FOSSEE Semester Long Internship— Autumn 2025

Final Internship Report
on
Animation and 3D Modeling

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Acknowledgement

I would also like to acknowledge the collaborative and inspiring environment created by the FOSSEE community. Being part of such a diverse and talented group of interns and contributors provided an opportunity to exchange ideas, learn from different perspectives, and continuously improve the quality of work. The discussions, feedback sessions, and peer reviews played an important role in refining my technical skills and creative thinking throughout the internship period.

During this internship, I was able to explore various aspects of 3D modeling and animation workflows using Blender. The guidance provided by mentors and fellow interns helped me understand professional modeling practices such as maintaining clean topology, optimizing mesh structures, and developing visually appealing assets suitable for educational and creative applications. This experience allowed me to gain practical exposure to industry-relevant tools and techniques while working within an open-source ecosystem.

I am also grateful for the opportunity to contribute to the Free and Open Source Creative Art Library (FOCAL), which promotes the development and sharing of high-quality creative resources for the broader community. Contributing to such an initiative has been a rewarding experience, as it aligns with the values of collaboration, knowledge sharing, and open innovation.

Finally, I would like to express my appreciation to everyone involved in organizing and supporting the internship program. Their dedication to mentoring young learners and fostering creativity has made this internship a valuable learning experience. The knowledge and skills gained during this fellowship will continue to guide me in my future academic and professional pursuits.

Contents

Objective

The primary objective of this internship was to design and develop high-quality, reusable 3D models using Blender that could be utilized for educational demonstrations, creative projects, and open-source learning resources. The focus of the work was on maintaining clean and efficient topology structures, ensuring proper real-world scaling of objects, applying effective and optimized material setups, and creating well-organized Blender project files. Additionally, emphasis was placed on producing models that are easy to modify, animate, and reuse in future projects while maintaining visual clarity and performance efficiency.

Summary of Work:

During the internship period, I successfully created a total of 30 unique 3D models, each accompanied by a fully organized Blender project file (.blend). These models include a variety of stylized, minimalistic, and functional objects such as everyday items, props, character-inspired models, and procedural assets. Each model was developed following standard 3D modeling workflows, which involved reference collection, base mesh creation, topology refinement, shading and material setup, lighting adjustments, and final rendering preparation.

Particular attention was given to maintaining clean quad-based topology, ensuring that the models remain suitable for further editing, animation, or subdivision. In addition, proper object scaling and proportion management were applied so that the models could be realistically integrated into different scenes or animation pipelines. Materials were designed using Blender's node-based shader system, and in several cases, procedural materials were utilized to reduce dependency on external texture files.

Throughout the internship, the modeling process also involved optimizing geometry and organizing project files in a structured manner to ensure that each asset could be easily reused or modified by other contributors in the open-source ecosystem. The completed models contribute to the Free and Open Source Creative Art Library (FOCAL) initiative, supporting the development of accessible and educational 3D resources.This internship not only enhanced my technical abilities in 3D modeling and asset creation but also strengthened my understanding of professional workflows, project organization, and collaborative open-source development practices.

Tools and Software Used

During the internship, Blender was used as the primary software for creating and developing all 3D models and related project files. Blender is a powerful open-source 3D creation suite that supports the entire 3D pipeline, including modeling, shading, lighting, rendering, and animation. Its flexibility and extensive toolset made it suitable for producing a wide range of assets required during the internship.

Blender provides a comprehensive set of modeling tools that enable artists to construct both simple and complex geometries efficiently. Throughout this internship, several key features of Blender were utilized to create high-quality and optimized models. The mesh modeling tools, such as extrusion, loop cuts, bevel operations, and vertex manipulation, were frequently used to construct the base geometry and refine object shapes.

Another important aspect of the modeling process involved the use of modifiers, which allowed for non-destructive editing and efficient geometry management. Modifiers such as the *Subdivision Surface modifier* were used to smooth and refine object surfaces, while the *Mirror modifier* helped maintain symmetry when modeling objects. In some cases, the *Boolean modifier* was used to create complex shapes by combining or subtracting mesh objects.

The Shader Editor within Blender was used to apply materials and textures to the models. Blender's node-based material system allows for procedural material creation, which reduces the need for external textures and provides greater control over the appearance of surfaces. Materials such as plastic, metal, and glass were created using combinations of shader nodes and adjustments to parameters such as roughness, metallic values, and color.

In addition to modeling and rendering, Blender's project management features allowed for proper organization of files. Each model was saved as a separate Blender project file (.blend) with a structured hierarchy of objects, materials, and collections. This ensured that the files remained easy to navigate, modify, and reuse for future projects.

Methodology / Workflow

A systematic workflow was followed during the development of each 3D model to ensure consistency, quality, and efficiency. The modeling process generally consisted of several stages, beginning with reference collection and ending with final optimization and file organization.

The first stage involved reference collection and planning. Before starting the modeling process, relevant reference images were gathered to understand the shape, proportions, and visual characteristics of the object. Studying reference material helped ensure that the final model accurately represented the intended design while maintaining proper proportions and details.

Once the reference was established, the next step involved base mesh creation. Basic geometric primitives such as cubes, cylinders, and spheres were used as starting points to block out the primary shape of the object. This stage focused on establishing the overall structure and dimensions of the model before adding smaller details.

After the base structure was created, the model underwent topology refinement. During this stage, edge loops were added and unnecessary vertices were removed to maintain clean and efficient mesh topology. Maintaining a quad-based topology was important because it allows smoother shading, easier editing, and better compatibility with subdivision surfaces and animation workflows.

The next stage involved material creation and shading. Blender's node-based shader system was used to apply materials that matched the intended appearance of the model. In some cases, procedural materials were used to create surface details without relying on external textures. Adjustments were made to parameters such as color, roughness, metallic properties, and reflections to achieve realistic results.

Following the shading stage, lighting and rendering setup was performed. Proper lighting was essential to highlight the shape and details of the model. Different lighting techniques, such as HDRI lighting and area lights, were used to create balanced illumination. Test renders were generated to evaluate the appearance of the model and make necessary adjustments.

The final stage of the workflow involved optimization and file organization. During this phase, unnecessary geometry was removed and modifiers were applied where necessary to ensure that the model remained efficient and easy to use. Each project was saved as a well-organized Blender file with clear naming conventions and properly grouped objects. This ensured that the models could be easily reused or modified by other users.

Deliverables

During the course of the internship, several deliverables were produced as part of the project work. These deliverables represent the final outcomes of the modeling tasks and demonstrate the skills developed throughout the internship period.

The primary deliverables include 30 Blender project files (.blend), each corresponding to a unique 3D model created during the internship. Every project file contains the complete modeling setup, including the mesh geometry, applied modifiers, materials, and scene organization. These files are structured in a way that allows them to be easily opened, modified, or reused for future work.

In addition to the project files, render preview images were generated for each model. These preview renders help visualize the final appearance of the models and provide a quick overview of the assets without requiring the Blender files to be opened. The rendered images highlight the shape, materials, and overall design of each model.

All files were maintained in an organized folder structure to ensure proper file management and accessibility. Each model was stored in its own directory containing the Blender project file along with its rendered preview image. This structured organization helps maintain clarity and allows other users or contributors to easily navigate and access the assets.

These deliverables collectively contribute to the development of reusable 3D assets that can be utilized for educational demonstrations, creative projects, and further development within the open-source creative ecosystem.

Model Gallery

1. Anime Style Title

Description / Notes:

This model represents a stylized 3D title created using bold typography and anime-inspired aesthetics. The text “BLENDER” is designed with thick, extruded lettering and enhanced with a procedural camouflage-style material pattern, giving it a vibrant and visually striking appearance. The model demonstrates the use of basic text-to-mesh conversion, material node setup, and lighting techniques in Blender to achieve a clean and impactful title render.

