Project 1 Robot Football Tasks

Aim:

To build an autonomous robot that must be able to activate on sound (whistle or hand clap), find the ball, dribble the ball towards the penalty area, stop and kick the ball towards the goal (containing an infrared transmitter that acts as a homing beacon).

Project deliverables:

* Group report written in ACM format (5 pages max)
* Individual report written in ACM format (3 pages max)
* Group oral presentation
* Functioning light following robot

Project stages:

* Research
* Design, build and test of robot
* Analysis of the scientific properties of the robot components
* Design and implementation of group report
* Design and implementation of individual report (including peer review)
* Design and delivery of group presentation (using PowerPoint)
* Penalty shootout competition

Research:

* History of the development of robots
* Economic, environmental and social impact of using robots
* Common applications of autonomous robots (mainly light following)
* Different types of light following robots
* Advantages and disadvantages of using autonomous robots
* Health and safety issues of using autonomous robots
* Analysis of the major components of autonomous robots
* Scientific principles that allow autonomous robots to function

Robot specifications:

* At least 2 electric motors
* 1 sound sensor
* 1 infrared sensor
* At least 1 touch sensor
* 1 ultrasonic sensor
* Microprocessor unit
* At least 2 wheels

Robot must be able to:

* Start and stop using sound (hand clap, whistle)
* Move forward, reverse, move left and right towards beacon (with ball)
* Stop exactly 40cm from goal, kick ball into goal
* Stop and shut down if robot collides with an object

Analysis of the scientific properties of the robot:

* How the robot gets, stores, distributes and consumes energy
* How the robot “hears”
* How the robot moves
* How the robot “sees”
* How the robot “thinks”
* How the robot communicates
* How the robot avoids injury to human beings
* What damage to the environment may these robots be causing?

The analysis does not need to be a detailed technical and mathematical description but must demonstrate that we understand the basic principles that make these components function. e.g. for the infrared sensor, an explanation will need to be given for:

* What is infrared light?
* How can we transmit/receive infrared light?
* How do we measure infrared light?
* How can we use infrared light to control devices?
* How can we use infrared light to carry information?

All major components must be analysed in this way (electric motor, sound sensor, infrared sensor, touch sensor, ultrasonic sensor, microprocessor unit).

Design of technical group + individual reports:

* Specifications for these reports are on student portal
* Computer programs and screenshots etc. must be placed into additional pages at the end of the report

Design of group presentation:

* 15 mins in duration
* 10 mins for presentation
* 5 mins for questions from audience
* Each student has 2 mins to present
* Students are assessed individually
* Presentation must be in PowerPoint
* Must wear suit and tie

Formal presentation is on Friday 22nd November 2019, 12pm

Submission for group + individual reports is Sunday 24th November, 12am

Reference:

Jenner, R.P. University of Greenwich (2019) *Project 1: Robot Penalty Shoot-out.* Available at: https://moodlecurrent.gre.ac.uk/pluginfile.php/1575668/mod\_resource/content/2/Project%201%20Specification%202019\_20.pdf (Accessed on 03/11/2019)