

Development of intelligent systems (RInS)

Task 1: Autonomous navigation and human search

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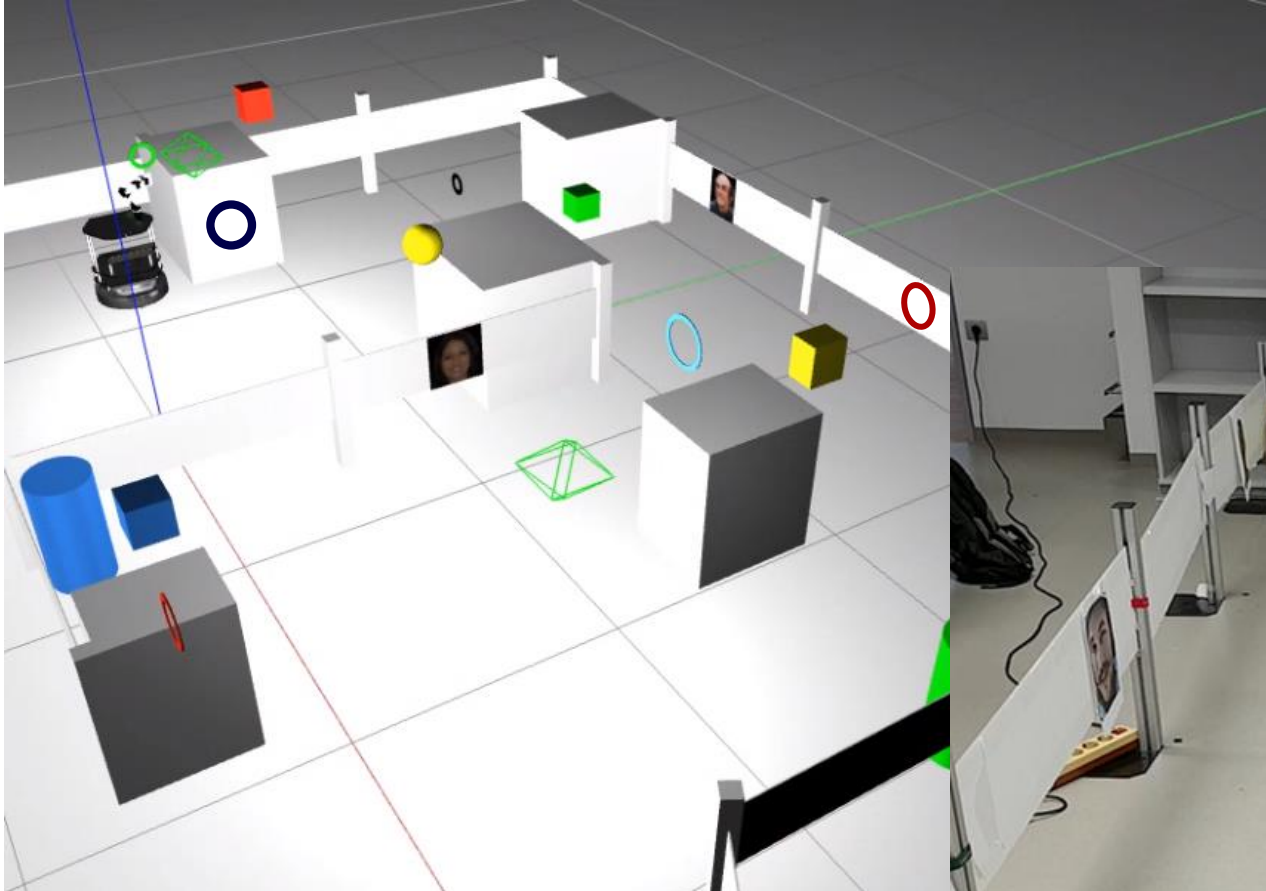
Faculty of Computer and Information Science

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Evaluation rules

- Setup:
 - fenced area
 - three printed faces (withouth masks) at random places
 - starting position
- Task:
 - build the map of the competition area
 - search the space and look for faces
 - when a face is detected pass by or approach (and greet) the face
 - when all three faces are detected, stop
 - do not redetect the same face
 - do not detect false detections
- Goals:
 - the robot should detect as many faces as possible
 - the robot should not detect something else as a face
 - perform the task as fast as possible

