

## **SoftDes Project Proposal**

### ***THE BIG IDEA***

The Big Idea of our project, Bipedal God, is to generate, simulate, visualize, and test physical bipedal systems. Our minimal viable product will create a bare-bone bipedal structure using an evolutionary algorithm, render a simulation of it in a 2D environment, and test the time the generation can remain on its feet. Our stretch goal will generate humanoid bipedal structures, simulate and render them in a 3D environment, and test each generation's ability against a range of obstacles, such as collision with objects and sloped ground.

### ***LEARNING GOALS***

**Shreya:** Better understanding of how to implement graphics in python and understand dynamic calculations to make the algorithms.

**Isa:** Explore evolutionary algorithms and how to define a physical system for a computer aided simulation

**Victor:** To understand the basic structure of dynamic simulation and see how math and physics are incorporated within the algorithms.

**Subeen:** To understand and try the basic implementation of kinematic simulation, from my classical view to computational stuff.

### ***IMPLEMENTATION PLAN***

Algorithms: 1) Establish how to define the physical system as input 2) Research evolutionary algos and libraries (DEAP?) 3) Write script for a very simple mechanical system 4) Slowly increase complexity

Simulation & Testing: 1) Choosing a proper library for simulation, 2) Constructing the objects, 3) Applying the algorithms, 4) Evaluating the result

Graphics: 1) Read documentation about creating graphics in python (Turtles seem to be a way to potentially do this) 2) Create a script that creates an environment for the bipedal

## ***PROJECT SCHEDULE.***

Week 1 (Oct 30 - Nov 6th)	Nov 1st: Code diagram and function criteria Nov 5th: Doctests for assigned functions + Research on each section
Week 2 (Nov 6th - Nov 13th)	Nov 6th: In-class Architectural Review
Week 3 (Nov 13th - Nov 20th)	Nov 16th: Project Presentation
Week 4 (Nov 20th - Nov 27th)	Thanksgiving Break
Week 5 (Nov 27th - Dec 4)	Nov 27th: Project Website
Week 6 (Dec 4th - Dec 11th)	Dec 4th: Final updates to bring project together

## ***COLLABORATION PLAN***

We have decided to each take one of the main parts of the project (Algorithms, Simulation & Testing, and Graphics) and begin implementation. We will split up tasks independently and integrate everything during our meetings. In addition, we will use a Trello board to keep track of tasks to make sure that our progress is running smoothly.

## ***RISKS***

It is necessary to construct the heavy calculation to accomplish our final goal. The biggest risk in simulation is to make the straightforward calculation without any obstacle.

## ***ADDITIONAL COURSE CONTENT***

3D object generation in Python (vPython)

Implementing graphics in python

Evolutionary algorithms