



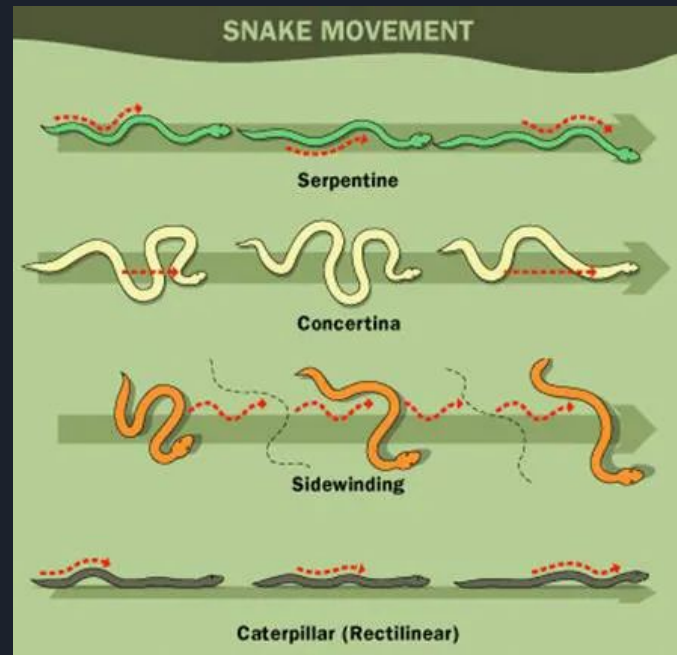
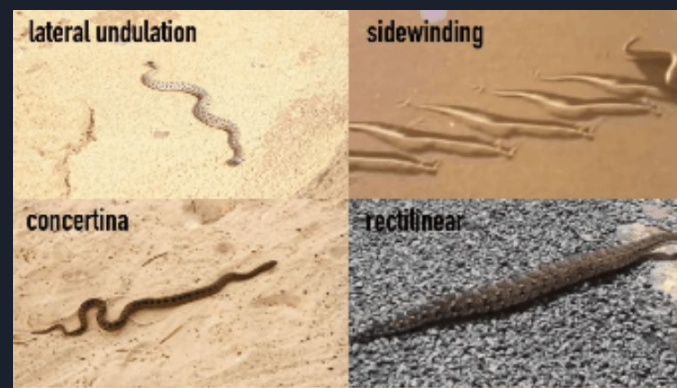
Slytherdrive

Soft Snake Robot

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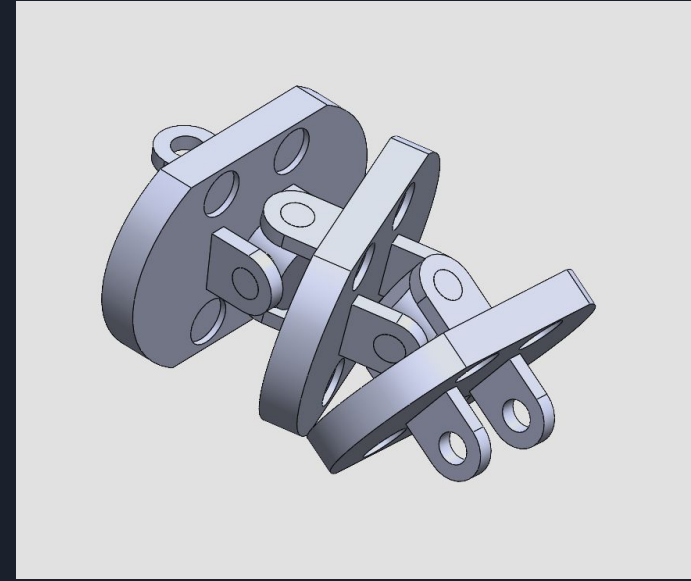
Project Introduction

- Concept: **Pneumatic Snake Robot**
- 4 main modes of locomotion:
 - **Serpentine** (wave-like bends push along the surface)
 - **Sidewinding** (body segments lift off the ground and push the rest of the body diagonally)
 - Concertina (anchor body, bunch up, and stretch out)
 - Rectilinear (belly scales push back like legs of a millipede)
- Engineering Principles:
 - Rigid and continuum mechanics
 - Fluid dynamics for pneumatic controls
 - Control of a highly redundant robotic system



Implementation & Design

- Chain of rigid exoskeletal “vertebrae” connected by soft pneumatic actuators
- Hinges between vertebrae allow for pure rigid-body kinematics
- Risks/challenges:
 - Pressure tube management
 - Developing a high degree-of-freedom pneumatic control system
 - Measuring position of each joint
 - Developing an easy-to-manufacture scale-like surface with anisotropic friction



Semester Timeline

Week	Simulation/Control Development	Hardware Development
0 (9/22) [Presentation 1]	Research motion and gaits in literature	Purchase pneumatic control components
1 (9/29)		Complete CAD model & prototype a few vertebrae
2 (10/6)	Import CAD model, initial simulation setup	Integrate vertebrae prototype with pneumatic controls
3 (10/13)		Testing with prototype
3 (10/20)	Develop a variety of gaits for straight line motion, turning, and traversing obstacles	Iterate on vertebrae design & purchase rest of components
5 (10/27) [Presentation 2]		Complete manufacturing of all vertebrae
6 (11/3)		Complete robot assembly
7 (11/10)	Real-world testing	
8 (11/17)		
9 (11/24)	Testing & Finalization	
10 (12/1)	Final Presentation & Report	