm
2. Giving the contour of the detected objects.

Capabilities:

The module defines 3 tasks:

1. searchObject(target=<target>) (see list below for targets), this task will active-search for the target in the current robot position, with the ability to move the head in order to detect the object, if the target found, the task will return with SUCCESS, and will continue publishing on the topics, objectDetected, and objectDimensions the robot coordinates in the format x,y,width,heigh. Where x,y is the top right corner. If the robot isnt' found, the task will return with FAILURE.
2. trackObject(target=<target>), this task will passive-search for the target in the current robot position without moving the head. Same behavior as searchObject, but doesn't move anything.
3. learnObject(target=<target>), this task gives the use the ability to control the module and learn a new object. When called, a new window with the robot's camera will be opened, the user can select any object with the mouse starting from the **top right corner**, then pressing **enter**. By doing this, the module will learn the new object and save it under **models**/ make sure there's no another model with the same name under models otherwise it will be **overridden**!. After selecting the object and pressing enter, **move it** around in order to learn it with different angles. After moving it around in all desired angles and places, **press S** in the image window in order to **save it**. After that kill the task by pressing **CTRL+C**.

How to:

In order to test the task do the following:

1. run the atlas/gazebo environment:
    - roslaunch atlas_utils atlas.launch
2. run the module
    - rosrun C23_ObjectRecognition c23 /multisense_sl/camera/left/image_color /multisense_sl/camera/right/image_color

3. run the task tester
    - rosrun C0_RobilTask task_tester <searchObject|trackObject|learnObject> time=-1 arg=target=<target>

List of objects:

- CAR_DRIVER
- CAR_PASSENGER
- CAR_FRONT
- CAR_REAR
- CAR_STEERING_WHEEL (needs learning)
- CAR_PEDALS (needs learning)
- CAR_HANDBRAKE (needs learning)
- ITEM_STANDPIPE (needs learning)
- ITEM_FIRE_HOSE (needs learning)