Evaluation setup



First in simulator

Until the end of semester
on a real robot



Evaluation protocol

- The evaluation course will be set up in advance
- The teams will be allowed to build the map in advance
- The faces will be positioned on the day of the evaluation
- The positions of the faces should not be hand coded
- The robot search goal positions can be hand coded
- The robot has to operate completely autonomously
- The teams will be allowed to tune the parameters

- The teams should be ready before the start of evaluation
- Every team will be able to run their robot twice

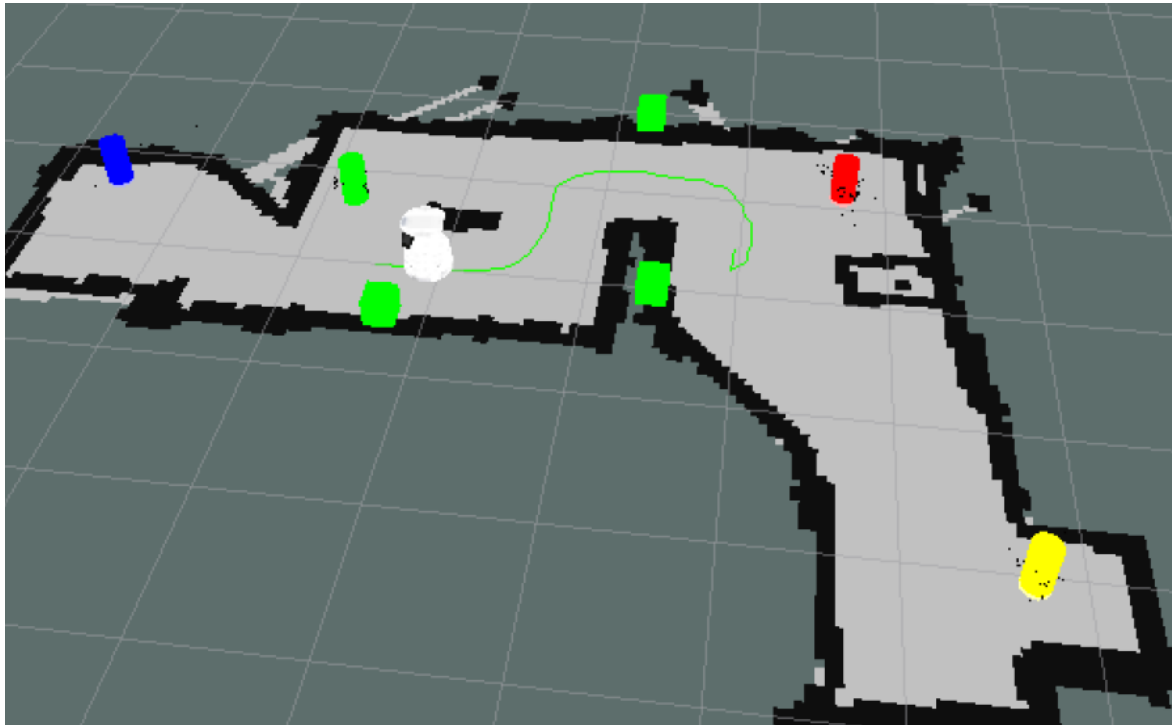
- The evaluation in simulation will be held on 25. 3.
- The evaluation with a real robot should be presented until 27. 5.

Evaluation criteria

- Measuring:
 - number of faces correctly detected
 - number of faces correctly passed by
 - number of faces correctly approached (and greeted)
 - number of redetected faces
 - number of false detections
 - the time until the robot stops
- But also:
 - Robustness of the performance
 - Repeatability
 - Innovation
 - Clarity of demonstration
 - Elegance of solution

