EE405A
Introduction

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KAIST EE

Classes

Lectures

- Will be uploaded online (in classum).

week	Topics
1	-
2	ROS (ubuntu & ros install, basic example)
3	Simulation (gazebo)
4	Vehicle control
5	Platform (hardware / software config) +PWM generator
6	costmap generation
7	(Motion) planning
8	-
9	Visual mapping & localization
10	LiDAR + Vision
11	Vision
12	Strategy for racing (indy)
13	final project preparation
14	final project preparation
15	final project
16	-

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Classes

Assignments

- Students who do not have a working laptop can use a computer in N5-2354.

week	Topics
1	-
2	ROS (Ubuntu Installation & ROS)
3	Simulation (Gazebo)
4	Vehicle control
5	Platform (hardware / software configuration)
6	Motion planning 1
7	Motion planning 2
8	-
9	Visual SLAM
10	Perception (1)
11	Perception (2)
12	Strategy for racing
13	Final project preparation
14	Final project preparation
15	Final project
16	-

Class Materials

Classum

- Lecture videos and materials will be upload.
- On-line QnA can be done in Classum
  - Questions asked in Classum will receive faster responses compared to those sent through TA's private email, which can be hard to monitor.
  - Students can freely share knowledge and engage in discussions on Classum.
  - www.classum.com/25DYV255C

Github

- Class materials and codes will be upload.
- https://github.com/Guri-cccc/EE405A_2023.git

TA session

TA session (QnA session)

- Time
  - Mon: 14:30 ~ 20:30
  - Tue: 14:30 ~ 20:30
  - Fri: 09:00 ~ 15:00
  - Survey for TA session time: https://docs.google.com/forms/d/e/1FAIpQLSc62ye-t20CHNCocugvzpDaz_NwhVYETtbwwlCJrC8Al7JJsw/viewform?usp=sf_link

- Place: N5 2354

Final Project

Multi-agent racing

- Autonomous racing using vision

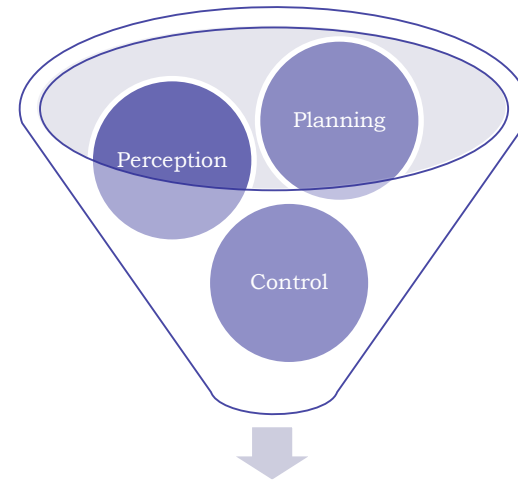- Multi-agent racing: obstacle avoidance (perception & planning)

- Control for high speed

About F1Tenth

https://f1tenth.org/

F1Tenth

What is F1Tenth ?

Perception

Planning

Control

Basics principles for autonomous vehicle

- F1Tenth is an educational platform and an international community that focuses on building autonomous systems at the scale of 1/10th of race cars.
- The primary aim is to help students and enthusiasts learn about the core principles of autonomous driving systems.
- By the end of this semester, students will gain practical experience and multidisciplinary knowledge in the principles of autonomous vehicle systems by handling uncertainties in real-world scenarios.

F1Tenth in EE405(A)

Focusing on Camera-based Autonomous Systems

- When we consider the realm of autonomous vehicles, the camera stands out as one of the most vital sensory organs, much like human eyes in driving.

Most important

Challenges & Limitations

Dynamic Environments
Reacting to moving opponent vehicles and understanding fast-paced scenes.

Visual Object Avoidance
Implement a system where the car detects and avoids obstacles using only camera input.

Lighting Variations
Handling shadows, glares, and transitions from bright to dim environments.

Computational Overheads
Real-time processing of images can be resource-intensive.

Background in following is recommended, but not required:

- Basic C++/Python language skills
- ROS programming
- Machine learning

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Final Project

About the race

● Date/Place: TBD

● Team building
  - 10 teams, 4~5 people each
  - Please fill out your names to form teams
  - You can search for teammates by listing your skills and finding others who match your needs.
  - Link to the form:
    https://docs.google.com/spreadsheets/d/1DcuqTMMe7ZQjHycpM0 2QGxiGbVLGDNmD4hIMcxYUEfA/edit?usp=sharing

Q & A

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