# Probabilistic Robotics Course

# Projects

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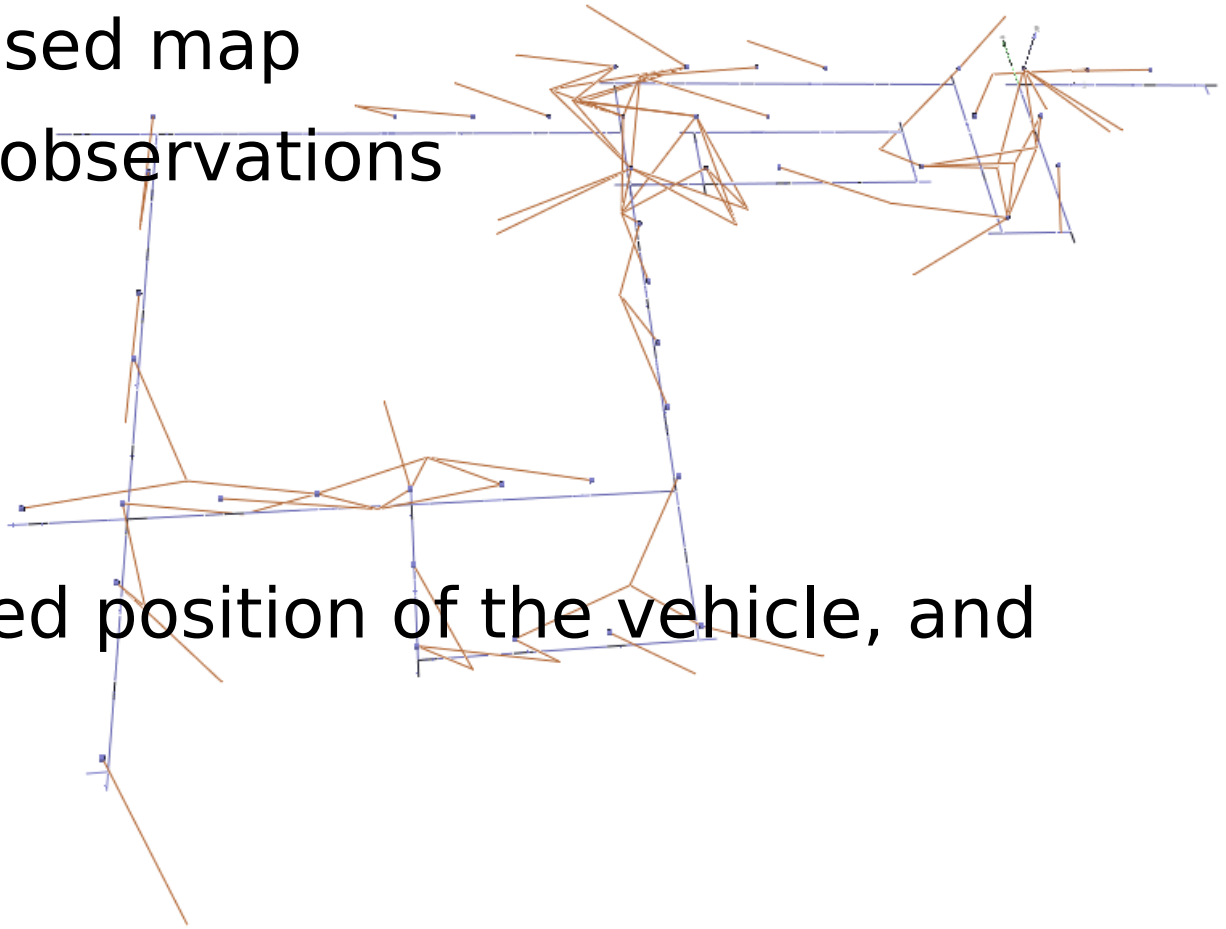
# #1 Least Squares based 3D Camera Localization

