	Credit-Hour Program		Program:	SBES	
	Academic Year:	2024/2025	Semester:	Spring	
	Course Code:	SBES 140	Course Title:	Computer Graphics and Visualization	
	Due Date:	May 29th, 2025	Full Mark:	100	

Course Final Project

Virtual Tours within Human Organs and Systems in Blender

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A. You can work on the project in groups of 5-6 students (The same groups formed for earlier assignments). The number of some group tasks is proportional to the team size.

B. You should submit a one-PDF-file report (6-8 pages), all Blender files, and a video demonstration of the different project features.

C. Please clearly indicate the contribution of each group member at the end of the report.

D. The report should be formatted as a MS Word file (or a LATEX template for a 5% bonus) with the IEEE conference template < https://www.ieee.org/conferences/publishing/templates.html>. Follow the structure of a scientific paper in writing your report, i.e., including an abstract, an introduction, a brief review of the literature, the methodology, experiments and results, conclusions, member contributions, and references.

E. In this project, you shall do the following:
   1. Create a virtual environment for people touring one major human organ.

2. Create and animate skeletal characters in Blender with reasonable degrees of freedom. The characters represent tour guide(s) and visitor (s) in a medical education training program.
3. Add suitable textures and clothing to the animated characters.
4. Animate the character motions for different scenarios involving interactions between the guide(s), visitor(s), and organ parts (e.g. the guides manipulate valves between heart chambers while visitors are either standing, sitting, or kneeling). The number of animated scenarios should be no less than the team size (e.g. if your team consists of 3 members, then you should animate 3 or more scenarios).
5. Animate common abnormalities or diseases of the selected organ. Your animations should reasonably mimic real abnormalities as much as possible (In your project demonstration, show your animation side by side with a video of the picked abnormalities.). The number of abnormalities rendered should be the ceiling of half the team size (e.g. if your team consists of 1 or 2 members, then you should animate 1 abnormality; if your team consists of 3 or 4 members, then you should animate 2 abnormalities; if your team consists of 5 or 6 members, then you should animate 3 abnormalities).
6. Create the animations in an indoor environment (e.g. halls of a science museum) or an outdoor environment (e.g. an open-air science fair) with suitable lighting sources (ambient lighting, point sources, spotlights, and distant light sources). The environment should include several objects of different diffuse and specular material properties (with object surfaces ranging from highly diffuse ones to highly specular ones). Add suitable textures to all objects in your environment.
7. The animated characters should be able to actually move in the rendered space (not just a motion in place). Also, the characters should be able to move in different directions (or paths). You should also handle collision between objects in the scene (i.e. detect collision and animate object motion accordingly).
8. Each group should select a unique human organ or system to work on. You can select from the following list:

	Organ/System
1	Digestive System (including stomach and intestines)
2	Musculoskeletal System
3	Cardiopulmonary System (including lungs and heart)
4	Visual System (including eyes)
5	Nervous System (including brain)
6	Dental System (including teeth)
7	Auditory System (including ears)
8	Respiratory System (including lungs and nasal cavity)

F. Submit all of your project files as a link to a Google Drive folder (that includes separate subfolders for the project report, the project video, and the Blender source files). Submission must be made through Google Classroom by 7 AM on May 29th, 2025. Project discussions shall be arranged with each group on that date where each group is expected to show a live demonstration of the project and answer any questions.

G. Here are some helpful materials on skeletal modeling and animation in Blender:

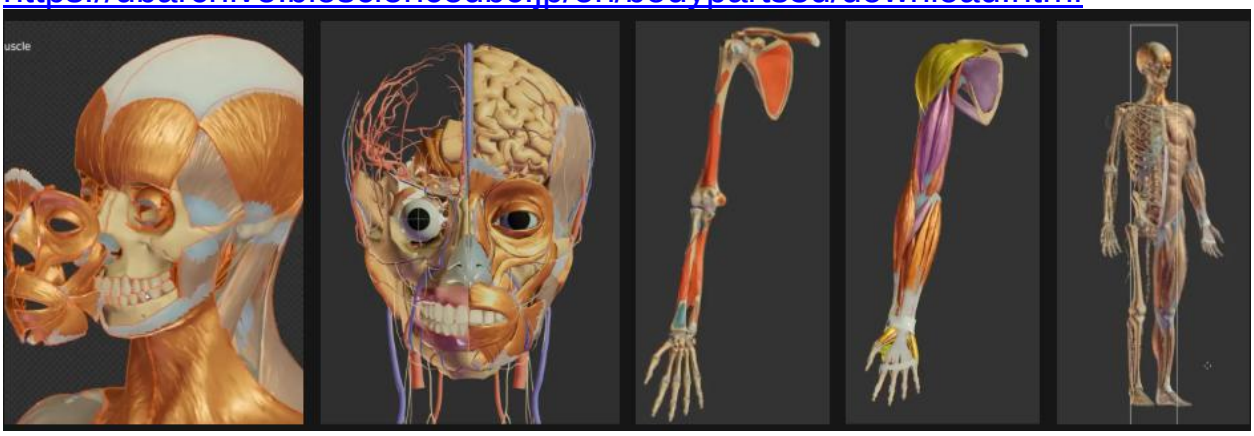
Blender Character Creation
https://www.youtube.com/playlist?list=PLFt_AvWsXl0fEx02iXR8uhDsVGhmM9Pse

Create a basic collision in Blender (Beginner)
https://www.youtube.com/watch?v=8dtffLC_QEs

Collision Detection In Blender's Rigid Body Physics
https://www.youtube.com/watch?v=jOc559tQzuo

H. Here are some helpful materials on human organ modeling in Blender:

Z-Anatomy is an open-source anatomy atlas available as a Blender file. It includes detailed layers of the human body, such as skeleton, muscles, blood vessels, nerves, and internal organs.
https://www.3dart.it/en/free-3d-anatomy/
https://drive.google.com/file/d/1gJYDJ2qTf1oqGo2_a3o_ywDcRtkciQ4t/view
https://github.com/Z-Anatomy/The-blend
https://dbarchive.biosciencedbc.jp/en/bodyparts3d/download.html



BlenderKit offers free and paid 3D models of internal organs, including lungs, brain, and digestive systems. These models are suitable for medical visualization or creative projects.
https://www.blenderkit.com/asset-gallery?query=order%3A-created+is_free%3Atrue+category_subtree%3Ainternal-organ