SpiderBot

## **Main Objective of the Project**

Our main goal for the project, SpiderBot is to study and analyse different walking gaits and leg trajectories for a round-body Hexapod (6 legged walking robot). And then optimize these gaits and trajectories for different terrain and environment. After having optimized trajectories and gaits we would move on to working on the controllers problem.

Our robotic system would function similar to [this](https://youtu.be/RluQvXL1tgQ). The leg architecture would be similar but maybe not the exact mechanical design of the assembly.

## **Current Progress**

Due to not being able to work on physical hardware, we have been majorly focused on literature review and simulations for our project since a year now.

* During this time we have ironed out some of our very crude details for the project and gained a lot of understanding in the field of legged robotics.
* We have also made an initial conceptual mechanical design and the team is working on refining it.
* We are simultaneously looking at various simulation frameworks to help us test our work later.
* Meanwhile we are facing major challenges in the optimization and modelling of the system.

## **Where we need your help**

So from the very beginning we needed to mathematically model our bot. We require the Kinematic and Dynamic model equations to feed them in the trajectory optimizers. And also firstly to check these equations we plan to test and visualise them on MATLAB & Simulink.

Kinematic modelling was something that we were able to wrap our minds around, but are facing some difficulties in testing that out on MATLAB.

For the Dynamic modelling we did struggle a lot, reading many research papers but would always end up finding it a bit too complex. We have come across a lot of terms like Lagrangien, Newton-Euler, LIPM model, SRBD and RBD model.

We now know that we require a LIPM and SRBD model for our robot in order to apply the trajectory optimisation method as followed in [this paper](https://drive.google.com/file/d/1tkUSnGWPurdvhQxCB7X_Ejo5EhVmAc7e/view?usp=sharing).

So we now need your help in solving this problem.

## **Papers in the folder**

We have added some of the papers that we did try and go through to solve the problem.

Along with this, the PhD Thesis of Alex Winkler titled “Optimization based motion planning for Legged robots” is added. We are majorly trying to replicate his work for a 4 legged robot into a 6 legged robot.