



AuE 8930: Machine Perception and Intelligence

Lecture: Course Introduction

Instructor: Bing Li, Ph.D.
bli4@clemson.edu

Assistant Professor
Department of Automotive Engineering
Clemson University International Center for
Automotive Research (CU-ICAR)



Course

- Schedule and location:
 - Mon. and Wed.: 9:15-10:30 AM
 - Classroom 404 at CU-ICAR
- Instructor:
 - Bing Li, Ph.D., Assistant Professor, Room 340
bli4@clemson.edu
 - Office hours: Wed.: 10:30 AM – 12:30 PM or by appointment via email
- Teaching Assistant:
 - Ziyue Feng, Cubicle #60
zfeng@g.clemson.edu
 - Office hours: Tues. 9 – 11 AM or by appointment via email
- Syllabus (subject to update):
 - Access canvas/Files/Syllabus.txt to download newest version;
(Subject to change according to the course needs and feedbacks)



Course Information

- Basic Information:
 - Course participation
 - Books, notes, etc.
 - Canvas page update – check regularly!
 - All slides, assignments, material and submissions use canvas only. Instructor/TA are not responsible to check email submissions unless special circumstances.
- Homeworks and Course Project
 - Submission
 - Grading
- Goal
 - What I expect from you
 - What you can expect from me
 - Resources



Books and References

- Lecture notes on Canvas
 - content self-contain;
- Digital Image Processing
 - Rafael Gonzalez et al, Pearson Press
- Computer Vision: Algorithms and Applications
 - Richard Szeliski, Springer
- Machine Learning
 - Tom Mitchell, McGraw-Hill
- Deep Learning
 - Ian Goodfellow et al, MIT Press
- Other online references



Prerequisite

- Linear Algebra
- A little Probability and Statistics
- Programming Experience
- Reading Literature (A little bit, for your projects)
- An Inquisitive Nature (Curiosity)
- No Fear



Course Outline

- Vehicle sensors and signals (2 weeks)
 - 1D signal processing
- Vehicle visual perception (5 weeks)
 - 2D image and processing
 - 3D vision and geometry
- Vehicle visual SLAM (2 weeks)
- Machine learning and deep learning for vehicle perception (4 weeks)



Grading

- Homework: 20%
 - independently
 - Homeworks which have literally same parts will be both graded as zero.
- Team Project Implementation and Presentation: 40%
 - Independently + collaboratively
- Team Final Report: 20%
 - Independently + collaboratively



Programming Languages

- To be used: Matlab, Python, C++ or any
- Matlab
 - An interactive environment for numerical computation
 - Good rapid prototyping environment
- Python
 - Interactive & Interpreted
 - Object-oriented
 - Extensive support libraries (for image processing, computer vision, data science, machine/deep learning)
 - Extensible in C++ & C
 - Support most of the mainstream deep learning frameworks
- Libraries
 - You may use high-level libraries (OpenCV, PCL, et al) for your project, but not for your homeworks.
- Submissions for homework and project
 - Source code file, which can be run directly under regular PC settings;
 - Word/PDF document(s) explain your solution and show code result;
 - The TA will/might check and run your code;



Course Outlook

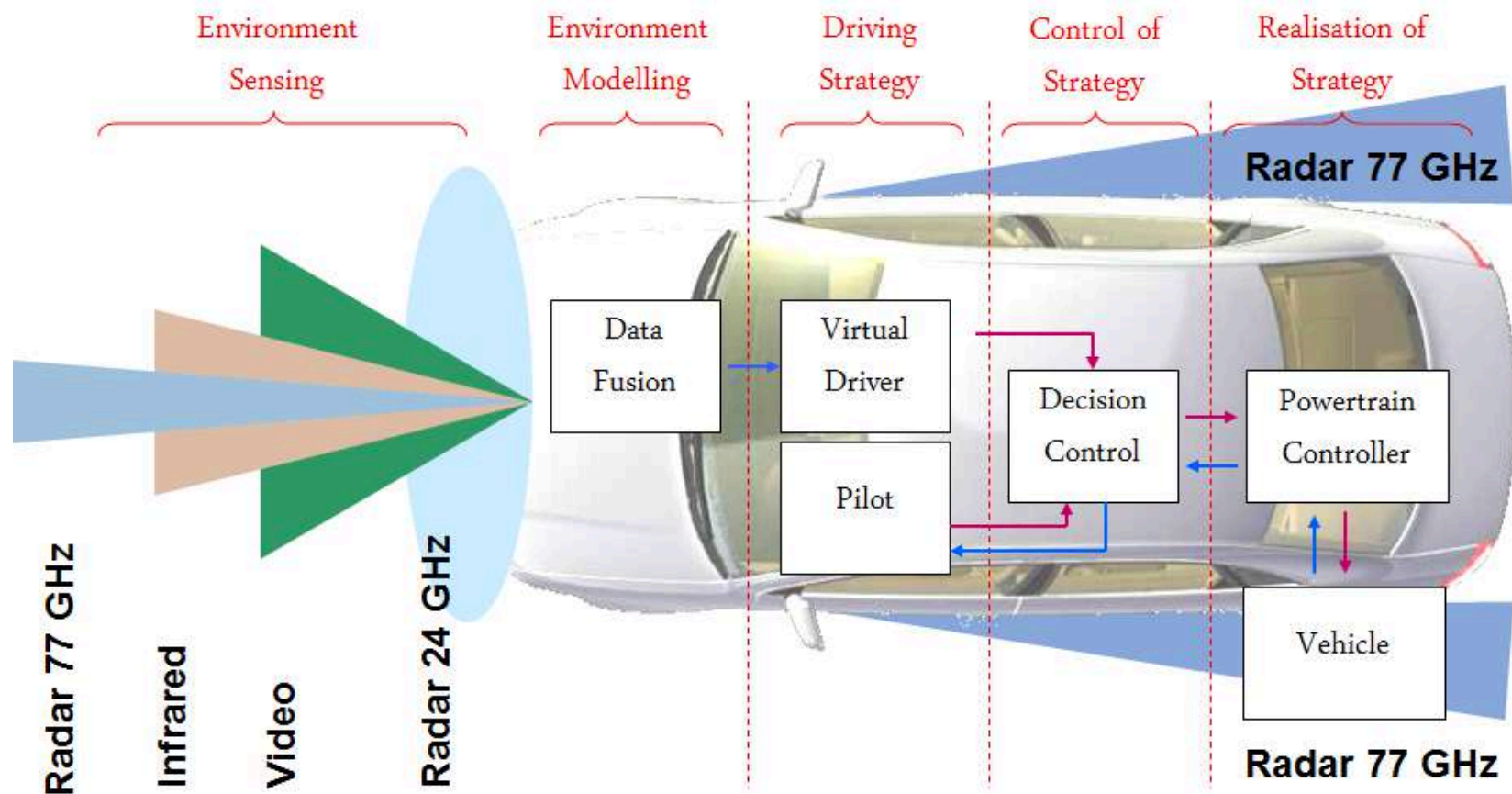
What makes Vehicle Perception interesting?

- Sensing Physical World
- Sensor Data Modeling and Analysis
 - Sources of knowledge in perception
 - Higher levels of abstraction
- Machine Intelligence
 - Let computer to understand (sensor) data
 - Conventional and modern techniques



Course Outlook

What makes Vehicle Perception interesting ?





Course Outlook

Milestones in the Development of Neural Networks

