University of Strathclyde
Department of Electronic and Electrical Engineering

EE518 Advanced Microcontroller Applications

Assessed Project

31st January, 2013

Project Description

Create a programmable autonomous vehicle by refitting a radio controlled toy.

The aim of this project is to design and build an embedded system which will allow an off-the-shelf remote controlled toy to be converted into a vehicle capable of operating independently. The vehicle will be placed at a specified starting point and must be able to:

- travel for a specified distance,
- reach a specified end point,
- cover the distance specified in less than a specified time,
- avoid an obstacle between the start point and the end point by turning, and
- not require any user input while travelling.

An example test run is shown in Figure 1.

To total (minimum) distance travelled is 6 metres. This distance must be covered in 30 seconds or less. Values for d and θ will be unknown until two minutes before an attempt at travelling the distance is made. Two journeys—with different values of d and θ—must be made in order to complete the project.

Marks for the project will be calculated on a group basis. 400 marks are available. Vehicles which have the shortest distance overall from the end point will gain an additional 40 marks, vehicles which come within 25 centimetres of the end point will gain an additional 10 marks, and vehicles which fail to come within 1 metre of the end point will loose 10 marks.

A Technical Documentation File must be produced for the design. This file must include:

- the specification of the design,
- a description of the hardware including circuit diagram and test points/instructions,
- a description of the software including a functional description, and
- usage instructions.

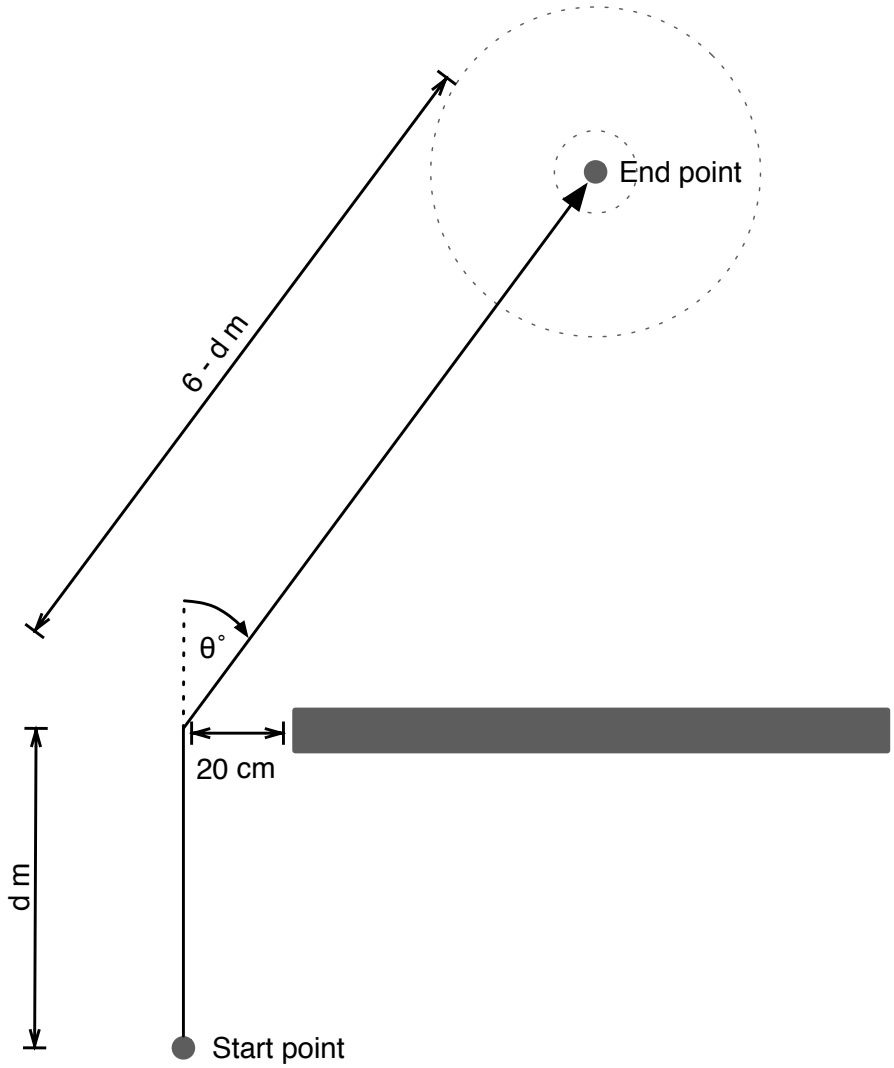

Figure 1: *An example test run (not to scale). The minimum distance between the start point and the end point is exactly six metres. A tolerance of 20 centimetres will be given between the edge of the obstacle and the shortest route between the start and end points.*

A descriptive report on the project is not required. However, the log books of each project member must be returned with the Technical Documentation File and it is expected that these log books will describe the design and debugging process.

By default, the group mark will be divided equally between all group members. However, group members may ask for a different proportional assignment of marks between group members at the time the project is submitted. It is up to group members themselves to make decisions regarding which group member should undertake which part of the design. The project is due to be demonstrated at some mutually agreed time during Week 10 of the Second Semester, and the Technical Documentation File must be submitted on or before the Thursday of Week 10 of the Second Semester (28th March). The mark allocated to each student will be considered to be a percentage, 80% of which will go towards the final course mark. The remaining 20% of the final mark will come from the log book.

Components can be requested from the workshop and will be available from Week 2 of the second semester. Laboratory space and equipment will be made available in GH7.02 for the duration of the project.