

Consumer Immersive Viewer

Directed Research Proposal
Fall 2006
Anthony Ko

Summary

This proposal is to investigate methods of producing and rendering digital stereo panoramic images on a handheld device using sourceless orientation tracking. Additionally, this will contribute to the Interactive Media Division's research initiative related to prototyping a digital, networked, handheld stereoscopic viewer.

Background

The consumer immersive viewer described by Michael Naimark (<http://www.naimark.net/projects/bigprojects/viewer.html>) can be thought of as a modern version of the classic stereoscope, or an enhanced ViewMaster. The device would be a digital stereoscopic display that is brought up to the eyes. In its basic form, this provides a "look-around" capability that allows the user to view the whole panorama. The ultimate goal of the current project is to create a device that, within a few years, can be manufactured and sold to the public for less than \$100, making the immersive 3D viewing experience more easily accessible to the general public than in the past.

This project has also been chosen to be part of a USC Marshall School of Business course Management of Radical Innovation, where graduate business students will be identifying marketing and manufacturing options, and evaluating funding options that will assist in the creation of a refined prototype that would be suitable for demonstrations to potential investors.

Approach

Compelling stereo panoramas for the "pitch package" will need to be created to convey the significance of the project to attract funding. In creating the content for this project, I will assist in investigating the factors that affect visual, stereoscopic acuity in digital panoramic images when using the "omnistereo" single camera panorama production technique described by Peleg (e.g. Peleg:1999 <http://citeseer.ist.psu.edu/peleg99stereo.html>) arriving at a set of parameters to enable the consistent production of digital stereoscopic images suitable for viewing on a handheld stereoscopic viewer. Various configurations of motion control will be tested to develop a prototype mechanism with repeatable and consistent camera movement utilizing a single camera. There will also be exploration into whether additional depth cues, such as motion parallax, can be incorporated into the panoramas.

Part of the time spent in this directed research role would be dedicated to engaging with GSBA-585 (Management of Radical Innovation), a class conducted by the Marshall School of Business, and assist in coordinating between the MBA students and Cinema-Television faculty as needed, as well as participating in marketing, manufacturing, and design proposals.

Timeline & Milestones/Goals

21 Aug – Start of Fall Semester.

Phase One

11 Sep

Begin design, prototype and development of a motion controlled stereo panoramic image capture apparatus. This platform will be used in the second phase of the research to test the viability of stop-motion (stepper motor) and continuous motion (DC motor) capture, using both still and video image recording.

11 Oct – Complete design and development of motion controlled stereo panoramic image capture apparatus.

Phase Two

16 Oct

Begin test of the motion control unit in a variety of environments by running several captures. From this, metrics for stereo acuity will be established based on the data collected, or by existing conventional standards. The selected environments will include settings with near-field objects, far-field objects, and using a matrix of controls across stop-motion capture, continuous motion capture, still image recording and video image recording.

Phase Three

6 Nov

Begin subjective user testing for the effectiveness of the stereo panoramas using a variety of display formats, including projection on a large wraparound screen, standard monitor, and handheld stereo viewer.

13 Dec – Finalize documentation. End of Semester.

Deliverables

- Prototype rig to be used to create stereo panoramic stills using a single digital camera
- Panoramic stereoscopic stills
- Documentation of the research, imaging technique, sample images and summary presentation

Signatures:

Advisor: **Julian Bleecker**, Assistant Professor, School
of Cinema-Television

Date

Scott Fisher, Chair, Interactive Media Division, School
of Cinema-Television

Date