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For this milestone I wanted to start developing an AI system now in order that it would be ready for the first friendly tournament. Since the second milestone could be achieved easily with or without the AI system I felt this was reasonable course of action to take.

My aims were: start planning and implementation work on the AI system, and ensure that the second milestone is ready on time.

It was the agreement of the team that the AI system should be started as soon as possible. I organised a meeting of representatives from the vision, control and strategy sub-teams to discuss how each of the individual subsystems would communicate with one another.

The strategy subteam then went away and we worked out an overall structure of the AI system over several 'round the whiteboard' discussions trying to iron out any problems with it. Our main drive was to keep it as simple as we possibly could. The reasoning behind this was looking back on previous years we noticed that the robots that did well had a very simplistic AI system whilst some had none at all. We had identified the AI system as of one of the areas we would improve on previous years from. We divided the tasks out and I chose the part of turning the plan from the path finding algorithm into commands that the robot can execute.

The algorithm I chose was the *Pure Pursuit Algorithm*. I came across this when discussing what I was trying to do with a friend¹ and she mentioned some work she did where they made the robot drive in arcs instead of trying to follow a straight line. I did some further research and found the Pure Pursuit Algorithm. This looks ahead the path it is following and projects an arc from the centre of the robot to a point ahead of the robot. There is not much literature about the algorithm but over a few days I pieced together the maths and worked out how to adopt the al-

gorithm to suit our needs. The main problem was that other implementations were designed for robots with a rear turning wheel or two front turning wheels. I had to adapt the algorithm so it could be used with the co-ordinate system we are using and so it could use the differential wheels on our robot. The issue of the robot driving in an arc is already solved as it is in the *lejos* library used in the robot.

I also did some worked helping with the debugging of the algorithm we use for driving to the ball for the milestone. It was working fine in one direction but when it tried to find the ball the other way it would turn so it was exactly 180 degrees in the wrong direction. A simple bug of declaring a variable twice was found and fixed and it works now.

The code the finds the ball works but due the limitations of the vision system at that time I felt that trying to change the way it drove to the ball close to the deadline would be very risky. I took the decision that the method Tomas developed would be the one we used for the milestone and the AI's method would be moved in once the issues with finding the orientation of the robots were resolved.

I feel I have achieved my goal of planning and starting the implementation of the AI system. My part is almost finished implementation and it should be done by the end of the week. The second milestone was ready 3 days before the demonstration day however there are still problems with the orientation of the robot that will have to be resolved before the first friendly. I do not like the way that the robot finds the ball currently. I think the AI system of getting to the ball is a much more 'cleaner'² and will not be confused by being right up against a wall as it is now. It will also ensure we approach the ball at the correct angle to score a goal.

¹Wenqi Yao - 4th year

²Much less 'hacky', it gets there by using the orientation provided by the vision system rather than guessing the robots orientation by driving forwards slightly and taking the angle of the two points it gets.