“Captured”, Using Photogrammetry as a Method of 3D Modeling

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Abstract

Photogrammetry is a continuously developing technology that enables the processing of multiple digital photographs of an object, person, or place into an accurate 3D scan. In the past, it was used in to map terrain and help create detailed maps.

For this project, I have been working with Professor Curry with experiments in the use of photogrammetry and 3D printing - the end goal being to construct a large-scale “photo booth” that would enable the instant scanning of one (or multiple) people using upwards of 100 cameras.

The resulting scan could then be 3D printed in full color; moving photography and event documentation to the next level. While this technology currently exists in a variety of forms, Professor Curry and I see this as an opportunity to develop his design from the ground up, while expanding on previous iterations. While this technology has many commercial and non-commercial uses, we see it as a unique way of capturing events here at FSU, such as graduations and visits from dignitaries, and researchers; a 3D photo-op.

Introduction

The creation of detailed maps of geography, infrastructure, and even the stars is all due to the invention of photogrammetry. It functions in many ways, from cameras high up in the sky to as low as 2 feet above the ground using a tripod. It covers vast regions in relatively clear images instead of small areas and high detail. In more modern days, it scans objects and obtains detailed imaging of them in 3D scans, which this project has proved. With Photogrammetry, Professor Curry and I 3D created a miniature copy of a person using multiple cameras connected to a Raspberry Pi programmable device.

Methods

- An app called “Polycam” was used in cooperation with an iPhone in order to test the proof of concept for this Project. This included taking numerous photos to create 3D scans on small objects.
- Polycam was then used to create 3D scans of a person's head(image below)
- Currently, a device with a turn table and a mounted camera is being constructed to conduct further tests with photogrammetry
- In the future of this project, a large scale device of similar construct will be created and possibly used by FSU for Graduating students. The goal is to be able to get a very quick 3D scan of a person or group of people and convert that into a printable 3D file.

Conclusion

Our results showed that it is plausible to create 3D models of a person or group of people. The miniature models of the project have proved successful in creating multiple different objects and people. There was difficulties in the process, as the lighting plays a large roll in the scan, and if a person was being captured, movement would also distort the scan. Based on the results of the miniature models, even with the difficulties, we can conclude that the larger model running on the exact software would work properly and successfully create 3D models of larger objects including people and groups of people.

Sources:

Sources:
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