

AS-84.3146 Behavior-Based Robotics

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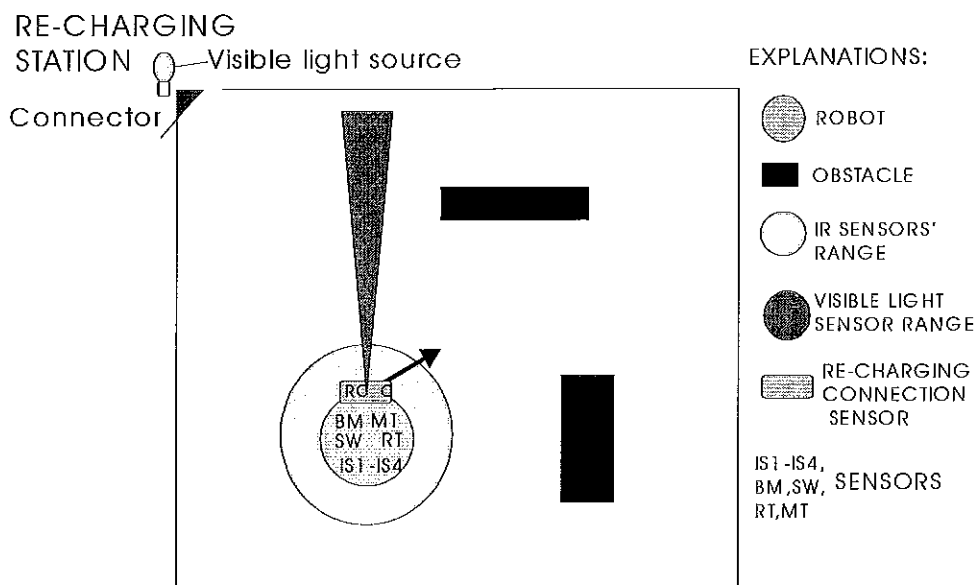
(You can answer either in Finnish or English / Voit vastata suomeksi tai englanniksi)

1. Robots in hospital environment: current status and future trends
2. Hybrid architectures –principles and benefits
3. Potential field approach in mobile robot navigation
4. Homogeneous fully distributed multi-robot system: description of the system, main benefits and main problems
5. Finite State Automata (i.e., Finite State Machine) task

After the robot has been started by pressing the start button it should vacuum clean a square shaped room while avoiding obstacles by using its four infrared sensors. For simplicity sake, there is no need to separate different sensor value combinations in obstacle avoidance behavior. The vacuum cleaner starts automatically after the start button is pressed. The vacuuming algorithm should be based on random movements. The mission should last exactly eight(8) hours but the robot's batteries only last about one(1) hour. In order to stay operational for the whole mission, the robot has to be able to find a re-charging station (station is marked with a powerful light source) and to connect itself to it. The energy loading should last 30 minutes. The mission is completed when the mission time is full.

The sensors

- Start button (SW): binary 1/0
- 4 infrared sensors (IS1-IS4) giving binary information 0=clear / 1=obstacle. Each sensor covers a quarter (90 degree) of the robot's surroundings.
- Mission Timer (MT), counts one tick per second
- Battery monitoring sensor (BM) giving binary information 0=energy OK/ 1=seek energy
- Re-charging station light detection sensor (RC_D) giving binary information 0=no station visible / 1=station detected
- Re-charging connection sensor (RC_C) giving binary information 0=no connection / 1=connected. Loading starts immediately after connection.
- Re-charging Timer (RT), counts one tick per second.



Based on the above task and sensor descriptions, make a FSA presentation for the application.