*NASA wishes to 3D print radiation shelters on Mars. Some of the regolith has been identified as suitable for 3D printing. NASA requires a prototype rover system to collect the resource and bring it to the collection area. The range of the system is over a 3m^2 area with an upper bound of 3m in the x and y directions. The rate of resource collection should be a great as possible. The rate of collection will be measured in kg/ 240 sec period. The system should be suitable for transport and operation in the Martian environment. It should consume as little power as possible.*

A group of first year engineering students are required to build a rover in a period of about 10 weeks. The design objective is ‘…your team is to design and build a prototype rover that is able to transport on a **Mars-like surface** and collect resources.’

The assessment marking emphasises the following points:

Productivity – This is based on the amount of resource that was collected and successfully brought to the container in the assigned 4 minute period

2.Innovation – Marks will be allocated to groups that are able to produce a machine that is able to incorporate systems that “think outside the box”.

3.Energy Consumption – You should always remember that energy efficient systems are most welcomed everywhere, but that question becomes even more important when we talk about spaceexploration.You don’t have a possibility to change batteries in your rover when it is working on another planet and the energy you get from solar panels is limited. It is important to understand that the power system needs to be sized for the whole mission to be completed. That is why you should build systems ,which consume as little energy as possible. By measuring the instantaneous power of the batteries before and after the run, we will find out how successfully you managed to achieve that goal.

4.OperationRememberthis golden rule of space engineers: KISS! Keep It Simply Stupid

The client is ‘NASA’ but in relation to the actual design the client is the course assessor and at least to some degree, our team as we will be the ones operating it.

The objective is to build a rover that can transit on a Mars-like surface (beach terrain with small rocks, sandhills and recesses) and collect resources.

The constraints are; it must be built by undergraduate students with little or no experience in building robots, a working prototype must be produced in ten weeks.

A close up of a newspaper

Description automatically generated

A screenshot of a cell phone

Description automatically generated

A picture containing screenshot

Description automatically generated