2. BAYMAX (Disney) Character

Description / Notes:

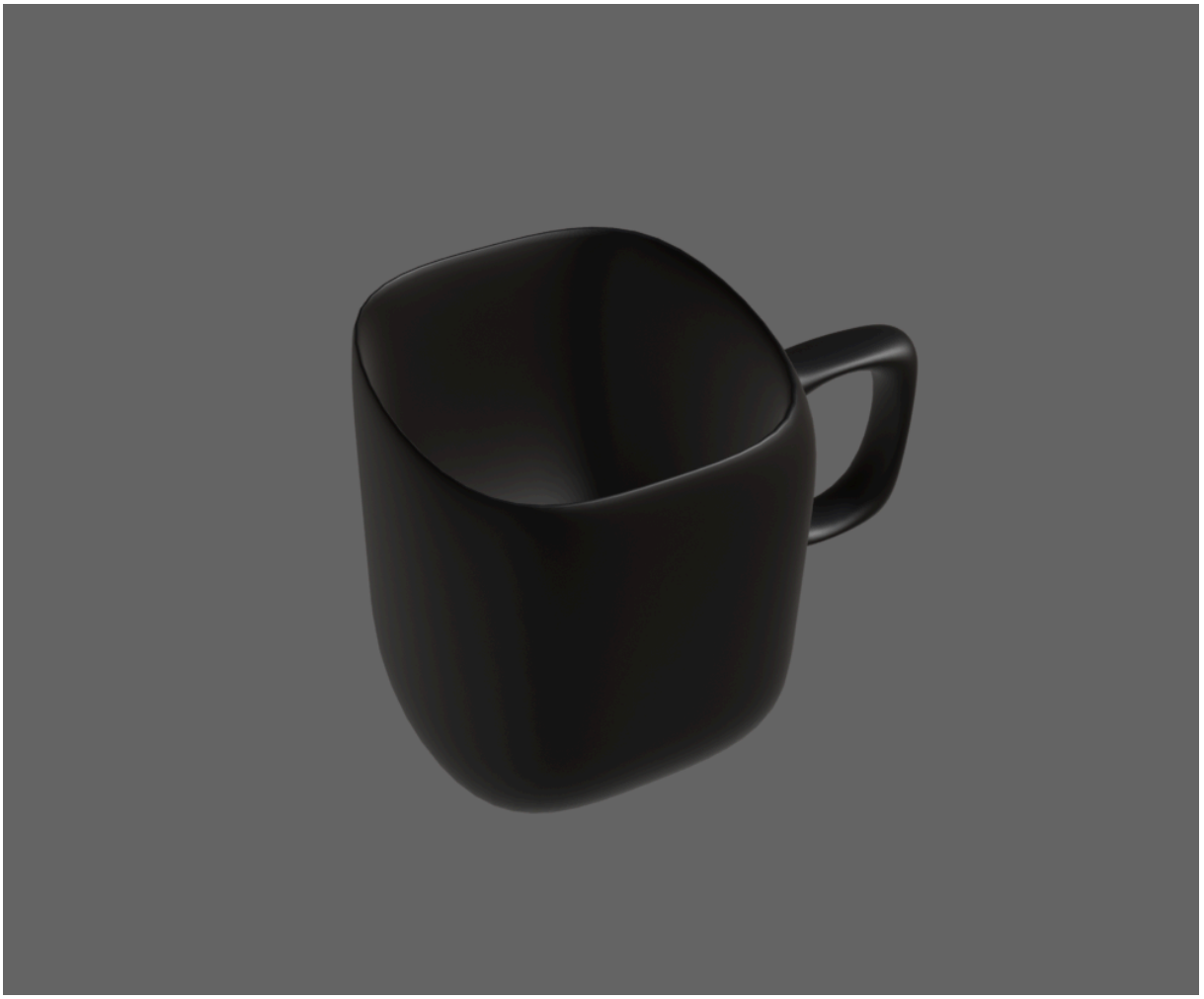
This model represents a simplified 3D version of the well-known character Baymax. The character was created using basic geometric shapes and smooth subdivision techniques to achieve the soft, rounded appearance typical of the original design. The model demonstrates the use of proportional modeling, simple character structure, and clean topology while maintaining a minimalistic style suitable for animation or rendering.

3. Captain America Shield

Description / Notes:

This model represents the iconic shield associated with Captain America, designed using circular geometry and layered shapes to recreate its distinctive pattern. The shield features concentric rings with red, white, and blue materials along with a central star element. The model demonstrates the use of basic mesh modeling, proportional design, and material application to achieve a clean and recognizable hard-surface prop.

4. Coffee Mug

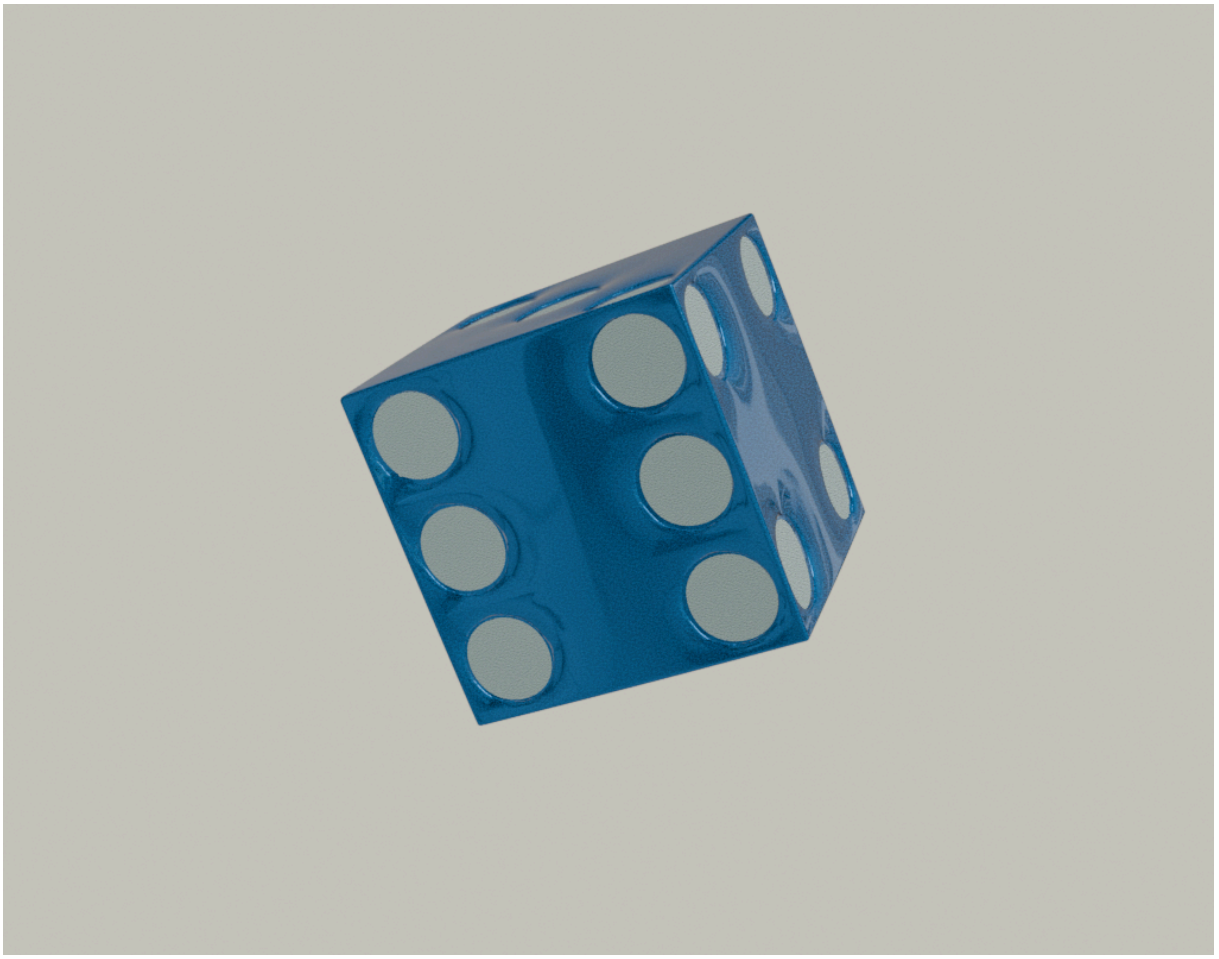


Description / Notes:

This model represents a simple coffee mug created using basic mesh modeling techniques in Blender. The mug features a smooth cylindrical body with a curved handle, designed using extrusion and subdivision methods to achieve soft and rounded edges.

