P3 A: Computation of Path for Free Foot

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CS 3451

Project 3 Part A Module 4

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Summary

The task for this module is to animate the path of the dancer's free foot. Given a set of foot placements, the dancer should be shown from a bird's eye view and moving along a clockwise path where they are also demonstrating the 4 tango steps: transfer, collect, rotate, and aim. In the original source code, two cones are drawn as legs without the hips. The four steps of the tango are not implemented. Also, forward step, side step, and backward step are not being considered.

Solution

The solution will be comprised of defining the hip structure of the dancer and creating a caplet for it, defining the forward direction relative to the dancer, calculating the angle of rotation on each step, and using LERP to follow the path the free foot would take.

With all of these general tasks in mind, here is a breakdown of what needs to be done:

- Define the hip and create caplets. Have each leg be on opposite sides of the hip.
- Determine the forward direction relative to the dancer. This is the norm of the hip vector W.
- Calculate the angle of rotation depending on the next dance step: forward step, backward step, or side step.
- LERP the free foot to the point that is tangent to hip circle before a lerp to the following position.
- Have the program repeat this procedure around the points.

In order to define the hips, the beginning of the left leg and the beginning of the right leg must be set apart and rotated 90 degrees from the the vector AB, which are parameters that are passed into the calculate leg function. These points represent the previous two foot placements. Then a caplet will be created from the beginning of the left leg to the beginning of the right leg. This process

is similar to the caplet problem in module 1. Once the hips are defined, the length of the hip will represent the size of the circle that the free foot will travel around, which will be a part of the aim phase.

Before the aim phase, the collect phase will have the free foot move to the position on the circumference of the circle tangent to the next point in path. Once the free foot arrives at that point on the circle, the hips will rotate around the support leg so that it is orthogonal to path B-C on forward, parallel to path B-C on side step, or 180 rotated on backward. Once the direction of the dancer is determined, the dancer will continue to transfer the support foot to the next point in path C.