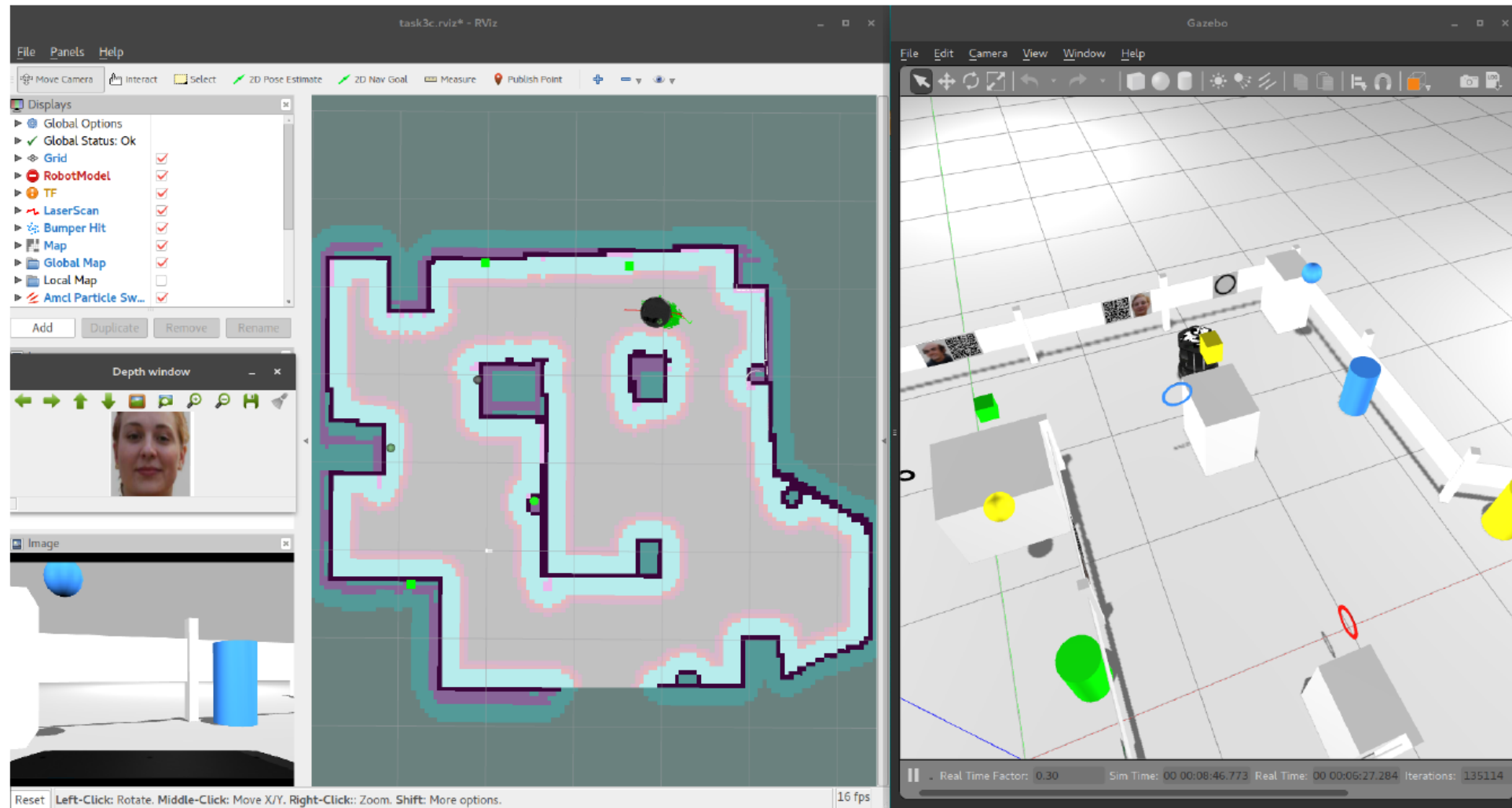
Demonstration

- Demonstrate what is going on in the robot
 - visualisation of detected locations
 - mark locations in RViz
 - verbalisation of detections
 - simple speech synthesis (greeting)



Presentation

- (Gazebo), RVIZ, camera view as well as images of detected faces should be shown



Tasks

- System setup
 - Running ROS Task 1
 - Tele-operating TurtleBot Task 2
- Autonomous navigation Task 3
 - Autonomous control of the mobile platform
 - Acquiring images and 3D information
 - Simultaneous mapping and localization (SLAM)
 - Path planning, obstacle avoidance, approaching
 - Advanced fine manoeuvring and parking
 - Intelligent navigation and exploration of space
- Advanced perception and cognitive capabilities
 - Detection of faces, circles, 3D rings, 3D cylinders
 - Recognition of faces, food, digits, colour
 - Basic manipulation and visual servoing
 - Speech synthesis, speech recognition, dialogue processing (reading QR codes)
 - Belief maintenance, reasoning, planning

Task 1 goals

- The main goals of the first task are:
 - to learn how to use ROS
 - to get familiar with the hardware
 - to set up the mobile platform (software and hardware)
 - to learn how to build a map
 - to learn how to use a map
 - to learn how to set a goal
 - to learn to instruct the robot to go to the goal position
 - to use Kinect
 - to learn how to relate points in different coordinate frames
 - to robustly detect faces
 - to search the space