The model demonstrates the use of clean topology and proportional scaling to maintain a realistic shape. A dark material with subtle reflections was applied using Blender's shader nodes to give the mug a smooth ceramic-like appearance. The asset can be used as a common prop in interior scenes, kitchen environments, or product visualization renders.

5. Dice

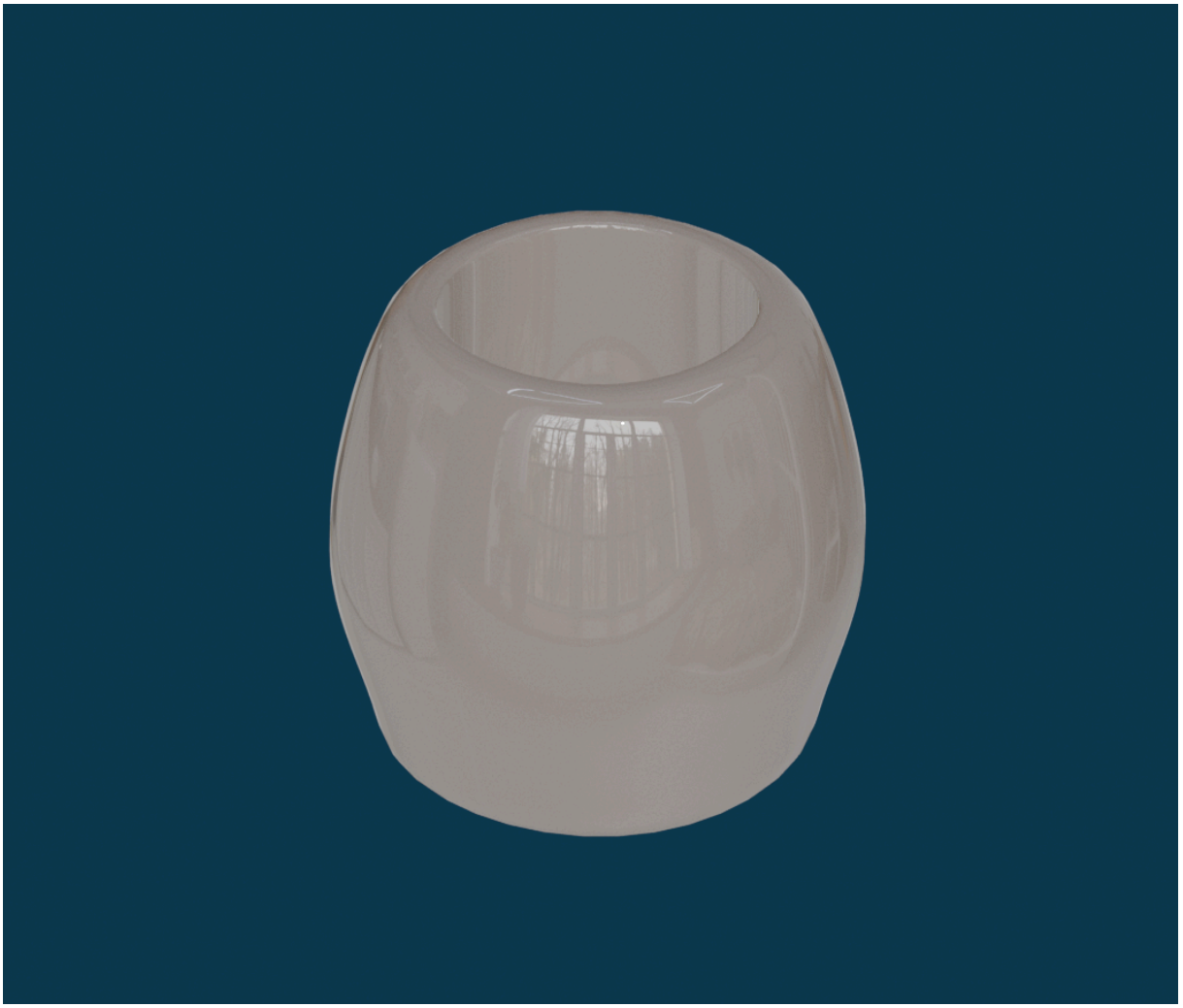


Description / Notes:

This model represents a classic six-sided dice created using basic cube geometry in Blender. The edges of the cube were slightly beveled to produce smoother corners, giving the dice a more realistic appearance.

Circular indentations were added on each face to represent the numbered dots, maintaining the traditional dice arrangement. A glossy material was applied to the surface using Blender's shader nodes to simulate a polished plastic finish, enhancing the overall visual realism of the model.

6. Flower Pot



Description / Notes:

This model represents a simple flower pot created using smooth cylindrical geometry and subdivision techniques to achieve a rounded and polished form. The design maintains clean topology and balanced proportions, making it suitable for decorative interior scenes or plant visualization setups.

A glossy ceramic-like material was applied using Blender's shader nodes to enhance the reflective surface and give the pot a realistic appearance. The model demonstrates the use of basic mesh modeling combined with smooth shading to create a minimal yet visually appealing object.

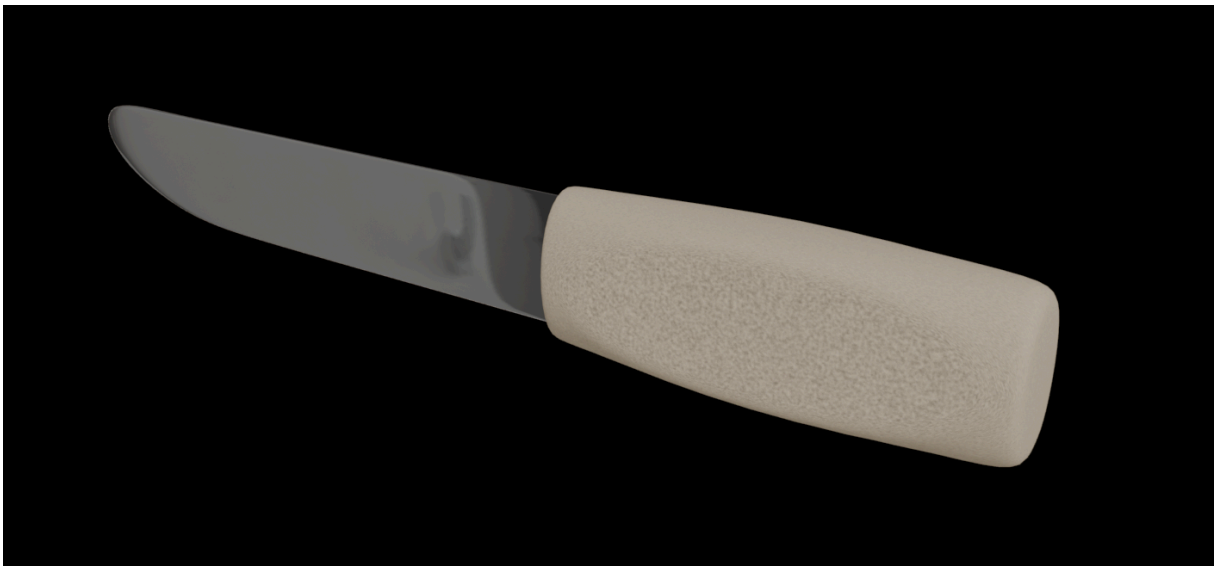
7. Key

Description / Notes:

This model represents a simple metallic key created using basic mesh modeling techniques in Blender. The shaft and teeth of the key were formed using extrusion and proportional scaling to achieve a realistic structure.

A metallic material was applied using Blender's shader nodes to give the key a reflective metal appearance. The model demonstrates clean topology and simple hard-surface modeling suitable for prop assets in scenes.

