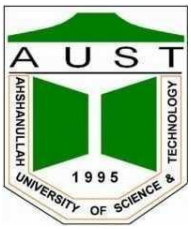
Ahsanullah University of Science & Technology
Department of Computer Science & Engineering



Project Title

Computer Graphics Lab (CSE 4204)

Project Final Report

Submitted By:

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Project Requirements:

The main requirements for this project are as follows:

- **Interactive 3D Book**: The primary requirement is to create a 3D representation of a book that users can interact with, including turning pages, rotating the book, and zooming in and out.
- **Realistic Animations**: The project must include smooth and realistic animations for actions like page turning and opening the book.
- **Web Compatibility**: The project must be fully functional in modern web browsers and ensure a responsive design for different screen sizes.
- **User Interaction**: The project must allow users to interact with the book using mouse controls or touch input.
- **Customizability**: The book model should be easily customizable, allowing different textures, colors, and styles for the cover, pages, and other components.

Software Platform:

The tools and technologies used in this project are as follows:

- **Three.js**: A JavaScript library for creating 3D graphics and animations in the browser. It handles rendering, scene management, and the creation of 3D objects.
- **HTML5**: Provides the basic structure of the webpage, including the scene container and user interface elements.
- **CSS3**: Used for styling the webpage, ensuring it is visually appealing and responsive.
- **JavaScript**: The core language for implementing the logic behind the 3D scene, animations, and user interactions.
- **OrbitControls.js**: A utility provided by Three.js for handling camera controls, allowing users to rotate, zoom, and pan the 3D book.
- **WebGL**: A browser-based rendering engine that allows for hardware-accelerated 3D graphics, enabling real-time interactive experiences.

Project Features:

1. 3D Book Model: The book consists of components like the cover, spine, and pages, all created using Three.js geometric shapes and textures. The model is highly customizable to suit different styles of books.

2. Page Turning Animation: A realistic page-turning effect is achieved through animated rotations, creating an immersive user experience as users interact with the book.

3. User Interaction: Using OrbitControls.js, users can interact with the book by rotating it, zooming in or out, and resetting the view to a default position. This allows for full 360-degree exploration of the book.

4. Camera Controls: The user can adjust the camera distance and orientation to zoom in on the book or examine it from different angles. This is implemented using the OrbitControls library.

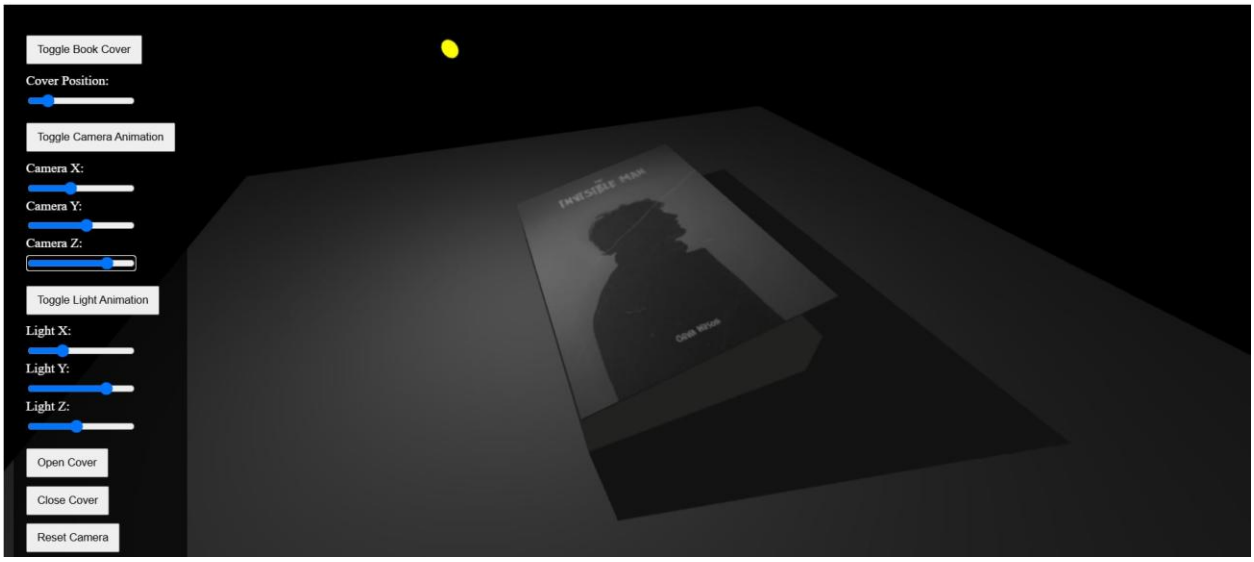
5. Performance Optimization: Techniques like texture compression, level-of-detail rendering, and animation loop optimization ensure smooth performance even with multiple pages and textures.

