

# KR exercise

## WASP Autonomous Systems course

Jacek Malec, Lund University

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The purpose of this assignment is to let you reflect on the knowledge you expect an autonomous system (e.g., an autonomous car, a service robot, an AAV, a UAV) to possess in order to fulfill its missions. In order to do this properly you need to define the domain of the system activities, the environment it will work in, possible interactions with other agents, the tasks it is primarily intended to perform (as assigned by human operators), etc.

The items below mention some of the more obvious choices, but do not necessarily exhaust the list of necessary pieces of knowledge. What have I forgotten?

With each kind of data/knowledge piece, please list the expected algorithms/tools you would use to process it in order to achieve the expected results (what are the expected results, BTW?)

### **Assignment:**

Write a min. 1 page- and max. 3 pages-long analysis of the use of knowledge for an autonomous mobile system (e.g., an autonomous car, a service robot, an autonomous aerial vehicle), taking into account at least the following areas. For each area analyze what knowledge is needed, how it could be obtained and how it could be used for the operation of the system. Be as specific and concrete as possible.

**Position and pose** What is the reference frame? Are there multiple ones? Are they relative or absolute? Do you need map(s)? Do you intend to use GPS? Do you intend to use visual information?

**Dynamic physical state of the system** What are the necessary variables and why?

**State of the environment** What are the relevant aspects of the environment your agent is acting in?

**Knowledge about the future state of myself and the world** or at least a prescription how to obtain it. Can it be computed on the fly? Precomputed and stored in a hash structure? Deduced?

**Mental state** What can I do? What should I do? What will I do? What do I need to do? Why? What I cannot do and why?

The outcome of this exercise is expected to be used in the practical assignment asking you to build a rule-based controller for an autonomous car that would let it navigate safely in city traffic or, more concretely, to pass an intersection equipped with traffic lights, with multiple lanes, with pedestrians crossing the street, and with meeting traffic.

The practical assignment will be distributed in the beginning of week 44.