**PRESIDENT UNIVERSITY**

**3D CGA - Project Report**

**THE LAST HOPE**

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A Report Submitted

in Partial Fulfillment of the Requirements

for the 3D Computer Graphic and Animation Class

Cikarang, Bekasi, Indonesia

**I. Character Profiles**

**A. Main Character**

|  | **Character Name:**  **Dr. Evan Diaz**  **Description:**  Dr. Evan is a determined and compassionate doctor in his mid-30s, standing at about 180cm with a lean, athletic build suited for constant movement. He has short black hair and wears a medical mask, symbolizing his role on the frontlines of healthcare. Dressed in a white coat featuring a red medical cross, black slacks, and sturdy brown boots, his outfit reflects both professionalism and practicality for traversing harsh environments. Rendered in a low-poly art style, his design emphasizes simplicity while conveying his cautious and somber nature. Despite his pessimism and tendency to focus on worst-case scenarios, his sense of duty pushes him forward on his critical mission, often balanced by the optimism and encouragement of his robot companion. |
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**B. Companion**

|  | **Companion Name:**  **SANA Robot**  **Description:**  SANA Robot, whose name is derived from the Latin word *'sana,'* meaning 'healthy,' is a compact, white medical robot designed for assisting Dr. Evan in his job. Standing at 90 cm, its body features a red cross symbol, a black face with glowing blue elliptical eyes, and a smiling tosca mouth. It wears a nurse’s cap with another red cross symbol, emphasizing its medical purpose. SANA’s personality is optimistic and loyal, serving as a reliable companion to Evan. Equipped with a self-repair function and a memory core, SANA not only provides practical support but also offers emotional balance, often encouraging Evan to remain hopeful in tough situations. Together, they share a strong bond, complementing each other’s strengths to overcome challenges. |
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**C. Props**

|  | **Props Name:**  **Suitcase**  **Description:**  The property is a sturdy, brown suitcase with reinforced metal corners and a dark, ergonomic handle. This suitcase serves as Dr. Evan’s medical kit, carrying essential supplies and tools needed for his mission to save his friend and others affected by the disease. |
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**D. Background Story**

In a small, isolated village nestled deep within a forest, life was simple and serene. Dr. Evan, a skilled but humble doctor, had dedicated his life to treating the sick and caring for his community. His closest friends were his family by choice, and among them was Buckley, a brilliant researcher with an unyielding curiosity about the mysteries of life.

One day, Buck became gravely ill, displaying some strange symptoms. As days passed, others in the village began to show similar symptoms. Panic spread as rapidly as the disease itself.

Desperate to save his friends and uncover the truth, Dr. Evan looked into Buckley's research. Hidden among his notes was a reference to a distant city known for its advanced medical technologies. Legends whispered of a hospital equipped to cure any disease—a glimpse of hope in a rapidly darkening world. Without hesitation, Dr. Evan prepared for the journey, accompanied by his loyal robot assistant, Sana. Designed by Buck himself, Sana was equipped with navigation capabilities, a vast medical database, and a warm, human-like personality.

The journey was long and tough. They traversed endless landscapes: dense forests, barren deserts, and crumbling highways. Along the way, they passed through once-thriving cities reduced to ghost towns. Abandoned vehicles lined the roads, and the eerie silence was occasionally broken by the wind's mournful howl. Signs of human life had all but vanished.

**II. Technical Aspects**

**A. Modeling Approach Texture/Material**

**Doctor**

1. Lower Body :
   1. First, we start from a cube. Since the character will be balanced for the x axis side, we will apply the mirror modifier. After that we need to scale the cube into a long block by using a specific scale in this case we reduce z and adjust the x and y.
   2. After that we select the right-bottom edge of the block and bevel it. At this part we already have the character’s waist.
   3. Then we extrude the bottom face of the waist, this will generate us the upper legs. We only need to adjust the rotation using R and the position using G.
   4. To create an effect that the doctor is using a medical suit, we will cut the bottom face where we will extrude again to get the lower leg by creating a margin, this will make the square of the lower leg smaller than the upper leg.
   5. After that we just extrude the bottom face to get the legs.
   6. The last part is the shoes, we just need to cut a little bit on the x axis after that extrude it to the front (y axis). And then we just need to bevel the edge to create a curved effect for the shoes, just adjust how many divisions you want.
2. Upper Body :
   1. From the waist part, we just need to extrude the top face. Cut a little part so we can create the shoulder. For the shoulder we just need to bevel the edge of the right top. From the shoulder we can extrude it to create upper arms. Similar to the legs, we can use R to rotate and G to position the arm.
   2. For the lower arms we also do the same like the upper arms, extrude the last face, adjust by rotating and positioning it, make sure to have a different position to make the character more natural.
   3. Next for the hand, we will extrude a little bit and scale it to make a difference between the suit and the hand. After that just play with the extrude, scale, and bevel to create more natural hands.
   4. The last part of the upper body is the neck, we just need to extrude and scale to reduce the radius.
3. Head :
   1. Start with a cube then we add a subdivision surface modifier, this will automatically make a low poly of a ball.
   2. Apply the modifier in the object mode, and then try to randomly adjust the shape of the head to look more natural by selecting some face and then use G to pull it.
   3. After that for the eye, we just need to select some faces and then use I to insert faces. This will make a little pit for the place of the character’s eyes.
   4. After completing all the adjustments, we just need to combine the head and the body together by just positioning it together

