UNIVERSITY OF CAPE COAST

COLLEGE OF PHYSICAL AND NATURAL SCIENCES

DEPARTMENT COMPUTER SCIENCE AND IT



# A – FRAME ASSIGNMENT DOCUMENTATION


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**Project Report: Building a Modern Two-Story Virtual Home**

**Project Title:** THE INTERACTIVE LUXURY VILLA

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## 1. Project Overview

This project is a 3D digital model of a modern "A-frame" style home. I built this house from the ground up to show how modern architecture can blend with fun outdoor activities. The goal was to create a space that feels like a real home while giving the user an easy way to move around using a special menu.

The project features a two-story building with a full interior and a large outdoor "compound." Inside, there are rooms for living, cooking, and sleeping. Outside, I added luxury features like a swimming pool, a basketball court, and even a futuristic Cybertruck to make the environment feel high-tech and exciting.

## 2. The Interior Design

I planned the house layout to be realistic. I wanted to make sure that if a person were actually living there, the flow of the rooms would make sense.

### The Ground Floor (1F)

The first floor is the "heart" of the home. It is designed for hanging out and daily tasks.

- **The Living Room:** A wide-open space for relaxation.
- **The Kitchen:** Positioned near the living area for easy access.
- **Bedroom 1F:** I included a bedroom on the bottom floor for convenience, perhaps for guests or residents who prefer not to use the stairs.

### The Top Floor (2F)

The second floor is more private and quiet. It is accessed by stairs and includes:

- **Two Bedrooms (Bed1 2F and Bed2 2F):** These provide plenty of space for a family.
- **The Hall:** A central area that connects all the rooms upstairs.
- **The Bathroom:** Centrally located on the top floor for all residents to use.
- **The Balcony:** A great spot to look out over the yard and the basketball court.

### 3. The Outdoor Compound

A house is more than just walls; it is also about the space around it. I spent a lot of time designing the yard (the compound) to make it look like a dream home.

- **Recreation:** I added a **Swimming Pool** for a luxury feel and a **Basketball Court** for sports fans.
- **Nature:** I placed **Trees** and **Flowers** in pots around the entrance to make the white walls of the house look more colourful and inviting.
- **The Cybertruck:** I chose to put a Cybertruck in the front yard. Because of its sharp angles and silver colour, it matches the modern "A-frame" style of the house perfectly.

### 4. How I Built It (Tools and Assets)

I did not build every single small item by hand. To make the project look professional, I used a mix of my own building skills and pre-made models.

#### Custom Building

I built the main structure of the house the walls, the floors, the roof, and the layout from scratch. This allowed me to decide exactly how big each room should be and where the windows should go.

#### Using Poly Pizza

For the furniture and the special objects (like the trees, the basketball hoop, and the Cybertruck), I used a website called **Poly Pizza**. This is a library of 3D models.

- **Why Poly Pizza?** I chose models from here because they are "Low-Poly." This means they look clean and simple, but they don't make the computer run slowly. It helped keep the project smooth and easy to look at.

## 5. Technical Challenges and Solutions

Building in 3D is not always easy. I ran into four main problems while working on this villa. Here is how I solved them.

### Challenge 1: The Positioning of Elements

**The Problem:** At first, I didn't know where to put the pool or the basketball court. If I put them too close to the house, it looked crowded. If they were too far away, the yard looked empty.

**The Solution:** I spent a lot of time **researching modern house layouts** online. I looked at photos of real luxury homes to see how they organized their backyards. This research helped me find the perfect balance for the compound.

### Challenge 2: Adding and Scaling Models

**The Problem:** When I downloaded models from Poly Pizza, they were often the wrong size. Sometimes the Cybertruck was bigger than the house, or the flowers were as tall as the door!

**The Solution:** I turned to **YouTube tutorials**. I watched several videos on how to "scale" and "import" models correctly. By following these guides, I learned how to use the "Scale Tool" to make sure every object looked like it belonged in the real world.

### Challenge 3: Applying Textures

**The Problem:** When I first made the grass and the walls, they looked like flat blocks of color. They didn't look like real grass or real concrete.

**The Solution:** I watched **online videos about "Texturing and Materials."** These videos taught me how to apply a "texture map" to a surface. I learned how to make the grass look bumpy and green and how to make the house walls look smooth and bright. This made the whole project look much more realistic.

### Challenge 4: User Navigation

**The Problem:** Because the house has two floors and many rooms, I was worried users would get lost or find it hard to move the camera around.

**The Solution:** I built a **Navigation Menu** (the green box in the picture). I programmed buttons for every room. Now, instead of walking slowly, a user can just click "ROOF VIEW" or "KITCHEN" and instantly teleport there.

## 6. Future Improvements

Even though the project is finished, I have ideas on how to make it even better in the future:

1. **Water Physics:** I want to make the swimming pool water move and splash when you look at it.
2. **Night Mode:** I would like to add "Street Lights" and "Indoor Lamps" so the user can see what the house looks like at night.
3. **Sound Effects:** Adding the sound of bouncing basketballs or birds chirping in the trees would make the environment feel alive.

## 7. Conclusion

Building this "A-frame" villa was a great learning experience. By combining my own 3D building with models from Poly Pizza, I was able to create a beautiful, modern home. Even though I faced challenges with positioning and texturing, watching educational videos and doing research helped me overcome these obstacles. This project shows that with the right tools and a bit of study, anyone can build a virtual dream home.