Applications of Robotics and Autonomous Systems (APP-RAS)

Project Course Module: 40305, 40889

Lecturer: Prof. Dr. Sahin Albayrak, Dr. Yuan Xu

Theme: Autonomous Driving

Supervisors: Yuan Xu, Philipp Grosenick, Martin Zehetner, Yuchen Liu

start time: 14:15

Contact: yuan.xu@dai-labor.de

Outline

- Introduction
- Past projects
- Group topics
- Course Details
- Next Tasks

Welcome …

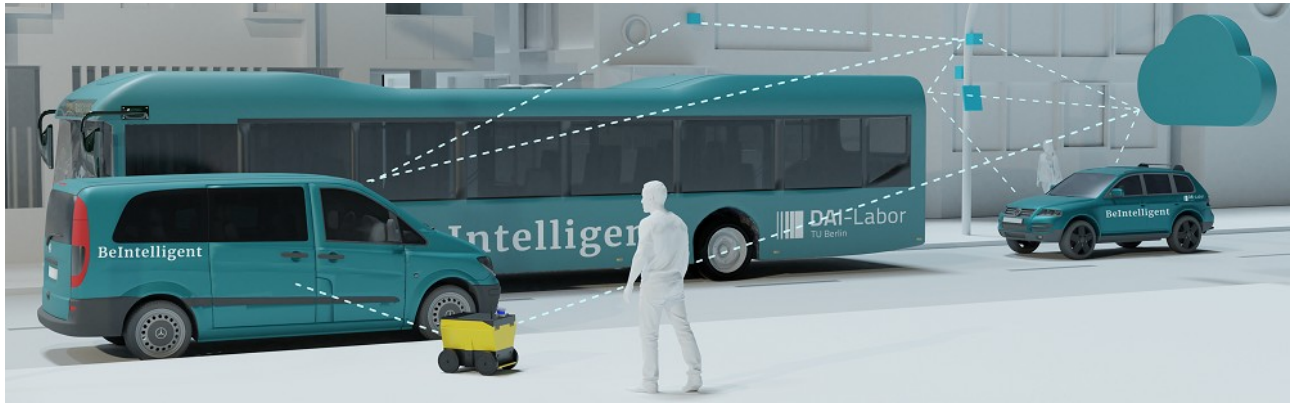
what are we doing …

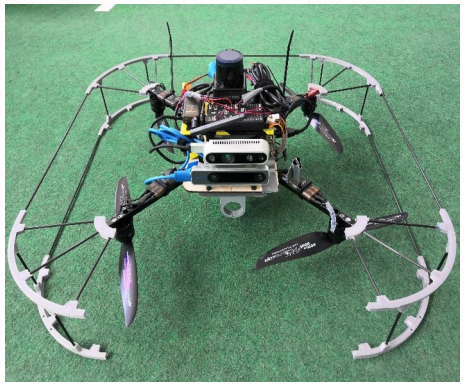
Autonomous Driving

Warehouse Automation

RoboCup

Service robots



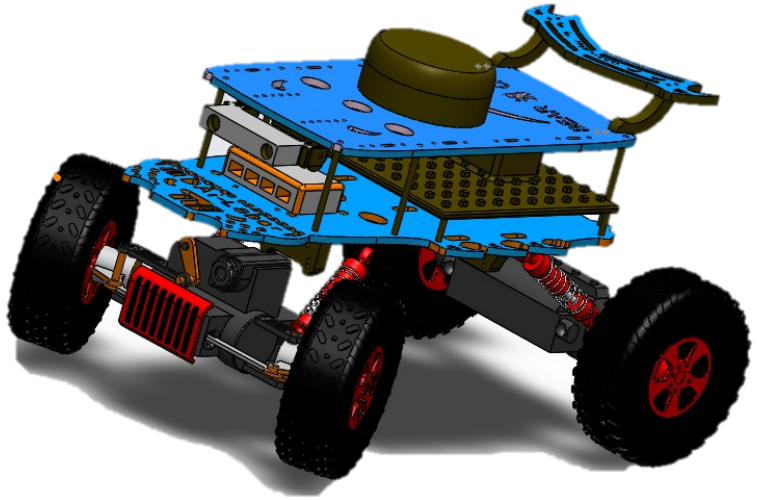


UAV

What will you learn?

►Robots are the next big thing, automation and collaboration are the biggest part of it.

►Our focus: autonomous cars and driving, from small scale to prototypes and the real car