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1. Coloring :
   1. For the color, we just need to color each face division. If there’s some specific part that needs to be colored, just cut it to create a new face division. For example the medical logo in the doctor’s suit is colored by cutting the suit with a plus pattern.

**Companion**

1. Body

* First create from cube and add a subdivision surface modifier then add viewport levels to 6. Then enter edit mode after that click loop cut, place the cursor in the center then click and direct to the top then click in another part so the cut is saved.
* After that click face and scale then extrude downwards so that in the middle there is a pit shape.
* Add a new plane by clicking shift + A and choose plane then click tab and click loop cut to cut the plane in the middle after that click edge and extrude until it forms a cross, then enter object mode and add color by clicking a material and add base color red and emission as brightness/contrast in red color. After finishing then add a modifier, add Shrinkwrap and Solidify, in Shrinkwrap click target and place in Cube as its body.

1. Hands

* How to see the hands is very easy that is click shift + D and click G + X, make towards the side of the body after that click tab and click edge and select the bottom of the copied object, then grab towards the right then adjust its top, we also use scale + z, S + X, S +Y to adjust the hands to the robot's body.
* After the right hand is made we just copy the hand and R +Z so the hands can be like the left hand of the robot then move towards the left of the robot.

1. Head, Face and Eyes

* Click Shift + A then choose cube and add modifier choose subdivision surface, add viewport levels 6 and render 6 and enter edit mode and click loop cut and click in the middle of the cube and direct downwards to the reference character Eve in Wall-E.
* Then add plane and add modifier, choose subdivision surface, add viewport levels 6, add Shrinkwrap and Solidify, in Shrinkwrap click target and place in head so the plane can stick and adjust to the curvature of the head. Set Thickness to solidify so the plane looks upwards. After that change the plane color to black and add its metallic.
* After the face is finished then add another plane with shift + a and do add a modifier same as the face before and scale to make it smaller and place the eyes in the center, next add a mirror and click on another object plane so the eyes match left and right. Add base color in blue and add emission as brightness/contrast and add blue color too.
* Next add another plane to form the mouth of the robot and add a modifier the same as the robot's face and color the robot's mouth with base color blue and add emission as brightness/contrast in blue color.
* Add cylinder by clicking shift + A and choose cylinder then click S + Z until small and click tab to enter edit mode after that click edge and select half of the cylinder then cylinder, select half of the cylinder then right click and choose delete edge, add mirror modifier click X or Y and enter sculpt mode then arrange the cylinder until it becomes like a nurse's hat.
* Add a new plane by clicking shift + A and choose plane then click tab and click loop cut to cut the plane in the middle after that click edge and extrude until it forms a cross, then enter object mode and add color by clicking a material and add base color red and emission as brightness/contrast in red color. After finishing then add a modifier, add Shrinkwrap and Solidify, in Shrinkwrap click target and place in Cylinder as its nurse's hat.

**Property**

● Modeling Approach and Textures and Materials:

1. First, select a cube then scale + x to widen the cube sideways, then scale + z and point downwards to shrink the cube. Press tab then click loop cut and place in the middle of the top cube twice. Then click the face in the middle of the loop cut, then click extrude and direct downwards so it looks like the bag is divided into two. Give the bag a base color of brown and also add emission as an image texture. Enter edit mode and select the edge at each corner of the bag and bevel, then adjust the bevel and enter object mode, then right-click the bag and select shade smooth.
2. Then add a plane and add modifier Shrinkwrap and Solidify, in Shrinkwrap click target and place it on the bag cube, also add mirror click x, y, and z to fill every corner of the bag. Give the plane a dark brown color and add emission as an image texture.
3. Then also add a UV sphere and place it on the corner plane of the bag, then add a mirror modifier and click x, y, and z.
4. Next, add another plane to create a key-like effect for the bag. Enter edit mode, then click edge and extrude upwards to the opposite side of the cut bag, then loop cut and extrude upwards and scale, then extrude upwards again and scale until it becomes a cone. Then on the opposite side do the same but only extrude once. Add color with base color brown and emission as an image texture.
5. Add another plane and tab, then select face and click on the left or right side, then extrude + x and place it on top of the bag and loop cut on the right edge and select the face in the middle and extrude downwards and add modifier mirror click z and also subdivision surface, then loop cut in the middle and bring it down, then click edge and select the corner and bevel. Add base color dark brown and add emission as an image texture.

