CSE 490R | Robotics Anatomy of a Self-driving Car

RACECAR



CSE 490R SLN: 13131



Tartan Racing: A Multi-Modal Approach to the DARPA Urban Challenge

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http://repository.cmu.edu/cgi/viewcontent.cgi?article=1967&context=robotics







Personal Robotics Lab



Road Network Definition File

Mission Definition File

MDF



LANE 2.1 LANE 2.2







•Determine it is safe to cross or merge with traffic at an intersection (>65m horizon)

•Determine it is safe to pass a static obstacle in an oncoming traffic lane (>120m horizon)

•Detect, localize and track vehicles such to hold separation distances (<30m horizon)

•Estimate road shape and lane locations (<30m horizon)

•Provide robust, redundant and complimentary sensing where possible

Major Challenge for Indoor Robots: Localization













Course Outline

- 5 assignments (4 full-assignments + 1 starter)
 - **PO Intro:** Introduction to Python, Numpy, ROS, Robot (1 week)
 - **P1 State Estimation:** Localization with particle filters (2 weeks)
 - **P2 Visual Servoing:** Line following / Move to object using images (2 weeks)
 - **P3 Planning:** Planning in a known map, Integrate with stateestimation to do closed-loop control (2 weeks)
 - P4 Learning: Learning from demonstrations (2 weeks)
- Final project: Autonomously navigating around a track using planning, perception & learning



Learn algorithms for autonomous driving and implement them on the RACECAR platform

in 11 weeks!

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