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Autonomous robotics

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Exercise 1 Reading

Read the paper "A dynamical systems approach to task-level system integration used to plan and control autonomous vehicle motion" by Gregor Schöner and Michael Dose, published in *Robotics and Autonomous Systems* **10**:253-267 (1992) (available on the course web page).

As you do the following tasks, please write complete sentences in English or German to answer any of the questions.

1. Read through the whole paper roughly. You will need to understand in detail only some sections, so don't get stuck on things you don't understand on a first reading.

2. Read more carefully Section 3 (but drop section 3.4).

3. To understand Section 3.2., make a drawing of the vehicle and a target, like in the lecture, marking the angles, ϕ and ψ. Identify the angle, $\phi - \psi$, in that drawing.

4. Make a plot of the dynamics of Equation 4. (What a plot of the "dynamics" is was illustrated in the lecture). There are two zero-crossings. Mark those. Which is an attractor, which a repellor?

5. Describe in words what happens when the vehicle is initially oriented at same heading angle, ϕ, relative to the target bearing, ψ, under the influence of Equation 4. What role does the repellor play?

6. Plot the same dynamics for a larger value of a and describe in words what the consequences are for the behavior of the vehicle.