THE UNIVERSITY OF SHEFFIELD
Department of Electronic and Electrical Engineering

First Year Great Egg Race (FYGER) 2013

Aim
To develop a small electric vehicle to compete for an 'egg' and transport it to your 'garage'. In order to develop the egg recovery vehicle the team (your tutor group) must use all their knowledge of mechanical, electro-mechanical and electronic systems if they are to eliminate the competition!

Method
The method that you use is entirely up to the team to decide, subject to the constraints imposed. Essentially, you must produce an integrated "means of transport and fighting machine", with an associated control system, which gives you speed, power and maneuverability, coupled with effective ease of control.

Organization
- The event will take place during weeks 10, 11 and 12 of the first semester, with the final competition taking place in **MAPPIN HALL** on Thursday 19th December, starting at 2pm. Attendance at this event is *compulsory*.
- The first year labs will be open on the afternoons of Mon. 2nd, Tue. 3rd, Mon. 9th, Tue. 10th, Mon. 16th, Tue. 17th and the morning of Thurs. 19th December.
- It will involve all EEE students competing in teams, with each team being a tutorial group.
- As this is a very time-critical exercise, you must organize yourselves effectively as a team. Thus, the team should make good use of "out-of-hours" time and facilities such as the library.
- Prizes are on offer for the winning team and runner up team

Constraints
- Each team will be given a "Kit-box", containing various components. In addition, there will be a selection of electronic components available in the lab. To be fair to every team, NO OTHER COMPONENTS WILL BE ALLOWED (e.g each team can only have a maximum of 2 motors).
- Your "Kit-box" will be made available on the desk at the front of the lab on the first Monday (2nd Dec). Once collected, the box will remain the responsibility of your team until it is handed back on the day of the final. You will be able to store your kit-box in the first year lab.
- The competition power supply to your vehicle will be fixed at 6V, 2A. The only connection allowed between the vehicle and its control system being a 20m length of 4 core, 1 amp, screened cable with a standard plug on each end.
- In the best gladiatorial tradition, no 'holds' are barred EXCEPT attempts to cut the opposition's power cable!
- Industrial ESPIONAGE is permitted, industrial SABOTAGE is not.

The Contest
A series of eliminating heats, culminating in the grand final. The heats and final will all be held in the "Arena". The "Arena" is a 2m diameter circle (made from chipboard), in which there are four "Garage" entrances (each 225mm wide at 90^o intervals). Starting from their garage entrances, each contestant just needs to pick up the single egg (table tennis ball) from the centre of the arena and take it back to their garage. The contestant wins when the egg and his "mode of transport" are both behind the garage entrance. Of course, the other contestants will be trying to do likewise at the same time!
There are 22 teams competing in this year's FYGER tournament. The format is shown in Figure 1. Each team will have the chance to compete at least twice in the tournament. The Group Stage consists of 12 heats in which 4 (or 3) teams play each other. In heat 1 the four teams from Group A will play each other, with the winner going through to the Quarter Finals. In heat 2 the remaining teams from Group A will play again with the winner also progressing to the Quarter Finals. Groups B-F are then played in the same manner. Just one team progress from each Quarter Final to a Semi-Final. In each Semi-Final 2 teams compete for a place in the Final. A best-of-three contest is used for the Final.