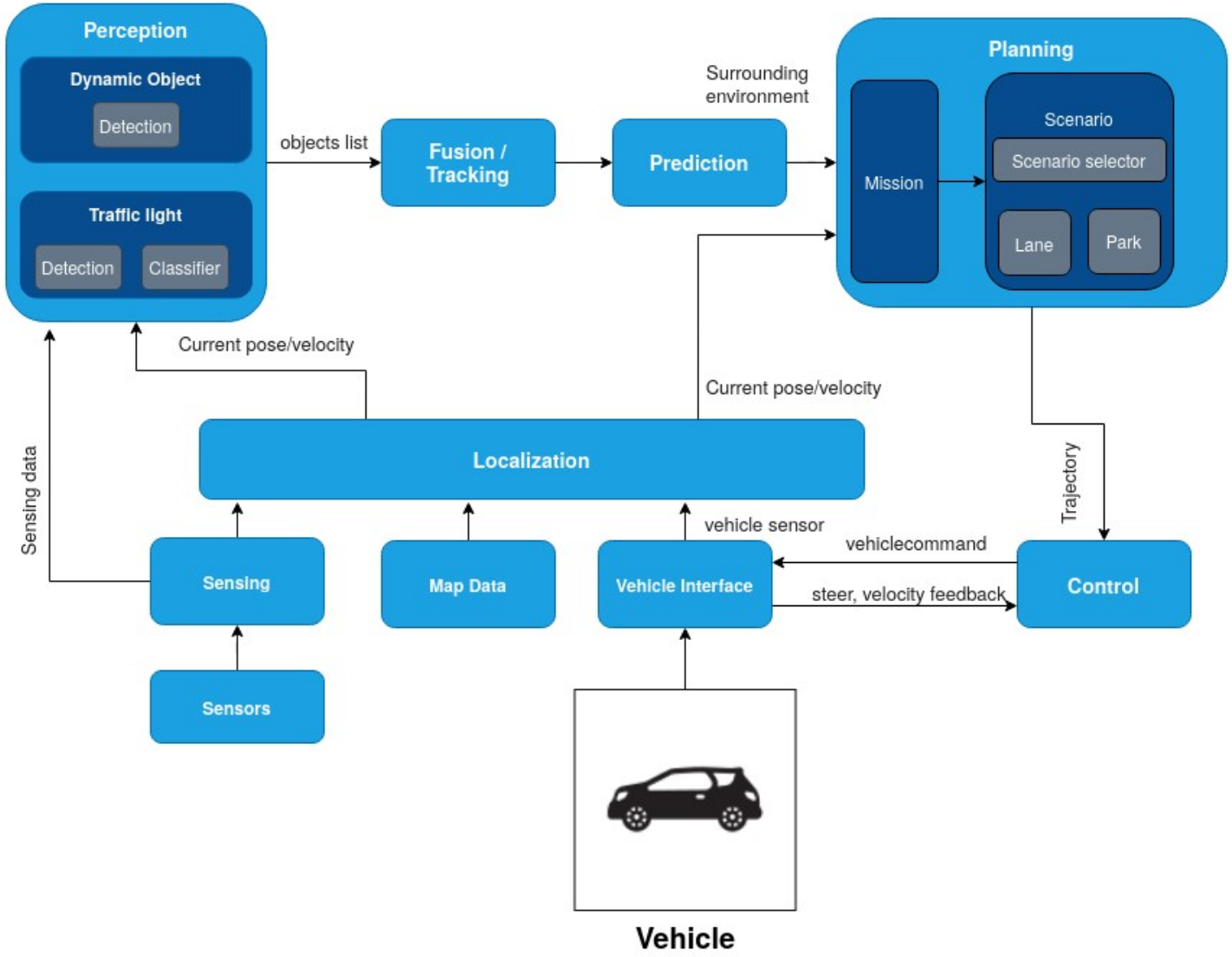
What are our expectations?

►Obtaining reusable results/implementations for our projects

- Building a demonstrator
  - In the end of the class, you will:
    - Have an hands on exp. on perception, prediction and planning
      - Skills for teamwork, project management and reporting, simulation, good C++/Python skills
      - Ability to look at a problem with top-down + bottom-up approach
        - We are starting from a use-case

Autonomous Driving Introduction

Software Architecture



Autonomous Driving Test Platforms

1:10 Small Scale

Donkey Car

MIT RaceCar

Deep Racer

Bear Car

Bear Cars

BEAR CAR

Hardware

2D LIDAR

RGBD Camera

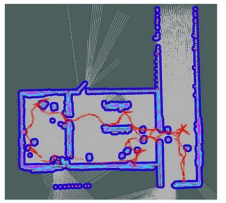
IMU

Jetson AGX

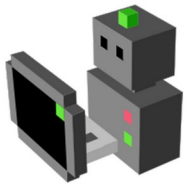
VESC

Software

ROS



SLAM



MORSE

Simulation support

Group Topics

Course Details

Course Details

- Project Course Module: 40305, 40889
- 9 ECTS (2h lecture + 16h remote)
- Status meetings: Wed 14:00-16:00 TEL
- All materials on the course ISIS page

- Max. 5 students / group (survey, selection)
- Enrollment via MOSES
- Communication via SLACK
- Weekly meeting: attendance mandatory

Course Details - Grading

- **35% Design, Implementation and Testing**
- **30% Presentations** (M1, M2, M3)
- **10% Documentation** (Final report)
- **25% Individual Contribution**: Attendance, Active Participation, Performance

Course Details - Preliminary Timeline

Date	Agenda (NOTE: Due to the current situation, the plan may change!)
W1: (today)	Welcome, introduction, course details, Use-Case and overall topics
W2	groups, possible work-division
W5 or W6	M1: Presentation (obj, motives, arch., specs)
W7 - W16	SPRINTs
W11 or W12	M2 (middle term status update)
W17 (last week)	M3 (Final Presentation)
W18 / W19	Last day of Final Report and code submission

Course Details - Core Deliverables

►**M1: Project Planning**

- Literature review, specific use-cases, objectives (goals)
- System architecture(comp. and data flow), possible methods, test cases, timeline

►**M2: Status Update**: Status of the progress, achievements, changes in the plan, demonstration of target system for M2

►**M3: Final Presentation** (~15 mins):Motivation, clear objectives, method, demonstration, results

►**Final Submission:**

- Code, data etc.
- **Final Report** (8+ pages):Same content of FP but details, results (numerical, statistical etc.), discussion

Next Tasks

- Please make a final decision: the next week we will start grouping
    - Please fill out the short survey:
        - Select your desired topic(s)
            - Please be advised from the readings / links under the slides
        - (Optional) tell us about your expectations and ideas too !
        - Announcing the groups next week !

►Enrollment via MOSES but not urgent, after the next week !

►Please decide till the end of this week! We will team up

Thank you for your interest!

A|O|T

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berlin