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Systèmes robotisés intelligents
Smart Robotic Systems

Introduction

Gilles TAGNE

Robotics

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A robot is a physical machine equipped with capacities of perception, decision and action on its environment










Robotics

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Applications/Fieds: industrial robotics, domestic robotics, medical robotics, military robotics, scientific robotics, transportation robotics










Robotics

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Classifications: mobile robots, humanoid robots, medical robots, agricultural robots, …











Mobile robotics

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Mobile robot: robot with mobile base










Mobile robotics

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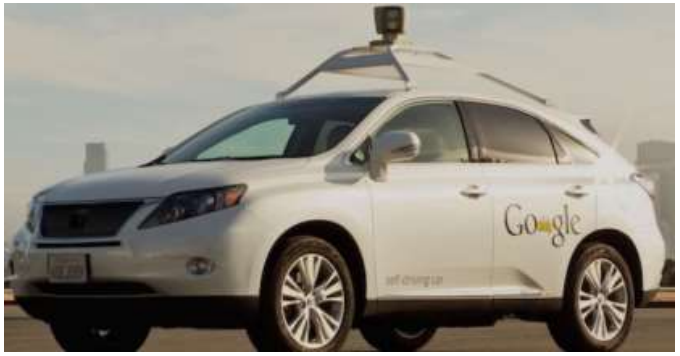
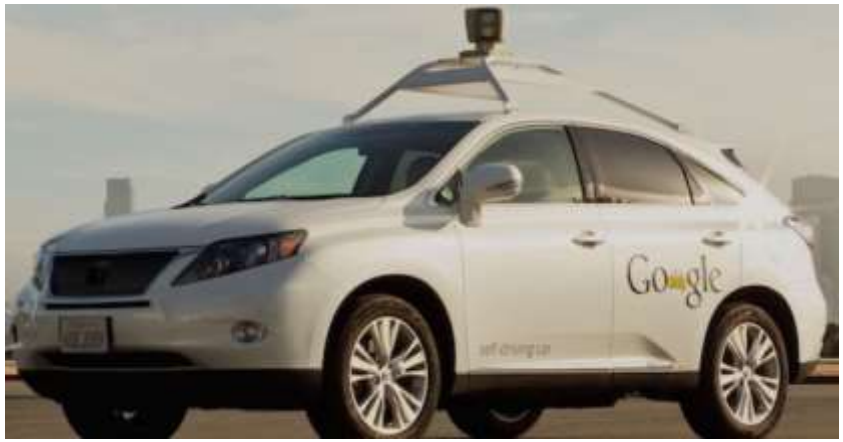
Mobile robots that will be the subject of this course:

- ✓ Mobile wheeled robots
- ✓ Aerial robots



Mobile Robotics
Example: Key Technologies for Intelligent Vehicles (according to Dirk Rossberg, BMW , Stanford University, 2013)



Mobile Robotics
Main Tasks

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- ***Localization :*** position the robot in its environment, which sometimes includes cartography functionalities

- ***Perception :*** detect the robot environment, navigable spaces, obstacles and ideally understand the scene

- ***Navigation :*** optimal trajectory planning for moving the robot

- ***Control :*** application of the commands on the actuators

Course objectives

- ✓ Know how to apprehend a robotic system
- ✓ Know how to model a mobile robot
- ✓ Know the different technologies of perception, localization
- ✓ Mastering different robot trajectory planning techniques
- ✓ Plan the movements and control the robot
- ✓ Design and develop a robotic system

Outline

Sensors and variables estimation
- ✓ Sensors
- ✓ Variable estimation
- ✓ Multi-sensor fusion

Locomotion
- ✓ Modeling of wheeled mobile robots
- ✓ Modeling of aerial mobile robots

Mobile robot Localization

Mobile robot trajectory planning

Robot control

Introduction to ROS (Robot Operating System)