

Foundations of Agent Programming

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Exercise 7.1

A robot is able to move between three locations: its owner, his fridge and a supermarket. The robot can fulfil requests of carrying a beer from the fridge to its owner. Moreover the fridge is able to issue a signal to the robot if the amount of beer goes below some threshold. In this case the robot eventually goes to the supermarket to buy a sixpack of beer and puts it into the fridge. The following tasks lead to an AgentSpeak encoding of the given scenario. We use the following fluents and actions:

- $At(x)$ $\hat{=}$ the robot is at position $x \in \{Owner, Fridge, Market\}$
 $Has(o)$ $\hat{=}$ the robot holds object $o \in \{Beer, Money, Sixpack\}$
 $Fridge(Beer, n)$ $\hat{=}$ the fridge contains n bottles of beer
 $Move(x, y)$ $\hat{=}$ the robot moves from x to y ; $x, y \in \{Owner, Fridge, Market\}$
 $Get(o)$ $\hat{=}$ the robot gets $o \in \{Beer, Money, Sixpack\}$
 $Deliver(o)$ $\hat{=}$ the robot delivers $o \in \{Beer, Money, Sixpack\}$ at its destination

- Define procedures for the triggering event $+(!(At(x)))$, meaning that the robot should assure to be at position x , where each position is reachable from each other position.
- Define procedures for $+(!(Has(Beer)))$ which should assure the robot to hold a beer from the fridge. If the fridge does not contain a beer, this goal should just be postponed.
- Define procedures for $+(!(Has(Money)))$. The robot can get money only from the owner.
- Define procedures for $+(Request(Beer))$. The external desire $\langle Request(Beer); [] \rangle$ is issued whenever the owner wants the robot to bring him a beer from the fridge.
- Define procedures for $+(Refill(Beer))$. The external desire $\langle Refill(Beer); [] \rangle$ is issued whenever the amount of beer in the fridge goes below 3. In this case the robot should go to the supermarket, buy a sixpack of beer and put it into the fridge.

Exercise 7.2

In the domain of Exercise 7.1, consider the belief base $B = \{At(Fridge), Fridge(Beer, 4)\}$ and assume that the first sensing will give an external desire $\langle Request(Beer); [] \rangle$. Calculate the first ten steps according to the semantics from Sl. VIa/22 - VIa/27.