Project or research paper

Robotics is a multi-disciplinary field encompassing different areas of specialization such as control systems, optimization, graph theory, algorithms, sensors, computer vision, machine learning, estimation, decision theory etc. An autonomous or AI-based robot's interaction with the world can be represented using Fig. 1.

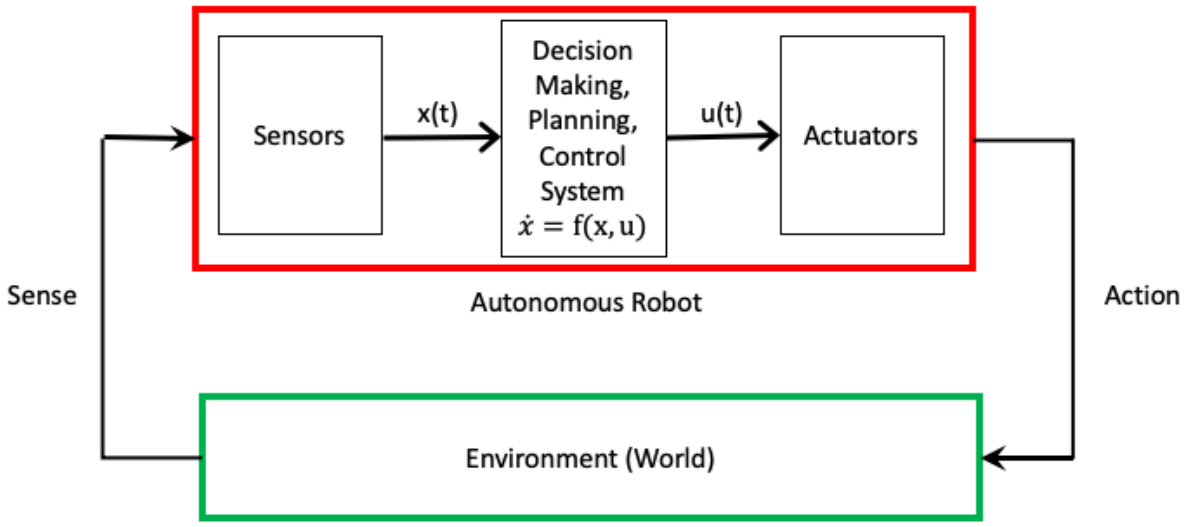

Figure 1: AI based robot's interaction with the world or environment

An example of a robot's system architecture which encapsulates the different tasks and requirements is shown in Fig. 2.

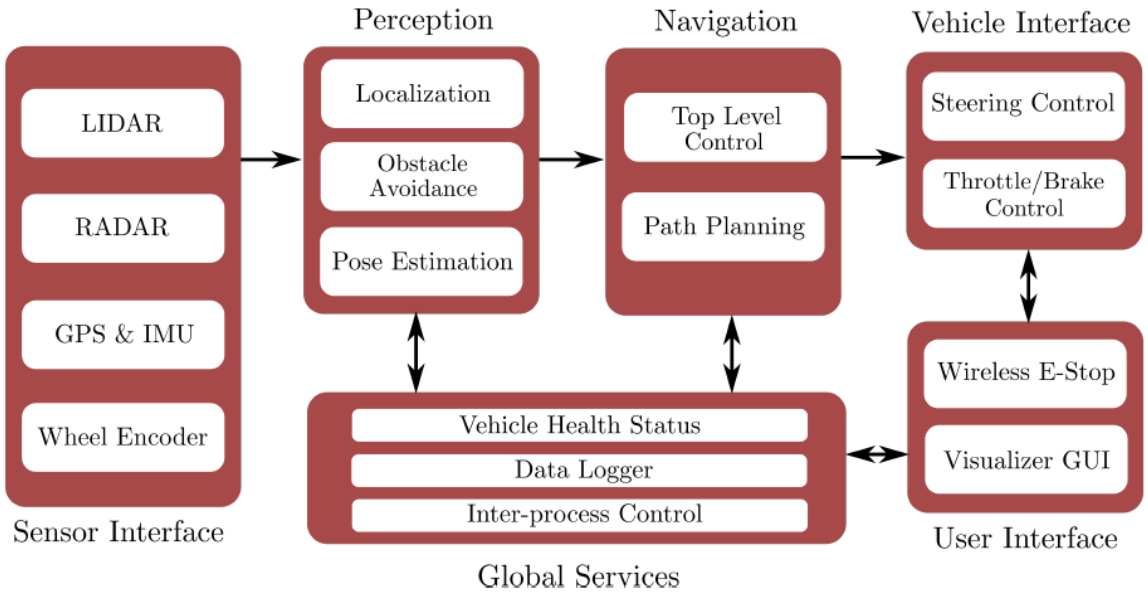

Figure 2: Example of a robot's system architecture that completes the different robot tasks and requirements. (Figure source: Principles of Robot Autonomy, Stanford University Course)

The objective of the project or research paper is for you to learn one of the tasks that the robot needs to complete as part of its greater mission as encapsulated in Fig 2. To make your job easier, note that this course has been divided into four separate modules:

1) Robot dynamics and kinematics
2) Trajectory generation, tracking and control. Motion planning and control.
3) Robot perception (In this course we are considering robot vision)
4) State estimation, localization and mapping, SLAM

Tasks to complete

1) Pick any one of the tasks that the robot needs to complete. Since each one of the tasks corresponds to a broad area of research, you can do either of the following:
   a) Write what you have learned on the area.
   b) Be more specific and pick a "specific" topic in the chosen area.
2) Complete a thorough study of your chosen topic. Study the class notes, books and research papers on your chosen topic.
3) Write a paper or do a project that demonstrates your grasp and understanding on the chosen topic.
4) Alternatively, if you want to challenge yourself, you can identify a research problem and proceed to provide a solution method.

Deadlines

TBD: Let me know your chosen topic, group information. (Google classroom folder)
TBD: Paper submission (Google classroom folder)

In the interim weeks, you should freely and actively seek my assistance. For the paper, you may work alone or in groups of two.