8. Knife

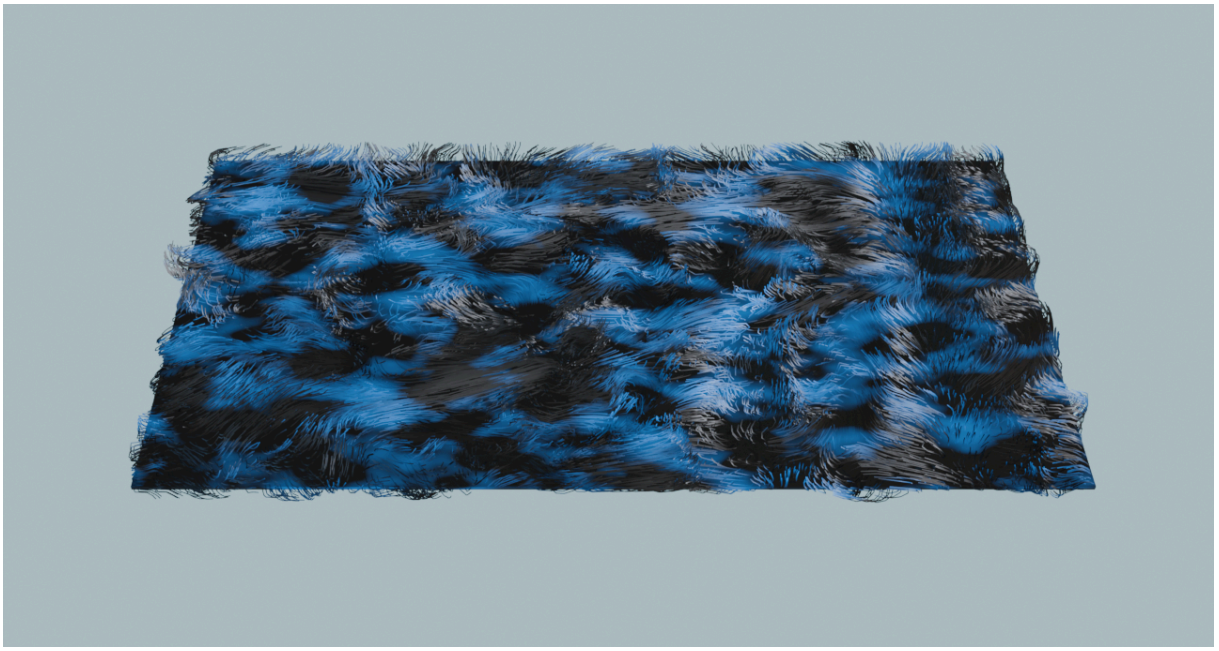


Description / Notes:

This model represents a simple kitchen knife created using basic hard-surface modeling techniques in Blender. The blade was shaped using extrusion and edge refinement to achieve a smooth metallic surface and realistic proportions.

A metallic shader was applied to the blade while a textured material was used for the handle to simulate grip. The model demonstrates clean topology and simple material setup suitable for prop assets in kitchen or interior scenes.

9. Living Room Mat



Description / Notes:

This model represents a decorative living room mat created using a plane mesh combined with a hair particle system to simulate soft fabric fibers. The procedural setup gives the mat a fluffy and textured surface, enhancing its visual realism.

A mixed color pattern was applied to add variation and depth to the surface. The model demonstrates the use of particle systems and shading techniques to create realistic fabric-like materials for interior scene assets.

10. Minimalistic Keyboard

Description / Notes:

This model represents a minimalistic keyboard created using simple hard-surface modeling techniques in Blender. Individual keys were modeled using repeated cube geometry with beveled edges to achieve smooth and realistic shapes.

Basic materials were applied to differentiate the keyboard body and keys, enhancing the overall visual clarity. The model demonstrates the use of duplication, proportional spacing, and clean topology to create an organized and realistic keyboard layout.

11. Minimalistic Monitor

Description / Notes:

This model represents a simple and minimalistic computer monitor created using basic hard-surface modeling techniques in Blender. The monitor consists of a thin rectangular screen and a simple stand designed with clean proportions and smooth edges.

Basic materials were applied to the screen and frame to simulate a modern display surface. The model demonstrates the use of simple geometry and clean topology to create a common electronic device used in interior or workspace scenes.

12. Minimalistic Round Table

Description / Notes:

This model represents a simple round table created using basic mesh modeling techniques in Blender. The tabletop was formed using circular geometry while cylindrical shapes were used to create the supporting legs.

A wood-like material was applied to the surface to give the table a natural appearance. The model demonstrates clean topology and simple hard-surface modeling suitable for interior and furniture visualization scenes.

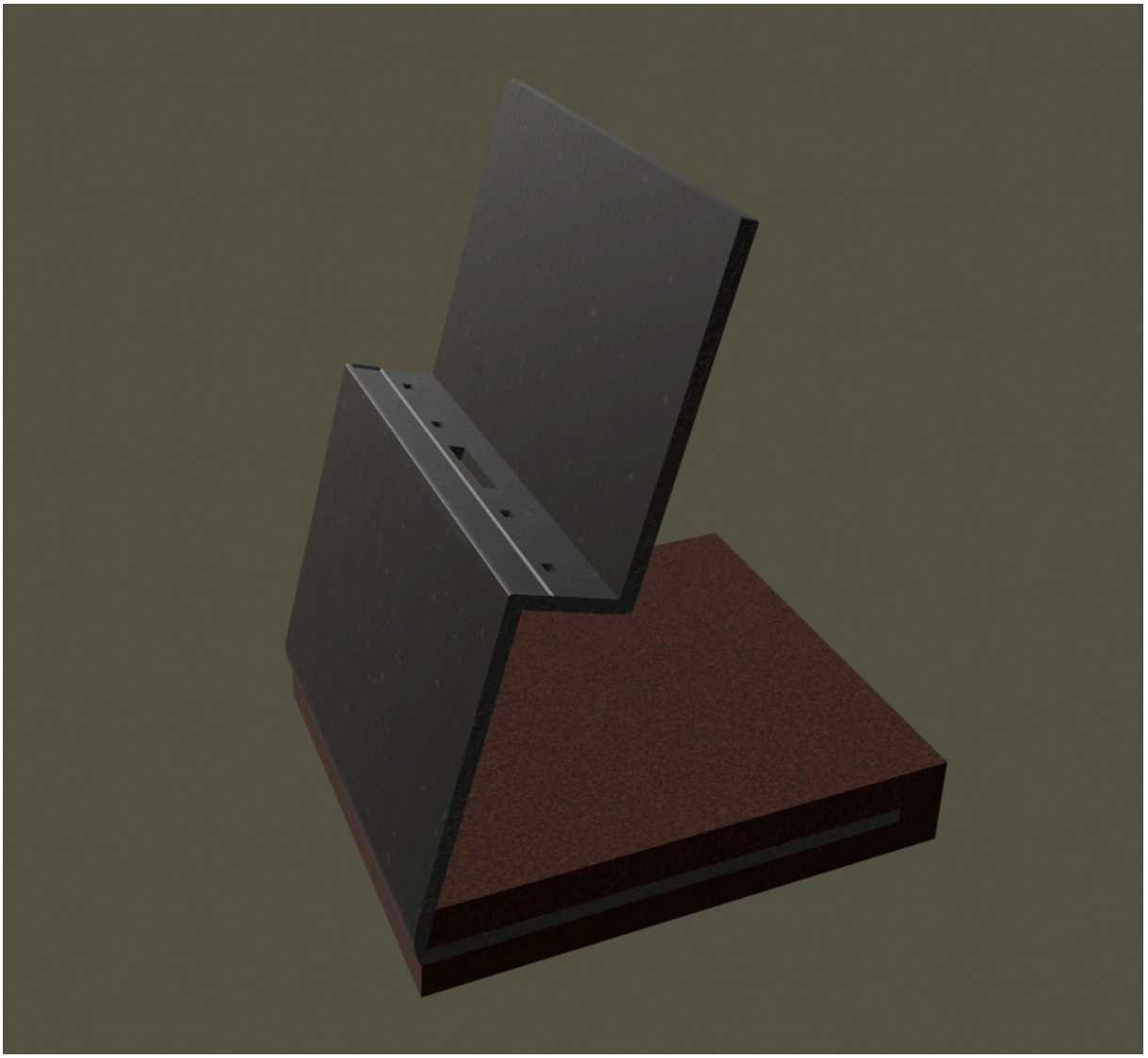
13. Minimalistic Trash Can

Description / Notes:

This model represents a simple trash can designed using cylindrical geometry and repeated vertical bars to create the open-frame structure. The model maintains clean topology and balanced proportions suitable for interior or street environment scenes.