**III. Final Reflections**

**A. Team Contribution**

| **Name** | **Contribution** |
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| Joy Adelia Sihombing | * Make and set the rigging for the robot model * Add colors and textures to the robot model * Create the doctor and robot walk cycle * Make the property * Add colors and textures to the property * Make the animation free * Contribution for report |
| Samuel Thomas | * Make the doctor model * Set the rigging for the doctor * Adding colour to the doctor model * Develop background story * Fill in the report |
| Zafyra R. Azhari | * Develop background story * Prepare the environment * Set up camera and lighting * Set characters image pose * Render all the blender files * Fill in the report file |
| Zelika Hannah | * Researching references for character designs, the companion, and the props * Created idle animations for the robot and the doctor * Make a signature move animations * Fill in the report |

**B. Learning Outcomes**

1. **Blender Kit**Our group has discovered Blender Kit, a powerful online library for Blender that provides a lot of free and premium 3D assets and materials. This tool significantly speeds up the creative process by giving immediate access to pre-made resources, allowing us to focus more on customizing and building our models.
2. **Using Modifiers Shrinkwrap**We have learned to use the Shrinkwrap modifier, which allows us to conform one object’s surface to another, a handy technique for tasks like creating clothing, decals, or adding intricate details to a base mesh.
3. **Using Modifiers Solidify**   
   The Solidify modifier helped us give thickness to flat objects, making it essential for modeling objects like walls, fabrics, or hollow structures.
4. **Using Emission for Image Texture Without the Shading Tab**We discovered that the Emission shader can be used as a shortcut to make objects glow or illuminate while applying image textures without diving into the Shading workspace. This approach simplifies quick visualization of light effects, such as creating glowing screens or light-emitting surfaces, and allows for a more straightforward setup during prototyping.
5. **Video Sequencer in Blender**We explored the Video Sequencer in Blender, a built-in tool used to edit and compile images or animations into a video. This tool allowed us to sequence frames, add effects, and adjust timing, providing us with a basic understanding of video editing directly within Blender. It’s an efficient way to render our image sequence into video, compared to other website or application
6. **Tri Lighting Add On**

We discovered the Tri-Lighting add-on in Blender, which simplifies creating a professional three-point lighting setup. It automatically adds a key light, fill light, and backlight, making it easier to adjust lighting intensity, color, and position. This tool saved us time and improved the visual quality of our renders, ensuring our models and scenes are well-lit and more appealing.

1. **Using Mirror Modifier**

The mirror modifier allows us to create a precise model by only creating one side of the model, not only save our time to model the character, this modifier also ensures the model has the same proportion depending on which axis we applied the modifier.

**C. Challenges**

1. **Difficulty Adding a New Bone to the Hand Area**While attempting to add a new bone to the hand area of our model, we found issues because we had forgotten to apply the scale transformation to the object. This caused the proportions and size of the doctor's model to distort when the new bone was added, disrupting the overall rigging process. We learned the importance of applying transformations (scale, rotation, location) before making further modifications to ensure consistency and prevent deformation issues.
2. **Forgetting to Save Progress and Overusing Ctrl + Z**We often forgot to save our progress while working in Blender, and our frequent use of Ctrl + Z to undo changes sometimes caused us to lose significant progress. This was especially problematic during complex edits, where Blender's undo history became overloaded or reset. As a result, we had to re-do several tasks from scratch. This taught us the value of developing the habit of saving our work regularly, preferably using incremental saves to maintain backups of earlier stages.
3. **Render Files Were Image Sequences Instead of Videos**During our first few rendering attempts, the output was saved as an image sequence instead of a video because we forgot to adjust the render output settings. This caused confusion as we had to reassemble the images manually or rerun the rendering process. Eventually, we located the setting to switch the output format to video (FFmpeg). This mistake helped us better understand Blender’s rendering settings and made us discover a Blender tool called Image Sequencer.
4. **Difficulty to create a smooth model**Even if the model is expected to be low poly character, still the character lacks smoothness especially for the doctor model, since we start using a cube, the final model will be really very stiff. This challenges us how to create more poly into our model.

These challenges not only tested our patience but also provided valuable learning experiences that strengthened our skills and understanding of Blender's tools and workflow.