- Input:
  - Landmark based map
  - Anonymized observations
  - Odometry

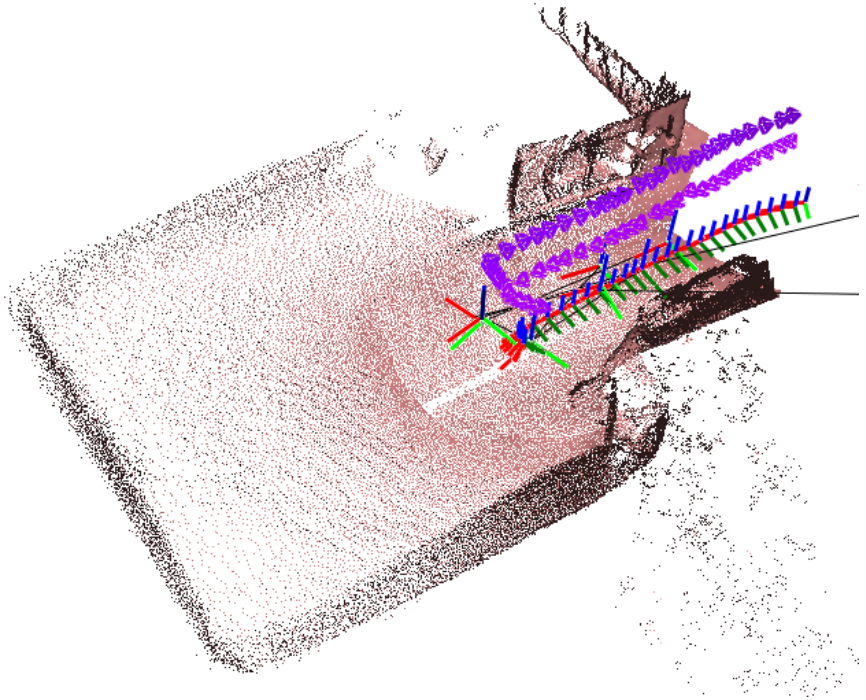


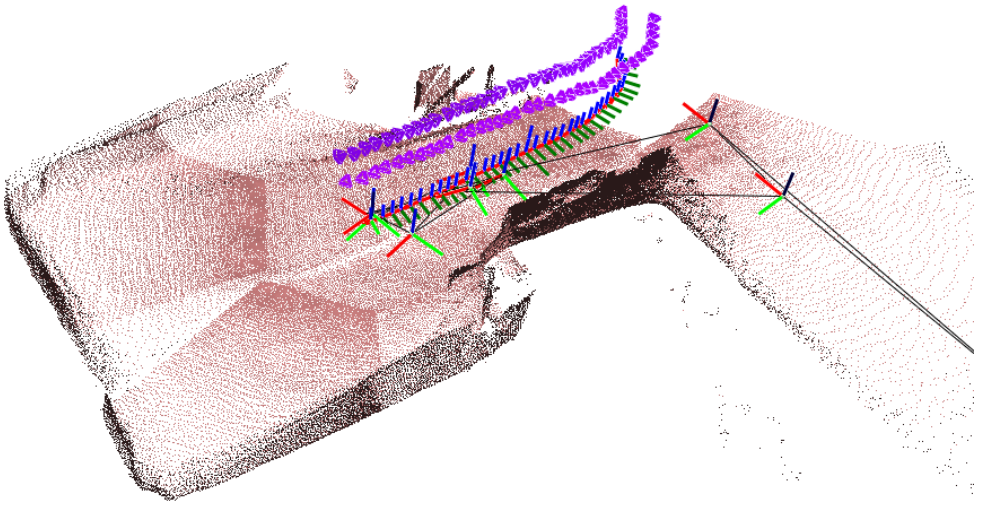
Output: tracked position of the vehicle, and covariance.

# #2 ICP++

- Input:
  - 2 Point Clouds (w/o data association)

Register them.





# #3 2D Loop Detector and Validator

- Input:
  - set of 2D point scans
  - a reference scan

Find the transform between reference and each scan, if they match.

# #4 Least Squares based 2D Bearing Only SLAM

Input:

- 2D Bearing only labeled observations
- Odometry

Output trajectory and map.

# #5 2D Least Squares-based SCLAM

- Input:
  - Encoder ticks
  - Labeled landmark observations
- Output:
  - Map
  - Calibration Parameters

# #6 3D Calibration

- Input:
  - Raw data
    - Camera tracking output
    - Encoder ticks

# #7 Kalman based IMU SLAM

- Input:
  - G2o file with IMU measurements
  - unlabeled point observations

- Output:
  - Trajectory and map

# #8 Find that object

- Input:
  - Cloud of an object
  - Cloud of a scene with the object inside
- Output:
  - Pose of the object in the cloud

# #9 Monocular SLAM with odometry guess

- Input:
  - Monocular stream data
  - Synchronized odometry
  - Extrinsics, i.e. transform odometry/camera
- Platform Trajectory

# #10 Planar Monocular SLAM

- Differential Drive equipped with a monocular camera
  - useful reading [*HBST,* Schlegel et al. 2018]
- Input:
  - Integrated dead reckoning
  - Stream of images
  - Extrinsics (sensor pose w.r.t. platform)
- Output:
  - Trajectory and Map

# #11

- Propose your own projects

# How to get a project

Send an email asking for a project (pick a number) to

- dellacorte@diag.uniroma1.it
  - or
- schlegel@diag.uniroma1.it

use as Subject: **[ProbRob][ProjAss]**

- Wait for instructions