

Students who will not use BRAHMS for their projects – please have ready your project proposals clearly formulated by March 10, 2010 (place them in the Assignment bins or hand them to me at class).

NOTE: Students who choose to work on the robotics project with Nicola please conform to those particular requirements (posted at the end of this document) and be in touch directly with him.

Project Deliverables:

- Project report (max 5 pages, without figures) – 15%
- **Due April 7, 2010**
- Project presentation (15 mins, including questions from class) – 10%

Each project will be presented at class, starting on March 22, 2010 (3 projects per class – 15 mins per presentation – with questions from the audience).

- Project implementation / detailed design – 20%
- **Due April 1, 2010 (at the Lab) [NO JOKE!]**

In your project report your creativity and ability to think independently will be rewarded in the first place. I strongly encourage you to contribute your own original thinking and vision, even (and especially if!) if it challenges what was taught at class. You will have to back your arguments with appropriate references to the state of the art in the particular area of AI that you chose to explore in your project. Present the problem, set clear performance measure(s) for your AI system and present your solution arguing why you chose that particular way to achieve the project objectives given the chosen performance measure(s).

Please use a maximum of five pages of plain text and as many figures as you like. Please separate the figures from the text (place them at the end of the text) so I can determine that the five pages limit was respected. Please refer to the figures in your text and number them accordingly.

Mandatory requirement: at least one knowledge representation technique that we covered at class will have to be used. If you will use AI techniques which we did not cover at class please justify your choice and back it with appropriate references.

General Requirements:

- Specify which AI techniques you chose to use and why;

- Refer as much as possible to all the AI concepts that we have learned at class. If some concepts are irrelevant to your project, still name them and state why are they irrelevant;
- Specify what type of agent(s) are you using. If you have more than one agent, describe two of them in detail and provide the agent architectures while clarifying what kind of ‘intelligence’ are your agents endowed with.
- If your architecture is complex you need not do an implementation, but only take a small part of your system and illustrate how the reasoning works (e.g. how will you query the knowledge base, etc) as appropriate for your particular project;
- At least two use cases shall be presented at class to explain how your system works;
- For each of the two use cases show how your solution maximizes the performance measure chosen arguing that you found the best possible solution to your problem vis-à-vis other alternatives that were taught at class (e.g. if you chose a reactive agent vs a proactive/deliberative one argue why this is better in case of your particular project.) Do this for all the other alternative concepts that were taught as much as they apply to your project.

Please keep in mind that your project is there to reflect how much you learned at this class – as such implementation is not as relevant as your ability to demonstrate that your system is intelligent and that it functions according to the AI principles that we learned. The onus is on you to cover as many as possible concepts that are relevant to your project and show that you chose them in favor of other alternatives because they serve better your particular problem.

Reinforcement Learning (RL) Project proposed by Nicola (‘special status’ project)

Robocode is a platform developed by IBM that allows virtual tanks to fight each other in a simulated arena. Each tank has sensors to get information about the environment (battle field). It also has actuators to perform actions. To program a tank in Robocode, players are likely to develop strategies or motion patterns. Since the environment in Robocode is dynamic and not fully observable,

hand-coded methods are not always the best way. In this project, a robot with adaptive behaviours has to be implemented. The idea is to use Reinforcement Learning (RL) to allow the robot to learn policies that maximize a given performance measure.

<http://robocode.sourceforge.net/>

http://en.wikipedia.org/wiki/Reinforcement_learning

Mandatory requirement:

- Propose a way to tackle the problem by identifying the proper states, actions, reward scheme and RL technique to be used. These elements have to be implemented together. *Even if it is highly desirable, it is not mandatory that your robot will be actually able to beat other robots in a competition.*

General Requirements:

- Motivate the critical choices you made both during the design and implementation stages;
- Test your robot against several opponents and compare the results with the number of training matches.