Engineering Tripos Part IIA Project, GF5: Animating 3D Characters, 2025-26

Leader

Dr E Wu [1]

Timing and Structure

Fridays 9-11am plus afternoons, and Tuesdays 11-1pm

Aims

The aims of the course are to:

- Introduce students to the core components of 3D character animation, including rigging, skinning, animation, and rendering
- Provide hands-on experience with modern 3D graphics and animation tools
- Give students practical exposure to building, animating, and rendering a 3D character model
- As part of the project, students will capture an animatable 3D model of themselves and create a short animation

Objectives

As specific objectives, by the end of the course students should be able to:

- Understand the concepts of skeleton-based rigging and skinning
- Construct a simple rig for a 3D character and bind mesh geometry to the skeleton
- Understand simple animation techniques such as keyframe interpolation
- Capture a 3D human model and integrate it into an animation pipeline
- Produce a short animated 3D scene with animated 3D characters

Content

Week 1

- Introduction to 3D visualization and animation tools (using Python-based packages)
- Overview of 3D meshes, skeletons, joints, skinning weights, and kinematic chains
- Basic rig construction and skinning weights assignment on a simple 3D character
- Implement forward kinematic transformations and pose the 3D character using Linear Blend Skinning (LBS)

Week 2

- Create a simple animation sequence using keyframe interpolation
- Render the animation into a 2D video
- Individual interim report

Week 3

- Load and animate a skinned 3D human model (SMPL)
- Explore human motion sequences using the human model

- Work in groups to capture 3D models of your team members
- Drive your character models using existing motion sequences and produce animated motion clips

Week 4

- Refine character animations and integrate them into a coherent 3D scene
- Produce a 30-second long animation video featuring the virtual characters
- Final group report

Coursework

Coursework	Due date	Marks
Interim report	Friday 29 May 2026 (4pm)	20 (individual)
Interim animation results	Friday 29 May 2026 (4pm)	5 (individual)
Final report	Friday 12 June 2026 (4pm)	40 (50% individual, 50% group)
Final animation results	Friday 12 June 2026 (4pm)	15 (group)

Examination Guidelines

Please refer to Form & conduct of the examinations [2].

Last modified: 30/11/2025 18:50

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Links
[1] mailto:sw2181@cam.ac.uk
[2] https://teaching.eng.cam.ac.uk/content/form-conduct-examinations