University of Strathclyde
Department of Electronic and Electrical Engineering

EE579 ADVANCED MICROCONTROLLER APPLICATIONS

Assessed Project

Build a vehicle to play a game of skittles.

The goal of this project is to create a vehicle capable of playing a game of skittles. Two teams' vehicles will compete simultaneously, with a single set of 3 metal “skittles” placed 10 metres from both vehicles, and both vehicles beginning adjacent to each other. The skittles will consist of two tin soup cans soldered end to end and painted black.

Each team will be supplied with a small model vehicle – you are expected to retro-fit this vehicle to operate autonomously, without altering the chassis of the vehicle or adding any protrusions to the vehicle of greater than 30mm.

The vehicle should be able to locate and knock over the skittles as quickly as possible. The only permitted means of providing input to the vehicle will be via the provided ESP-1 Wi-Fi module, specifically the SparkFun WRL-13678. Since the vehicles will compete against another vehicle, scoring is based on relative performance – there are 3 skittles present in each round of the competition, lasting 2 minutes. The vehicle to knock down most skittles during the round will win the round. In the event that there is a tie in the number of skittles knocked down, the team which knocked down their skittle first will win the round. If neither vehicle knocked down a skittle, the vehicle which has travelled furthest will win the round. During the heat, no team member will be permitted beyond the start line 10m from the skittles.

Upon powering the vehicle on, it must not immediately move; instead it must wait for an instruction you provide over Wi-Fi, through the ESP-12 module, when you are allowed to start. Any other communications with the vehicle must be provided over Wi-Fi, including the instruction to stop at the end of the round.

Marks for the project will be calculated on a group basis. 400 marks are available for the project. In addition, the overall winning team will be awarded an additional 40 marks (over and above the 400). The team coming overall second will likewise be awarded 20 additional marks.

Cars, MSP430s and ESP-1 modules will be available at the end of week 3. You may use these as you see fit. Passive components can be requested from the workshop. Other components may be requested but a case may need to be made. Other things being equal, designs which are cheaper to manufacture will gain higher marks. You are not required to use the MSP430, but you should justify the use of other components in the technical documentation file.

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.

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. A technical documentation file is designed to provide enough information to a fellow engineer that they may maintain and modify or adjust your vehicle in the future, based on the information contained therein.

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 during a slot scheduled like an exam during the examination period in Semester 2. The Technical Documentation File must be submitted on or before then. The mark allocated to each student will be considered to be a percentage, 70% of which will go towards the final course mark. The remaining 30% of the final mark will come from the log book (20%) and first semester programmes (2.5% each).

Room 3.53 in the Royal College Building is available on Friday mornings for constructing and testing the hardware. Safety regulations require that students undergo an induction prior to working in the lab, and that more than one person be present in the room when any work is carried out – attending as a group satisfies this requirement.

Project Groups:

1	BROWNLIE MARK
1	COATS NATHAN
1	HANSAWANGKIT JIDAPA
1	HUANG YUMIN
1	KELLY JORDAN
2	LIU YUREN
2	O'DONNELL ANDREW PATRICK
2	PETRIE ALAN
2	SMITH DOMINIC
2	SUN YUHAO
3	HOWIE AIDAN
3	ILIEV ILIA
3	LAZZARI PAOLO
3	POCOCK DAVID THOMAS
4	BARTHOLOMEW JAMES
4	FITZPATRICK MARTIN
4	LAWRIE ANDREW
4	LUNARDI DAVID
5	MCKENNA ALAN
5	MCMENEMY CALLUM
5	REID ALASTAIR
5	YOUNGSON ALISTAIR
6	BAXTER LEIGH
6	IZQUIERDO BADIOLA SILVIA
6	MAO YIMING
6	MCLEOD IAIN
7	ANDREW EUAN
7	BOYD RUAIRIDH
7	DRAGANOV KARLO
7	GIBBARD LUKE SIMON
8	GORDON FRASER
8	LIWSZYC VALENTIN
8	MASOUD ADAM
8	PEARCE GRANT
9	MEDINA AMADOR JUAN
9	MULLEN JONATHAN
9	NAIRN TRISTAN
9	WANDS KENNETH
10	COMBES YOHAN
10	FOURNIER SÉBASTIEN
10	JEGAT ROMAIN
10	MONTJOIE HENRI