

## Introduction to Multi-Agent-Programming

B. Nebel, A. Kleiner  
C. Dornhege, D. Zhang  
Winter Semester 2009/2010

University of Freiburg  
Department of Computer Science

### Exercise Sheet 3

**Due: November 9th, 2009**

#### **Exercise 3.1** (Logic-Based and Reactive Architectures (2 Points))

- (a) Consider the vacuum cleaner example in the lecture. How many rules in total would have to be written for the  $3 \times 3$  Grid world? How does this change for a  $10 \times 10$  world? (0.5)
- (b) Describe a subsumption architecture solving this same problem. Assume the following definitions:

$$A = \{Suck, Forward, Turn\}$$

Full Observability, i.e.:  $Dirt = 0, 1$ ,  $X = 0, \dots, n$ ,  $Y = 0, \dots, n$ ,  
 $\Theta = \{North, South, East, West\}$  and

$$P = Dirt \times X \times Y \times \Theta$$

Give sensible definitions for the behaviors  $b(c, a)$ , especially the sets  $c$  and define the inhibition relation. (1.5)

#### **Exercise 3.2** (Behavior networks (1 Point))

Draw a simple behavior network for the vacuum cleaner world as in the CS:Freiburg case study.

The graph should include:

- (a) The competence modules
- (b) Propositions in the world
- (c) The goals
- (d) pre-and postconditions connected via edges You can derive propositions, e.g. `location_dirty`, informally from the definitions in the previous exercise (i.e. it is ok to describe them in words, if it is clear, that they can be derived).

**This exercise should be submitted during the lecture on Monday (Nov. 9th)**