INTEGRATING GHANAIAN SCENERY AND LANDSCAPE INTO A FLIGHT SIMULATOR CASE STUDY (KUMASI)

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Abstract

This work outlines a comprehensive process for generating a customized and realistic scenery integration into the X-plane flight simulator. Focused on the Ashanti region of Ghana, the process involved marking out the desired area using Ortho4XP software and extracting satellite images at a high resolution. The 3D modeling phase began with accurate representation of the Kumasi airport, followed by the Kwame Nkrumah University of Science and Technology (KNUST) campus, which required special attention to unique building features. Lighting, reflections, and shadows were strategically employed to enhance visual authenticity. Rigorous testing and debugging were conducted, ensuring accurate representation of structures and objects in the simulator. The finalized works were simulated within the X-plane environment, aiming to achieve a high level of realism and resemblance to the actual locations. This methodology offers a comprehensive approach to crafting an immersive and accurate flight simulation experience.

Introduction

- ✓ In building virtual sceneries for a real-world environment, there are a number of tools and software employed in gathering data that possess some detailed information from the satellites or maps for use in real-time rendering projects [1]
- ✓ Flight simulators can be used to investigate aircraft characteristics, control handling characteristics, design and development of aircraft, as well as for pilot instruction or recreation/gaming.
- ✓ The use of flight simulators has been studied to be an effective means to train pilots. They depict real-life flying scenarios and serve as a safe and regulated environment in which pilots can practice their maneuvers and operations [2]

➢ **The main aim of this study is to ;**

✓ Model sceneries of the Kumasi airport and some significant areas in Kumasi into the X-plane Flight Simulator.

➢ **The specific objectives are to:**

✓Mark out and extract satellite images of specific areas

✓3D model of various structures and objects in the virtual environment.

✓Examine the geometric optics in relation to the scenery environment built.

✓Test and debug the 3D models created in the X-plane Flight simulator.

✓Simulate the finalized or finished works.

Case Study (Kumasi)

Fig. 1: Map of Study Area

Methodology

❖Marking out and extraction of satellite images

❖3D Modeling of virtual structures and objects

❖Examining the geometric optics of the scenery

❖Testing and Debugging of 3D structures

❖Simulation of the finalized works

Results and Discussion

Fig. 2: Kumasi Airport

Fig.3: 3D model of the KNUST admin. block

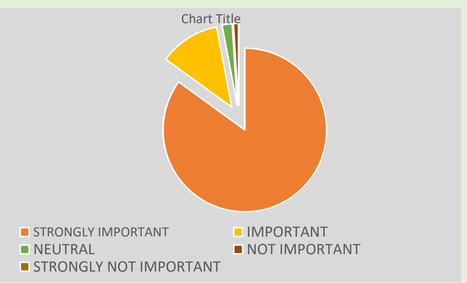

Fig. 4: Chart providing responses from pilots on the importance of Kumasi

Fig 2 provides a finished 3D representation of the Kumasi airport area with some notable airplanes like that of Passion Air and Africa World Airlines.
Fig 3 is a picture of a completed 3D model of the KNUST admin. Block.
Fig 4 is a chart that represents the responses from the pilots interviewed on the importance of this work.

Conclusion

In conclusion, this study navigated the complexities of satellite image processing, architectural modelling, and simulation to create a detailed 3D representation of the Kumasi airport area and KNUST campus. Despite initial challenges with image quality, iterative efforts led to the successful development of a virtual environment using Blender and World Editor software. The incorporation of geometric optics principles enhanced realism, although testing in the X-Plane flight simulator revealed and rectified imperfections. Endorsements from pilots and aerospace engineering students underscored the project's practical value. This research showcases technical prowess and adaptability and paves the way for future advancements in simulation techniques across diverse domains.

References

[1] Perry, A. R. (2004). The Flight Gear Simulator. *In Proceedings of the USENIX Annual Technical Conference*, 1-12.

[2] (2022, October 18). Retrieved from Alpha Aviation Group: https://aag.aero/why-flight-simulators-are-important-tools-for-training-pilots/

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