A basic metallic material was applied to give the trash can a realistic industrial appearance. The model demonstrates the use of duplication and structured spacing to efficiently create repeating design elements.

14. Mobile Stand

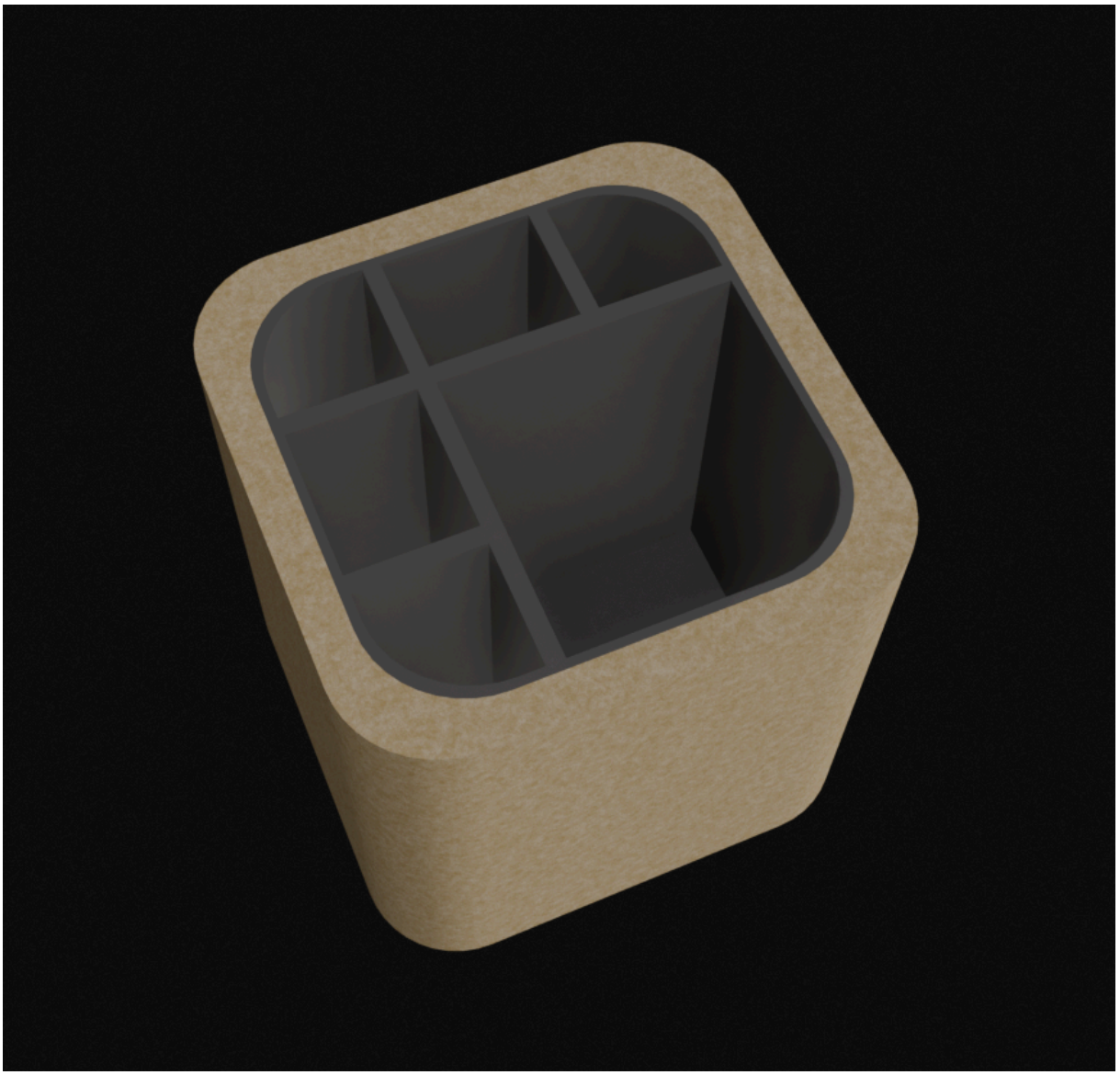


Description / Notes:

This model represents a simple mobile phone stand designed using basic hard-surface modeling techniques in Blender. The stand consists of angled support panels and a base structure that allows a phone to rest securely for viewing.

Different materials were applied to the base and stand to create visual contrast and realism. The model demonstrates the use of simple geometric shapes and clean topology to create a functional desk accessory.

15. Pen Organizer



Description / Notes:

This model represents a simple desk pen organizer designed using basic geometric shapes and compartment divisions. The internal partitions were created to form multiple sections for holding pens, pencils, and small office items.

Different materials were applied to the outer body and inner compartments to enhance visual contrast. The model demonstrates clean topology and practical object design suitable for workspace or study desk scenes.

16. Portable Power Bank

Description / Notes:

This model represents a portable power bank designed using simple hard-surface modeling techniques in Blender. The body was created using a rounded rectangular shape to resemble modern compact electronic devices.

Basic materials were applied to simulate a smooth plastic surface with subtle reflections. The model demonstrates clean geometry and simple design suitable for technology or desk setup scenes.

17. Procedural Tree

Description / Notes:

This model represents a procedural tree generated using Blender's built-in vegetation generation tools and modifiers. The structure of the tree includes a detailed trunk, branching system, and dense foliage designed to resemble a natural plant form.

Procedural methods were used to distribute branches and leaves efficiently, allowing the tree to maintain a natural and organic appearance. Materials were applied to simulate bark texture on the trunk and vibrant green leaves for the canopy.

The model demonstrates the use of procedural generation techniques, particle systems, and shader-based materials to create realistic environmental assets. Such assets are useful for outdoor scenes, landscape visualizations, and environment design projects.

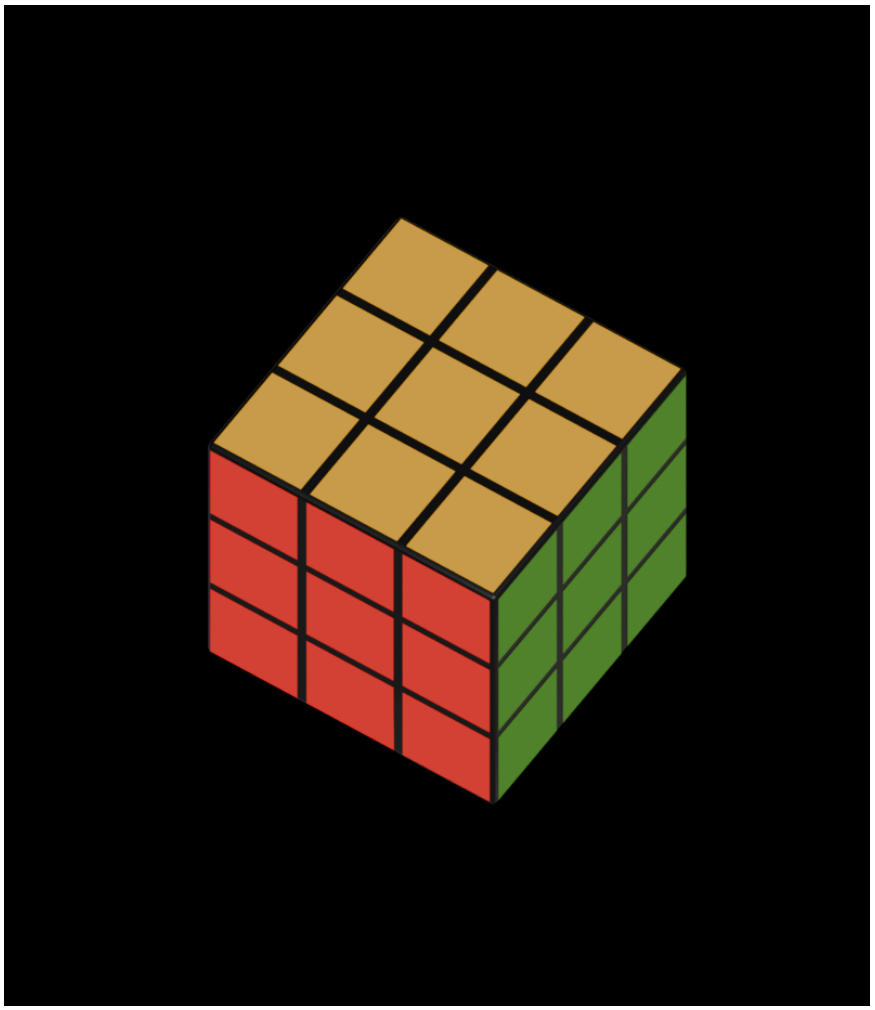
18. Realistic iPhone

Description / Notes:

This model represents a realistic smartphone inspired by modern iPhone design, created using precise hard-surface modeling techniques in Blender. The body was modeled with rounded edges and clean geometry to accurately represent the sleek and minimal design of contemporary smartphones.

