# System Design Project 2012

Individual report for Milestone 2

s0908031-group 8

## 1. INTRODUCTION

The aim of this report is to present my individual contribution towards Milestone 2, within group 8 and to state the aims for the next milestone.

## 2. VISION

In the previous report, I stated that one of my aims for milestone 2 would be the delivery of a reliable image processor using live images from the camera, not only test images. However, after milestone 1, the group rearranged the structure of the teams and I decided to take part in the simulator team, with Martin Marinov.

## 3. SIMULATOR

After rearranging the teams, the group decided to experiment with XP practices, such as Pair Programming. Therefore, I assisted Martin at building a simulator without the help of a third-party library.

Some members of the team suggested that using a Physics library would be more efficient than trying to implement Physics concepts on our own. Thus, I started working on a simulator using Phys2D, while Martin continued to develop the other simulator. However, I encountered some difficulties in modelling the state of the robot world with the library functions and as Martin had a better solution to the implementation of the original simulator, I stopped working on that project and continued to assist him.

After this simulator was built, I implemented the collisions between the robots and between the robots and the walls.

## 4. MACHINE LEARNING

The simulator was delivered in a relatively short time, thus enabling the AI team to test the algorithms required for milestone 2 and giving us the opportunity to explore machine learning techniques that could replace the 'conventional' AI in certain situations.

One of the first approaches that we have discussed was using neural networks to train the robot to perform actions such as chasing the ball or avoiding obstacles.

After doing some research into java libraries with neural network support, Martin started to implement the neural networks-based AI and I did research into various types of networks and machine learning techniques used in robot motion control, such as genetic algorithms and Markov Decision Processes.

## 5. AIMS FOR MILESTONE 3

If the neural network approach proves to be successful, one of the aims for milestone 3 and possibly for the first friendly would be to integrate both the conventional and the machine learning AI into the behaviour of the robot. This is a task that could be divided between the members of the two AI teams.

In order to test their strategies, the AI team currently uses the simulator, which allows only one of the robots to follow a predefined strategy. Since it would be very useful to allow both robots to follow different strategies and to compare them, my current aim is to adapt the simulator and the GUI to accommodate strategies for both robots.

## 6. CONCLUSION

In conclusion, my contribution towards the second milestone consisted in assisting Martin on the simulator, fixing robot-robot and robot-wall collisions and updating the wiki page of our group with my conclusions on the research I did I various machine learning techniques.