Worksheet 15
BeastieLab: GoverPod

Preparation

Download **MAS22_BeastieLab** and unzip. Download **Octave_ Release** and unzip.

Now run the Unreal level. Press **F11** to get a moveable window, use **Alt-Tab** to move between windows and shift them around. There are four hexapod 'GoverPod' robots in the level. Find the one on the left which is not aimed at the stairs. Select it by left-click with the cross-hair. Some parameters will appear as shown on the right. This Pod will walk with the *Tripod* gait.

How to drive the simulation

Left-click cross-hair	Select the actor
F1	Start and pause the actor
X	De-select actor and dump log file
P	Bring up parameter dialogue
tilde (left of '1')	Bring up console. Type 'exit' to exit

1. Getting some Forward Motion

(a) There is insufficient lift drive to raise the feet off the ground (large gravity effect) so increase the value of **LiftDriveAmp** until you start to get .

(b) Now increase the value of **LiftDriveAmp** and note down how the speed increases.

(c) Find the largest value of **LiftDriveAmp** before the robot's behaviour becomes abnormal. (Remember in a Tripod gait, three feet are in contact with the ground at all times).

(d) When you have enough data then you can enter it into the Octave **Plotit.m** script. Press **X** to deselect the actor, and perhaps best to exit the level.

(e) Let's have a look at the auto-generated Octave files. Navigate to the folder MAS22_BeastieLab > OctaveFiles. Capture the filepath. Now open Octave, and on the command line **cd** to the folder. Run the script **GPod_Tri**.

(f) Do you understand why the **LiftDriveAmp** affects the Pod's speed and behaviour?

2. Effect of Swing Drive Amp

Let's see how this parameter affects the Pod's speed and behaviour.

(a) Choose a sensible value for **LiftDriveAmp** and keep this fixed.

(b) Increase the **SwingDriveAmp** in stages and observe how the leg swing changes. Note down the speed for each value.

(c) Can you find a maximum value for **SwingDriveAmp** where the Pod shows reasonable behaviour?

(d) Plot your values on a graph using **Plotit**.

(e) Do you understand how **SwingDriveAmp** affects the Pod's speed and behaviour?
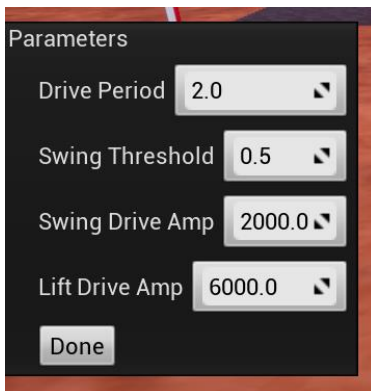
3. Effect of Drive Period

This parameter determines the time take for a complete lift and swing operation in seconds.

(a) How would you expect this to influence the Pod's speed? Perform a mini-investigation and collect some data.

(b) Use **Plotit** to summarize your results and draw out some conclusions.

4. Investigating the Metachronal Gait

The two Pods on the right have been programmed to use the metachronal gait. Find a parameter set to get this moving with the fastest possible speed.

How does this compare with the tripod gait?