**[CS7GV5-A-SEM202-201920 REAL-TIME ANIMATION](https://tcd.blackboard.com/webapps/blackboard/execute/courseMain?course_id=_60664_1" \o "CS7GV5-A-SEM202-201920 REAL-TIME ANIMATION)**

**Assignment 2 – Inverse Kinematics**

* **The Humanoid Model:**

A screen shot of a computer monitor

Description automatically generated

* **Analytical Solution for Computing Angles:**

I’ve used the simple law of cosines and trigonometric functions to create my own function for the analytical solution.

A screenshot of a computer screen

Description automatically generated

* **Jacobian:**

Created a function for Jacobian also. Although, I was not able to get the exact joint positions successively after changes which resulted in unsuccessful implementation of the function.

A screenshot of a computer screen

Description automatically generated

* **The output:**

A screen shot of a computer monitor

Description automatically generated

A screen shot of a computer monitor

Description automatically generated

* **Constraints for unreachable positions:**

Defined reachable positions to be (L1-L2) to (L1+L2) where L1 and L2 are the length of upper and lower arms. Any point beyond this distance is unreachable.

* **Extra Features:**

1. CubeMap for background scene.
2. Toon Shading on the model for “cartoon” kind of effect.
3. Moving Lights.

* References;

1. <https://learnopengl.com/Advanced-OpenGL/Cubemaps>
2. <https://appliedgo.net/roboticarm/>
3. <https://medium.com/unity3danimation/overview-of-jacobian-ik-a33939639ab2>
4. Lecture Presentation on Inverse Kinematics