# Interview Assignment

Instill Motion

Assignment Task 1

- Robotics system comprise of a mechanism for traveling in multi degree of freedom and have non circular or non axial traction device to move it in desired direction, replicating movement and ability of a beetle/cricket.

- Make a enclosed housing to cover all the internal components and standard component(motor ,mechanism ,chassis ,electronics, etc).

- Design a mechanism which has a ability to move in any linear direction 1 meter/sec and have ability to propel omni directional at instant speed of 3 meter/sec.

- The overall weight of the whole commodity should be 100grams (+/- 20gms).

- The device should be able to carry weight 15X higher then its own weight

- It should also consist of proportional space for electronic and battery.

- The overall footprint should be within 150x75x50mm

- Also provide detail theoretical calculation or simulation to justify the material selection and design.

- Make a Bill of material with defined material and appropriate manufacturing method.

- Prepare drawing for any 3 parts with detailed GD&T.

375mm

15X weight then the weight of the device
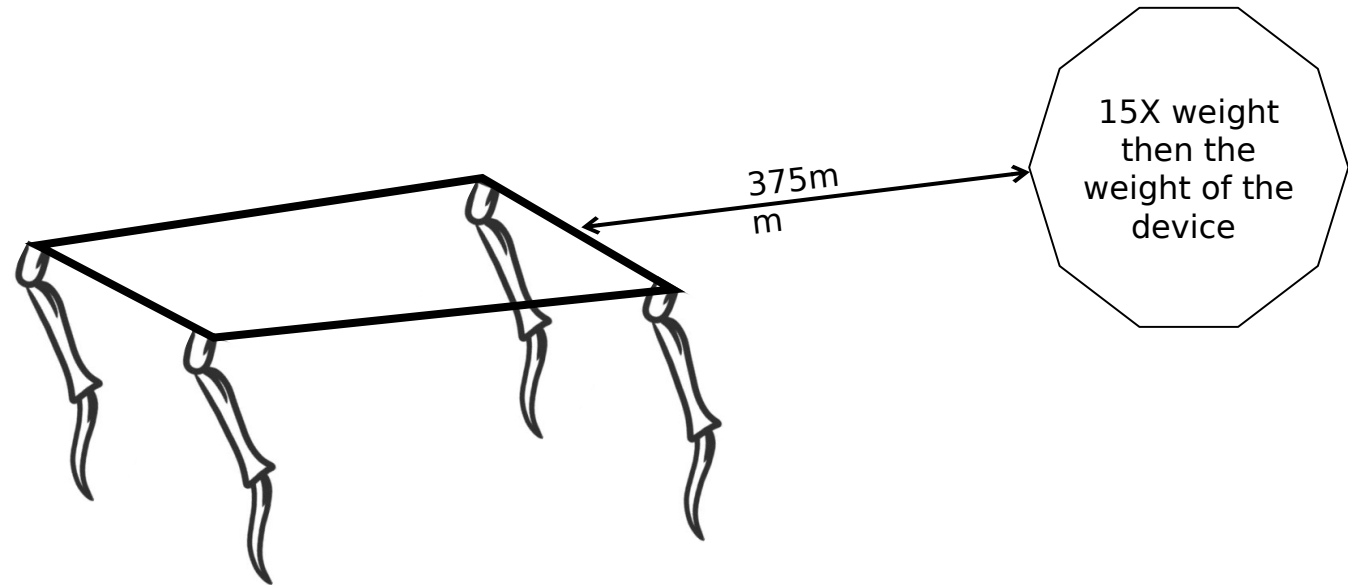
Assignment Task 2
(Data Science)

1. If you had to make this robot smart, how would you go about doing it? You may describe this in written along with any flow charts/block diagrams/rough sketches etc. For instance, consider this scenario:

 - Say you have used various MEMS (Micro-Electro-Mechanical Systems) and other sensors which are gathering data in helping you making this robot semi-autonomous or fully autonomous and you have to prove to someone how the robot is smart, how would you go about explaining to them the various aspects and convince them of it being smart and autonomous?

2. [This follows from point number 1] Depending on the nature of data that you are getting, is there scope for analysing it using various data science techniques and processes and suggest any mechincal/electro-mechanical optimisations to maybe increase battery life, speed, 'smartness' etc?

3. Explore the use of MEMS sensors such as Inertial Measurement Units (IMUs), Pressure sensors, Accelerometers, Digital e-compass and other electro-mechanical sensors for functionalities such as motion detection, obstacle avoidance, or environmental monitoring, do you think it's possible to achieve those with the mentioned set of sensors? If yes, then give a brief description of how it could be done...no need of a lot of details, just your preliminary thoughts on it. However, if any or none of those can be achieved, then provide reasoning and justifications and if applicable, suggest other or additonal sensors that can give such capabilities.

[Bonus]

1. How would you use data science to guide you in selecting materials, composites, components etc for making a more finalised version taking into account aspects like power-to-weight ration, compatibility of various components, ease of integration and manufacturability?

Note: Focus on your creativity and skill in utilizing data science techniques for design optimization, material selection, and the integration of sensors to enhance the robot's performance. Feel free to explore innovative ideas and think critically about the data-driven aspects of the robot's design.