**Enigma**

Computer Science Club
Mahindra University
mu-enigma.org

# Data Challenge -Problem Statement

Muver is a tough terrain rover that has been sent from Bahadurpally Space Station (BSS) to the surface of Mars to detect rare underground metals. It has the ability to constantly send information back to BSS but it is totally autonomous and doesn't require any instructions from BSS as it moves on the surface of Mars.

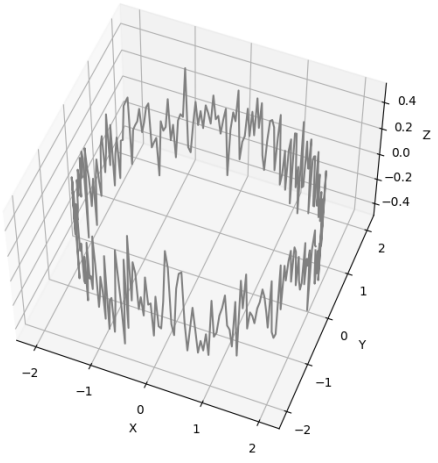
Muver is equipped with an accelerometer that is quite similar to the one that your smartphone has. All that the accelerometer does is to constantly record the acceleration of your mobile device - namely the 3 components of the acceleration vector ($a_x$, $a_y$, $a_z$).

To get a feel for how this works, you may want to install the "Sensors" app on your android phone (available for free) and play with it for a few minutes.

Muver is programmed to autonomously explore the surface of Mars by moving around in a set of predefined patterns.

1) Circular
2) Oscillatory (linear)
3) Hop-forward
4) Spirally upwards

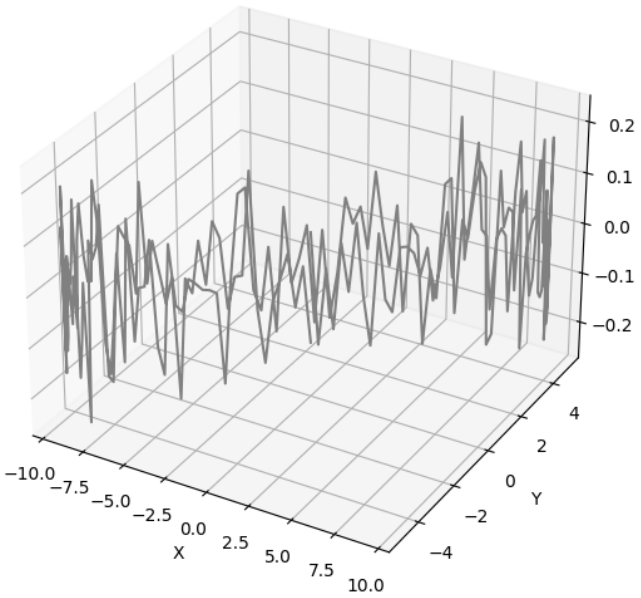
**1)Circular paths:**
Typically look as in this picture:



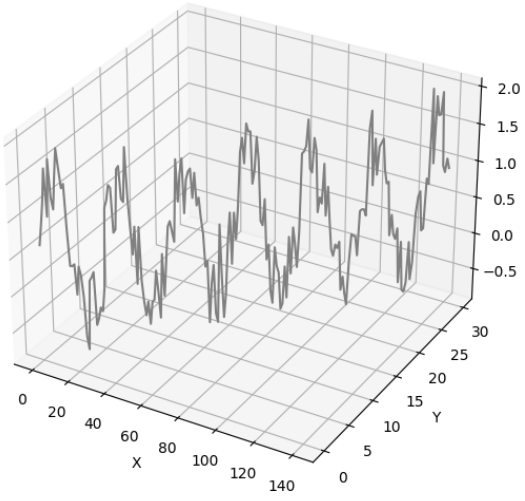

this is how it’d look from the top

Because the surface is rough on Mars, you could notice that the Zth co-ordinate of Muver varies although the motion is confined only to the ground.

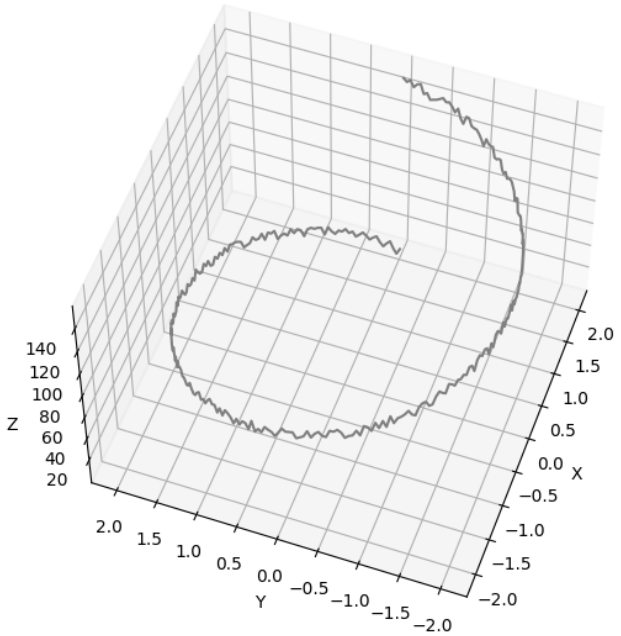
**2)Oscillatory (linear) path:**When our rover finds a interesting sample it keeps moving between two points to test the sample




**3) Hop-forward:**Our Muover has a feature to hop periodically on the surface to speed up its motion when it needs to hurry




**4)Spiral Path:**




The jet of Muover is broken so it cannot go straight up but in broken spiral motion

**What do you have to do then?**

IT Genius Nowin claims to have an ability of reading a dataset and figuring out what sort of motion the rover is performing. But interestingly he called in sick on a crucial day and we are unable to decipher what motion the Muover is making although we have the data points available with us.

Your task is to build a Machine Learning Model which can help identify the motion the rover is performing (circular, oscillation, spiral etc..), we will provide you with all the previous data for what ($a_x$, $a_y$, $a_z$) what motion Muover is making with 200 samples per 30 seconds.,Help us predict the motion of Muover.

## Dataset

Click here for dataset (https://mahindraecolecentrale-my.sharepoint.com/:f:/r/personal/enigma_mahindrauniversity_edu_in/Documents/Aether%202k23/Data_challenge?csf=1&web=1&e=K4ahzS)

Data set is given by column (1,2,3) is ($a_x$, $a_y$, $a_z$) respectively with 200 samples for 30 seconds of motion (this is one set) and 10^5 such sets have been provided to you.

## Judging Criteria

1)Accuracy of your model
2)Time and complexity

**Thank You**
**Good Luck**
**Team Enigma**