Parameter Identification

Team Granular: Teresa, Aaryan, Andrew, Rohith

Introduction

The purpose of this assignment is to decide as a team how you will split up the various Parameter ID tasks individually

Instructions

1. Identify and discuss the materials you plan to use in fabrication. Decide who will be obtaining those materials and distributing them.

Parts List:

Part	Size	Weight	Cost	Link
Battery (x2)	18x65 mm	45 g	$5	
Servo (x4)	40.8 × 20.1 × 38 mm	40 g	$14	link
Microcontroller (Arduino Nano)	18 x 45 mm	7 g	$20	link
Motor controller	62.5mm x 25.4mm x 3mm	5.5 g	$15	link

2. Identify and Discuss the various parameters you plan to model in your simulation, including
    - actuator modeling-select servo, look up existing servo model and specs from company
    - input signal specification-force-torque sensor and/or encoder, specify certain angle in microcontroller, then measure real angle in real life
    - mass and inertia properties-solidworks and verify in real life by measuring mass
    - link and/or joint stiffness-simulate in solidworks, measure link deflection,
    - damping
    - Friction-measured by dragging a plate within the granular media with media

3. Identify and Discuss how you plan to prototype your system and assign one person to do that

The system will be prototyped using the parts mentioned in the parts list table. The first step to prototyping the system is to refine the final design of the system, specifically combining the spine and leg actuation into one dynamic model both in pynamics and in solidworks. Then we will begin prototyping the foldable mechanism for the main body and limbs of the craft using simple materials available to us in the design lab such as what we used in the lamination demonstration. Aaryan and Andrew will be analyzing link and joint information so they will be the primary leads with prototyping the actual foldable mechanism to make the body of the craft. Teresa and Rohith will aid in implementation of the actual motors and control system to prototype the full functionality of the system

4. Identify and Discuss how you plan to collect system-level motion or force data, including

    System-level motion will be captured via a camera system (either using phone or 60fps motion camera) Colored blocks can be attached to the side and top of the salamander and a matlab color tracking script can be used to track the location of the main body of the craft as well as limb movement.

    In addition force-torque sensors are also being considered to collect information on the force of the actual limb.

5. Identify and Discuss your plan for shared simulation tasks

Teresa and Aaryan have been assigned the tasks of updating dynamics. They will coordinate with the team so as experiments are done that determine parameter they will update the code to be more reflective of the real-life system such as with joint stiffness and link stiffness. They will be filtering, interpolating and otherwise massaging input data as necessary to make the simulations as realistic as possible.

6. Finally, identify and discuss any reporting tasks that may be needed

Documentation of each process will be kept so that the documentation will be available when the reports are due. In addition Andrew will keep the website up to date will any relevant information on the project. The main reports will come up as the due dates get closer such as system dynamics II, the parameter identification, and the next level of presentation.

7. Split each of these tasks to the individuals on your team, and come up with at least one deliverable for each person for the remainder of the week

   The system designs/dynamics must first be refined and parts will be purchased. Then each team member will take charge of their designated task as shown in the table below. As shown its broken up into link info, joint info, motor info, and overall system info. The overall system info cannot be accomplished until the other tasks are accomplished. All team members will help out one another, but the person assigned the role will be the primary lead for that given task.

Task | Teammate	Teresa	Aaryan	Andrew	Rohith
Finish design	✓	✓	✓	
Update dynamics	✓	✓		
Link information (mass, inertia, stiffness)			✓	
Joint information (stiffness, damping)		✓		
Motor information (actuator modeling, internal friction, encoder verification)			✓	✓
System information (friction with media, leg dynamics)	✓			✓