

Exercise 4 Reading

Given the size of the task, this exercise will give you double bonus points. Hand in your solutions on the 1st of June, 2012. This gives you two weeks to finish the assignment. Your text can be written in English or German.

Read the paper: A Dynamical Model of Visually-Guided Steering, Obstacle Avoidance, and Route Selection by B R Fajen, W H Warren, S. Temizer, L P Kaelbling *International Journal of Computer Vision* **54**(1/2/3), 1334, 2003

In a first reading, ignore problems you have comprehending, only look up words critical to your understanding, try to get a picture of the whole article first. Mark passages you don't understand (but don't work through them yet), underline points you do understand and find important. Try to gain an understanding of what the components of the paper are.

1. Only then write down a short summary of what you think are the main goals of the paper. You will do best to first write a draft of this summary and then come back to this summary later, revising it as your understanding of the paper improves while you do the next two tasks.
2. Focus now on the dynamics listed in Equation (4).
 - (a) Describe how this dynamics differs from the dynamics discussed in the lectures for robots.)
 - (b) Describe the attractor of this dynamics in words. Compute the attractor, neglecting the exponential range term, $\exp(-c_3|\phi - \psi_0|)$ by setting it equal to 1. To that end, transform the second order equation into a first order equation with two variables (ϕ and $\omega = \dot{\phi}$), Also introduce useful abbreviations for the constant terms.
 - (c) This dynamics is a harmonic oscillator. Look that topic up in a textbook or on the internet. Based on mapping the equation onto the harmonic oscillator, discuss and graphically illustrate the solutions (assuming the inputs to the equation are fixed).
3. Write a second short text about what you believe are the main insights from the work and analysis performed in this paper. This is at a higher level than the summary you first wrote, could include evaluative comments, critical comments, ideas you have about further things to do in this direction.