CPT302 Week 6 In-Class Exercises with Solutions

Name and Surname:_____

Student ID:_____

Q1. You are asked to design "*football player robot*" based on a subsumption architecture. Propose several rules/behaviors that you will consider in your design.

Ans (one proposed solution):

- *turn* if the robot sees the ball, then turn towards it
- *wander* move around at random
- *avoid* an obstacle if it is in your path by turning randomly
- *shoot* if the ball is in front of you, then shoot
- *home* move towards the home goal, if we can see it
- *orient* orient the robot to face the opponents goal when inside the home goal box

Q2. Design a subsumption architecture for a simple *vacuum-world*. To coordinate your behaviors, you can consider to use inhibition.

Ans (one proposed solution):

We apply the action selection in the subsumption architecture (see the lecture notes for details). We consider the following percepts (just simple cases): "There is dirt in the robot current location", and "The robot is facing a wall".

The robot's behaviours are the following:
– "If detect dirt then suck up dirt" (b1)
– "If detect wall then turn" (b2)
– "If true then move in random direction" (b3)

We employ the following inhibition relation:

$$b1 \prec b2 \prec b3$$

Q3. Briefly describe the overall operation of the InteRRaP agent architecture including the layer interactions in InteRRaP.

Ans (one proposed solution):

InterRRaP uses a vertically two-pass architecture. It contains 3 layers: behavior-based layer deals with reactive behavior; local planning layer deals with everyday planning to achieve the agent's goal; cooperative planning layer deals with social interaction. Each layer has an associated knowledge base. Layer interactions include the following: bottom-up activation: a lower layer passes control to a higher layer because it is not competent to deal with the current situation; top-down execution: a higher layer makes use of facilities provided by a lower layer to achieve its goals; and the basic flow of control begins when perceptual input arrives at the lower layer, and control may flow to higher layers and then back again.