Special attention was given to details such as the camera module, lenses, side buttons, and screen proportions to enhance realism. Different materials were applied to simulate glass, metal, and reflective surfaces using Blender's shader nodes. The model demonstrates accurate scaling, clean topology, and detailed material setup suitable for product visualization and technology-related scenes.

19. Rubik's Cube



Description / Notes:

This model represents a classic Rubik's Cube puzzle created using precise cube geometry and structured grid divisions in Blender. Each smaller cube segment was modeled to form the familiar 3×3 arrangement, maintaining accurate proportions and alignment.

Different colored materials were applied to each face to represent the traditional puzzle colors. The model demonstrates the use of duplication, clean topology, and organized geometry to create a recognizable and well-structured puzzle prop suitable for desk or game-related scenes.

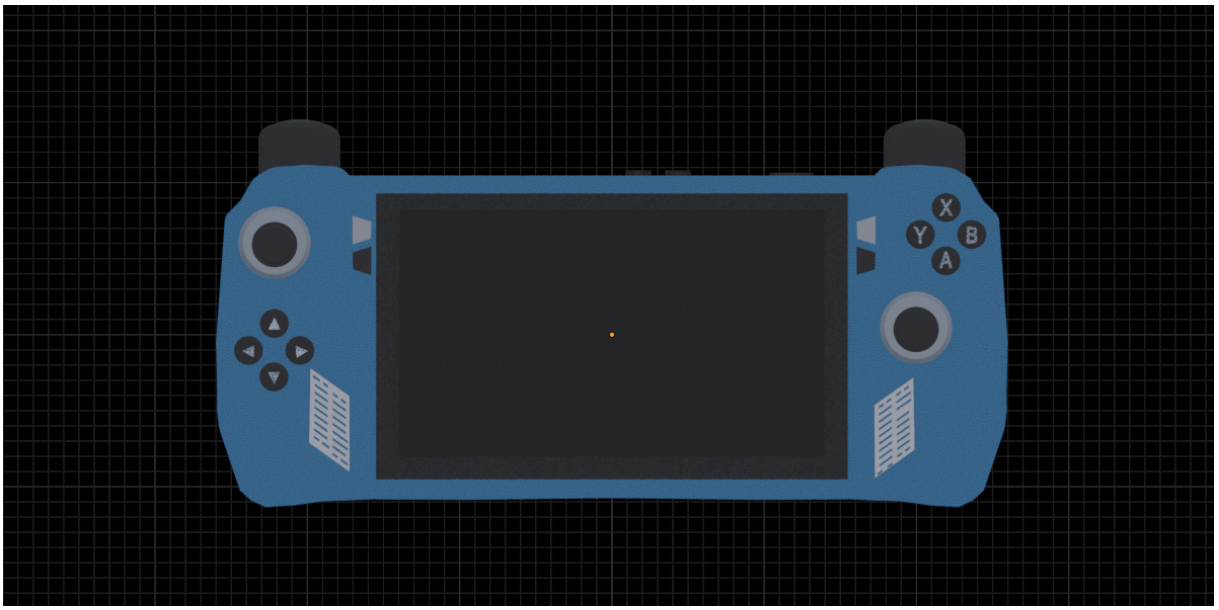
20. Rust Pipe

Description / Notes:

This model represents an industrial-style metal pipe created using cylindrical geometry and curved pipe joints in Blender. The structure includes a bent elbow section and connection rings to replicate real plumbing or industrial pipe systems.

A rusted metal material was applied using textured shaders to simulate aging and surface corrosion. The model demonstrates the use of hard-surface modeling and realistic material setup to create environment assets for industrial or urban scenes.

21. Simple Gaming Console



Description / Notes:

This model represents a handheld gaming console designed using basic hard-surface modeling techniques in Blender. The structure includes a central display screen along with control elements such as analog sticks, directional buttons, and action buttons arranged on both sides.

Different materials were applied to distinguish the screen, body, and control components, giving the device a modern electronic appearance. The model demonstrates the use of organized geometry, symmetrical design, and clean topology to create a recognizable gaming device suitable for technology or gaming-related scenes.

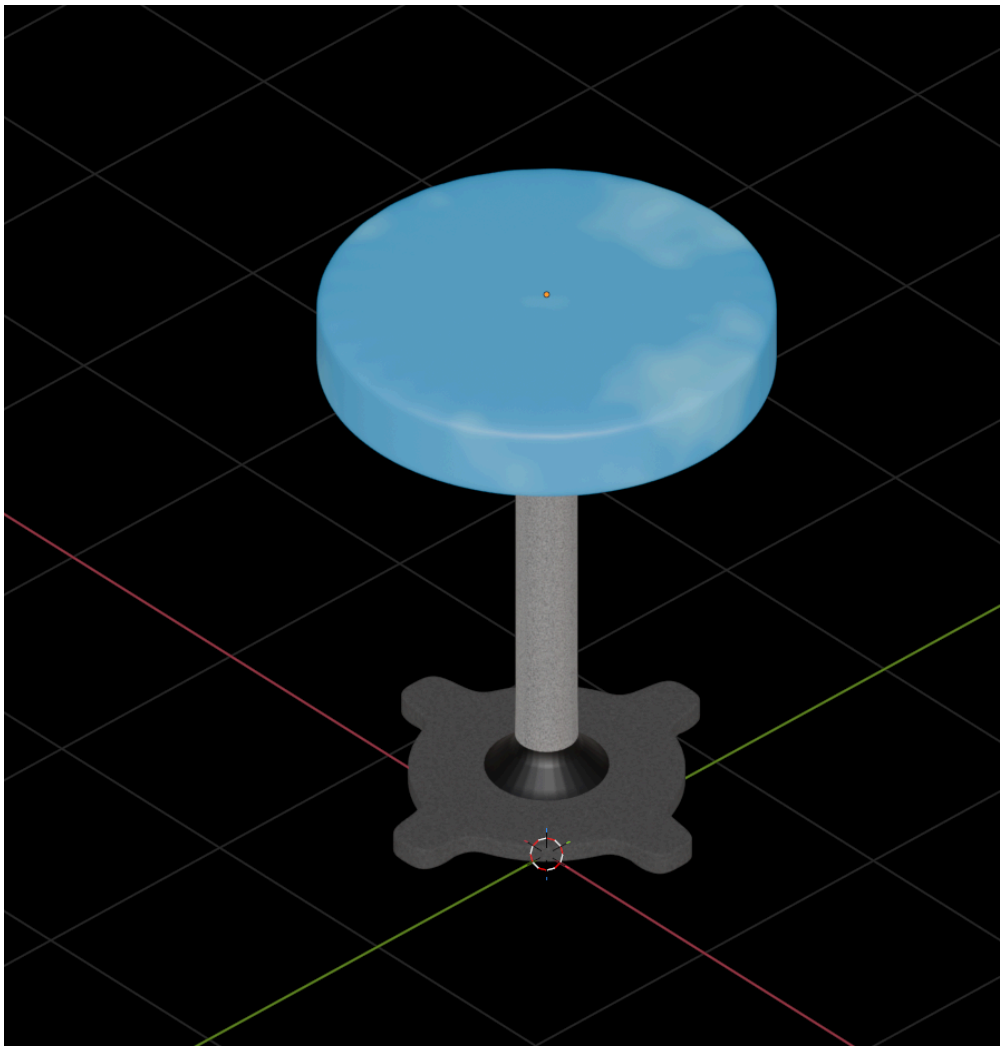
22. Simple Minimalistic Mobile Phone

Description / Notes:

This model represents a simple and minimalistic mobile phone created using basic hard-surface modeling techniques in Blender. The device was designed using a rectangular form with smooth edges to replicate the clean and modern look of contemporary smartphones.