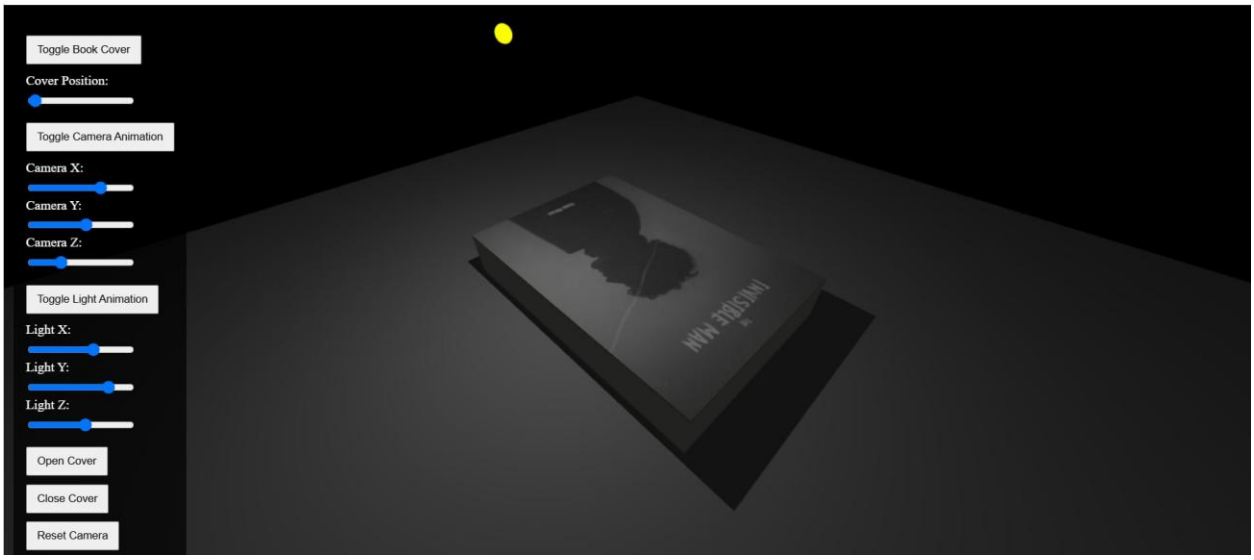
Features Table:

#	Features	Status
1	3D Book Model Creation	Implemented
2	Cover of the book will open and close	Implemented
3	User Interaction (Camera movement)	Implemented
4	Light position will rotate around the book	Implemented
5	Cross-browser Compatibility	Implemented

Table 01: Project Feature Table

Snapshots:


Toggle Book Cover
Cover Position:
Toggle Camera Animation
Camera X:
Camera Y:
Camera Z:
Toggle Light Animation
Light X:
Light Y:
Light Z:
Open Cover
Close Cover
Reset Camera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Camera X:
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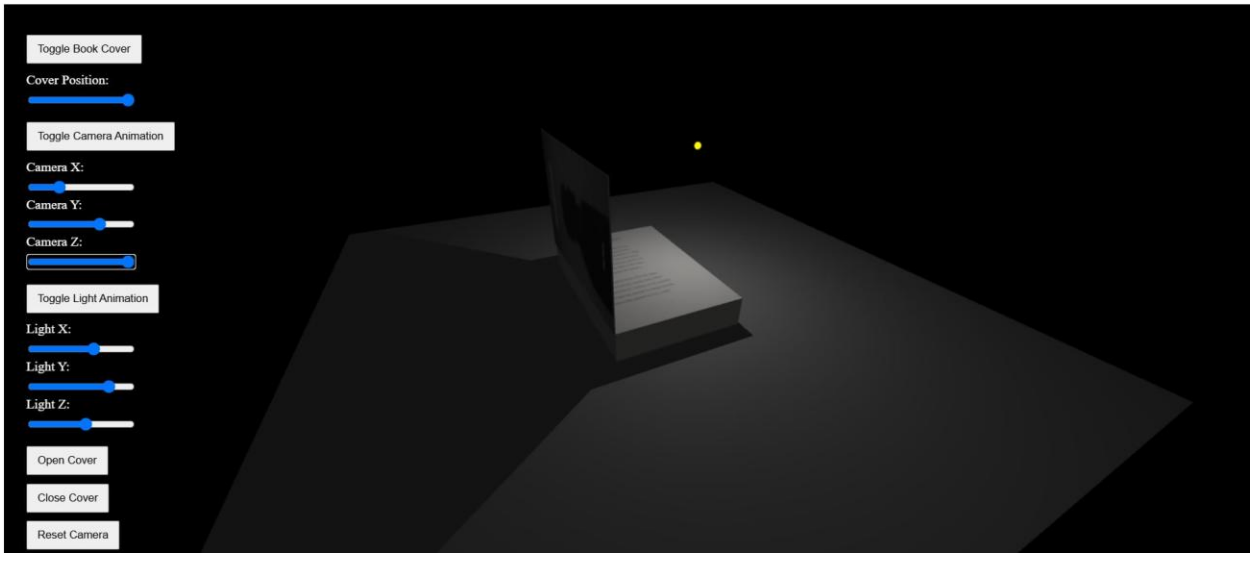
Camera Z:
Toggle Light Animation
Light X:
Light Y:
Light Z:
Open Cover
Close Cover
Reset Camera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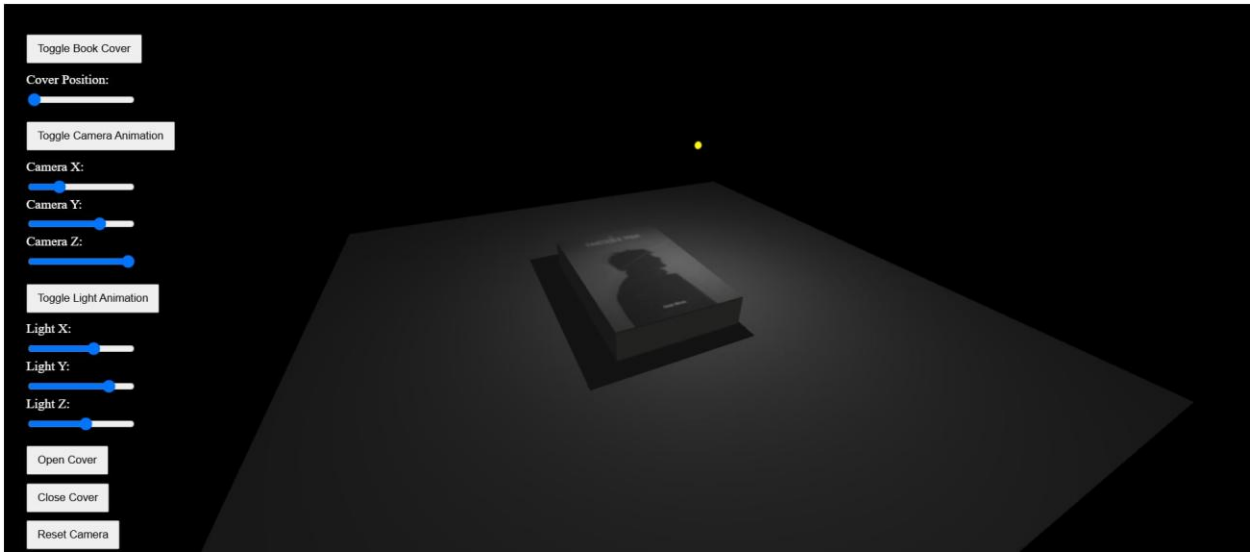

Some screenshots of the project from different camera angle and different lighting.

Contribution:

Contributor	Role and Contribution
Mahmudul Haque(20200204006)	Led the development of the 3D book model using Three.js.
	Implemented the page-turning animations using GSAP for smooth transitions.

	Integrated OrbitControls for user interaction (rotation, zoom, and reset).
	Optimized the performance of the application for smooth rendering and minimal lag.
Md. Asif Rahman	Assisted in designing the textures and materials for the book's cover, spine, and pages.
	Contributed to the page-turning animation by helping with animation timing and transitions.
	Supported the development of user interface elements and improved user experience design.

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Future Work:

- **Content Integration**: Implement functionality to load actual book content, such as PDF or ePub files, allowing for dynamic page loading and display of real text.
- **Audio Effects**: Introduce sound effects for actions like page turning, opening, and closing the book to enhance the immersive experience.
- **Mobile Optimization**: Improve touch controls for a better mobile user experience, ensuring that interactions on touchscreens are smooth and responsive.
- **Reading Mode**: Develop a reading interface that removes unnecessary UI elements, providing users with a distraction-free reading experience.
- **Annotation Features**: Add the ability for users to annotate pages, highlight text, or add notes, which would be useful for educational purposes.