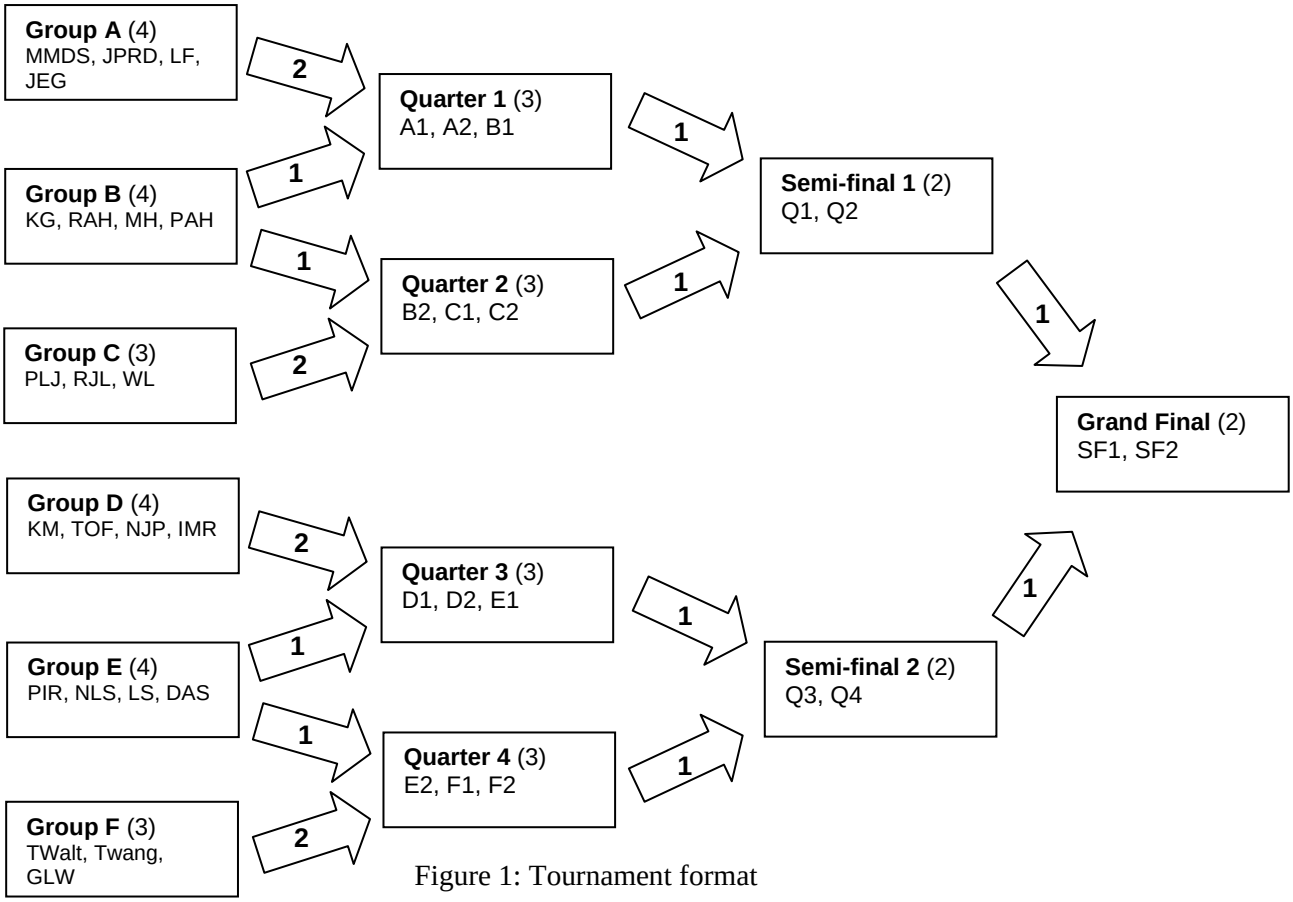

Figure 1: Tournament format

Each heat will last 3 minutes. If there is no outright winner after this time then one will be chosen by the judging panel. The judges' decisions are final! There are 21 contests in total, thus the total contest will take approximately 2 hours. All students are required to attend ***the whole of the event***, irrespective of whether their team has been eliminated an earlier round.

Finally, after the contest is completed an award ceremony will be conducted where prizes will be presented to the 1st and 2nd placed teams.

You have to choose a name for your team. Please supply this to the demonstrator by Monday 9th December.

Rules of the contest

1. No team is allowed to use more than 2 motors.
2. Use of sticky tape for catching the ball (or some other devious method) is prohibited.
3. Competitors are not allowed to touch any competing vehicles once a heat has begun.
4. If a car is not ready at the start of a heat then it cannot compete in the tournament.
5. Judge's decision is final.

Contravening of the rules will result in disqualification of your team and humiliation for your team and your tutor!

The "Kit-box"

Meccano set plus one "egg" (table tennis ball)
2 x 6V, DPDT relays: 2 x DPDT, centre-off, 2 way biased switches: 2 x SPDT toggle switches, 2x 100k double ganged linear potentiometers, the switches and pots mounted in a plastic box.
4m test lead (4 core screened with plugs, as per competition lead) with matching 5 pin DIN sockets.
Assorted ICs and transistors, including NE555, NE556, TL074 and BC184L
Breadboard and connecting wires, to be used in the breadboard only, not soldered!
Matrix board and pins, IC holders.

Useful resources

'Art of Electronics', Horowitz and Hill; 'Microelectronics', Millman and Grabel;

'Power Electronics', Mohan and Undeland.

PLEASE RETURN YOUR KIT BOX AFTER THE CONTEST!