Basic materials were applied to the screen and side frame to create contrast and realism. The model demonstrates the use of simple geometry, clean topology, and proportional scaling to create a recognizable electronic device suitable for technology or product visualization scenes.

23. Simple Round Chair



Description / Notes:

This model represents a simple round chair created using basic cylindrical geometry and smooth mesh modeling techniques in Blender. The seat was designed with a rounded shape to provide a soft and minimalistic appearance.

The supporting stand and base were modeled using simple geometric forms to maintain stability and balance in the structure. The model demonstrates clean topology and straightforward hard-surface modeling suitable for interior furniture scenes.

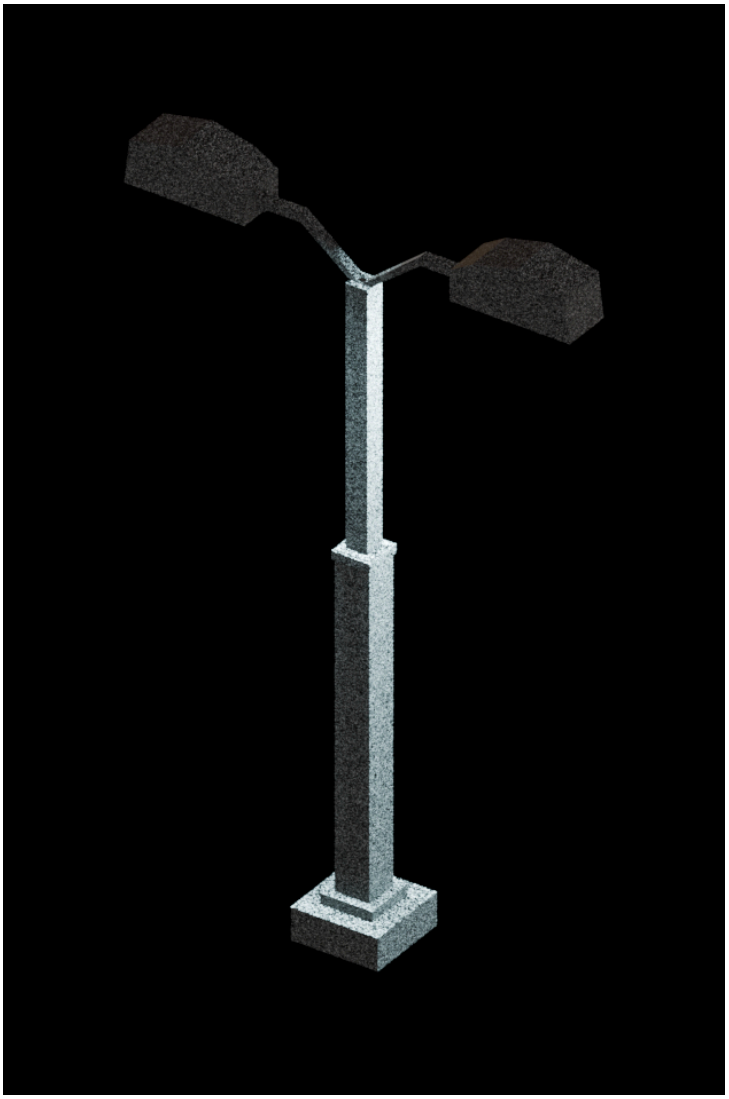
24. Spoon

Description / Notes:

This model represents a simple metallic spoon created using smooth surface modeling techniques in Blender. The shape of the spoon was formed by refining the mesh to achieve the curved bowl and elongated handle structure.

A reflective metal material was applied using Blender's shader nodes to simulate the polished surface of stainless steel. The model demonstrates smooth topology and realistic material setup suitable for kitchen or dining scene assets.

25. Street Light



Description / Notes:

This model represents a simple street light designed using basic hard-surface modeling techniques in Blender. The structure includes a vertical pole with two extended arms that support the lighting fixtures on both sides.

Simple materials were applied to simulate a metallic surface commonly used in outdoor lighting structures. The model demonstrates clean geometry and proportional design suitable for urban environment, road, or outdoor scene assets.

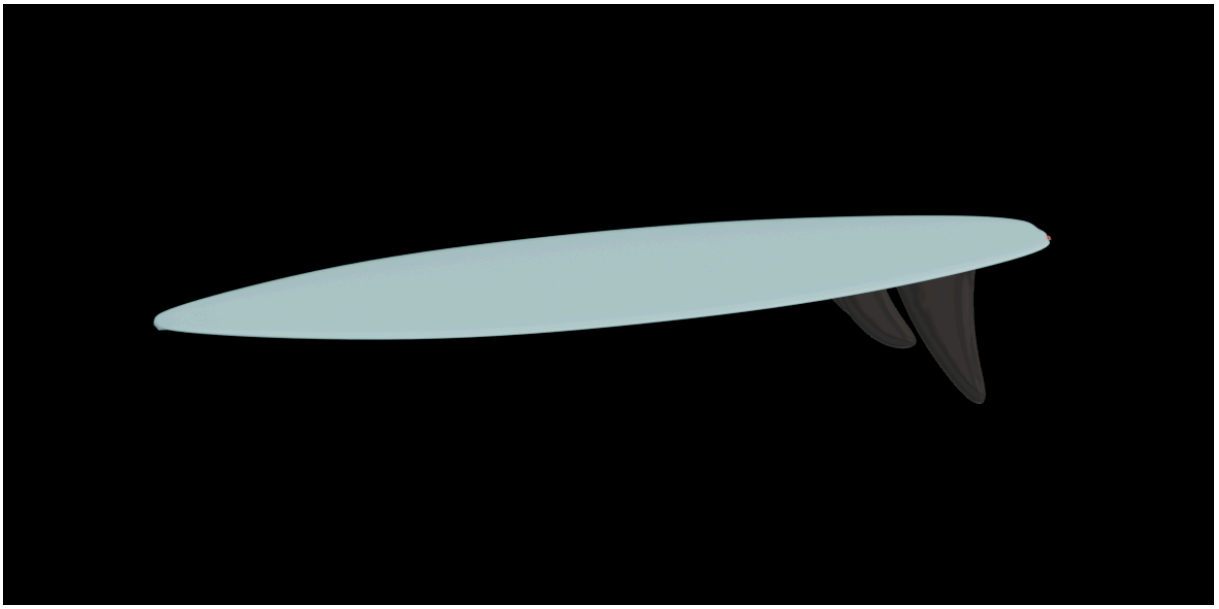
26. Study Table

Description / Notes:

This model represents a simple study table designed using basic hard-surface modeling techniques in Blender. The table includes a flat rectangular tabletop supported by four legs and a side drawer unit for storage.

Wood-like materials were applied to the tabletop and drawer surfaces to simulate a realistic furniture appearance. The model demonstrates clean topology and structured geometry suitable for interior, study room, or workspace scene setups.

27. Surf Board



Description / Notes:

This model represents a surfboard created using smooth surface modeling techniques in Blender. The board was shaped using a simple elongated mesh with curved edges to achieve the streamlined form typical of surfing boards.

A smooth material was applied to the surface to give the board a clean and polished appearance. The model demonstrates basic mesh shaping and smooth topology suitable for beach, water sports, or outdoor environment scenes.

28. Sword

Description / Notes:

This model represents a stylized medieval sword created using hard-surface modeling techniques in Blender. The design includes a detailed handle, crossguard, and a long blade shaped using refined mesh geometry to achieve a sharp and symmetrical form. Metallic materials were applied to the blade and handle components to simulate polished steel and metal surfaces. The model demonstrates clean topology, proportional design, and material setup suitable for fantasy, historical, or game environment scenes.

29. TV

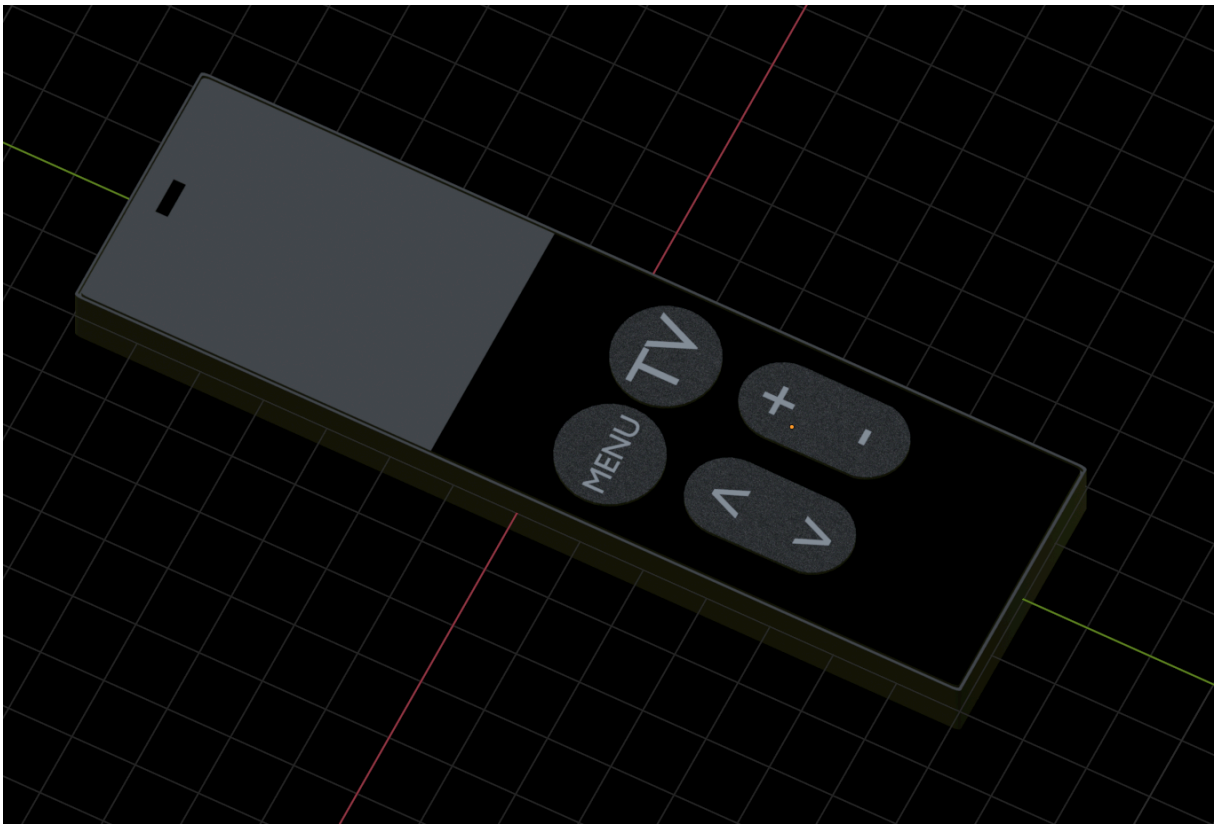
Description / Notes:

This model represents a modern flat-screen television designed using Blender with a focus on clean geometry and realistic proportions. The television features a thin bezel display, minimalistic frame design, and two angled support stands that provide stability while maintaining a sleek aesthetic.

The screen surface uses a glossy material to simulate reflective glass, while the body and stand components use darker matte materials to replicate the look of modern consumer electronics. Care was taken to maintain simple topology and balanced proportions, making the model suitable for interior scenes, product visualizations, or real-time applications such as games.

The design highlights basic hard-surface modeling techniques including edge control, beveling for subtle highlights, and material separation to create a believable modern device.

30. TV Remote



Description / Notes:

This model represents a simple television remote control created using Blender with a focus on basic hard-surface modeling and UI detailing. The remote features a slim rectangular body with rounded edges, designed to resemble modern minimalistic consumer electronics.

The front panel includes several functional buttons such as TV, Menu, Volume (+ / -), and Channel (▲ / ▼) controls. These buttons were modeled and arranged carefully to reflect a realistic control layout commonly found on television remotes.

Different materials were applied to distinguish the device components:

- A dark glossy surface for the main body panel
- Soft matte materials for the buttons to simulate rubber controls
- Subtle reflections to give the device a more realistic electronic look

The model demonstrates key Blender skills such as hard-surface modeling, button detailing, material assignment, and clean topology, making it suitable for product visualization, interior scenes, or real-time applications like game

Issues Faced and Solutions

During the development of the 3D models, several technical and workflow-related challenges were encountered. These issues were carefully analyzed and addressed using appropriate techniques and tools available in Blender to maintain model quality and performance.

• High Polycount Issues — Some models initially contained a high number of polygons, which could affect performance and render efficiency. This issue was resolved by optimizing the mesh using Blender modifiers such as Decimate and by applying basic retopology techniques to reduce unnecessary geometry while preserving the overall shape and detail.

• UV Stretching — While applying textures to certain models, UV stretching was observed in some areas due to improper UV mapping. This was corrected by carefully placing seams and properly unwrapping the models to achieve a balanced UV layout, ensuring that textures appeared natural and evenly distributed.

• Rendering Time — Rendering complex scenes initially required a longer time due to higher sample settings and lighting calculations. To improve efficiency, the sample count was optimized and Blender's built-in denoising tools were used, which helped maintain image quality while significantly reducing rendering time.

• Scale Inconsistencies — During the modeling process, some objects were created at inconsistent scales, which could affect scene integration. This issue was solved by enabling proper unit settings in Blender and using measurement tools to maintain consistent proportions and realistic dimensions across all models.

Conclusion

During the internship period from October to January, I successfully designed and developed a total of 30 different 3D models along with their corresponding Blender project files (.blend). Each model was carefully created using proper modeling techniques, clean topology, and appropriate material setups to ensure that the assets are reusable and organized for future use. The models included a wide range of objects such as household items, electronic devices, furniture, environmental assets, and stylized objects, which helped me practice different aspects of 3D modeling.

Throughout the internship, I gained practical experience in hard-surface modeling, material creation, lighting setup, UV mapping, and rendering workflows within Blender. Working on multiple assets also improved my attention to detail, workflow organization, and file management skills, which are important for maintaining consistency in larger projects.

This internship played an important role in strengthening my technical knowledge of Blender and improving my ability to convert conceptual ideas into structured 3D assets. It also helped me understand the importance of optimization, clean geometry, and proper project structuring when creating models intended for educational or production purposes.

The assets developed during this internship are designed to be reusable learning resources and contribute to the open-source creative ecosystem supported by the FOCAL initiative under FOSSEE. This experience has been a valuable step in my learning journey and has motivated me to continue exploring and improving my skills in 3D modeling, animation, and digital content creation.

References

During the internship, several learning resources and technical references were used to understand modeling techniques, improve workflow efficiency, and solve technical challenges encountered during the project. These resources helped in gaining a deeper understanding of Blender tools, 3D modeling concepts, and practical asset creation.

• Blender Official Documentation – The official Blender documentation was used as a primary reference to understand different tools, modifiers, and workflows within Blender. It provided detailed explanations of modeling techniques, material creation, UV mapping, and rendering settings.

• FOCAL / FOSSEE Learning Resources – Resources provided under the FOCAL initiative and the FOSSEE project were used to understand the purpose of creating reusable open-source creative assets. These materials helped guide the structure and quality of the models developed during the internship.

• Online Tutorials and Learning Platforms – Various online tutorials were referred to for improving modeling techniques, understanding efficient workflows, and learning best practices in Blender. These tutorials helped in gaining practical insights into hard-surface modeling, material setup, and scene optimization.

These references played an important role in supporting the learning process and improving the quality of the models developed during the internship.