This summer, I was a research assistant for Professor Pond in the art department. My job was to help with coding in a 3D video project.

Our goal for this project was to use the 3d vision capabilities of Kinect cameras to record the movements of mobile subjects, especially dancers, and to use these recordings to create sculpture. Fully 3D recording is distinct from what we see in movie theaters. The perspective in movie theater 3d recordings cannot be changed after the fact, because they employ a kind of stereoscopy and do not record the actual depth of what they are seeing. In a truly 3D recording, the scene can be viewed from any perspective because all of the depth information was recorded. Kinect cameras can record depth information, are fairly inexpensive, and there are some open source development kits and other reverse-engineered tools available to use them online, so they are perfect for art projects like ours.

For the first several weeks of the summer, I was working on one specific aspect of the project: making 3 kinect cameras “work together” to achieve a fully three dimensional recording. A single Kinect can only sense depth on the front side of an object, so in order to get a 360˚ 3D recording, we need at least 2 (but more likely 3, since the kinect has a hard time seeing objects at a grazing angle). I successfully got 3 Kinects to record at the same time; they use quite a lot of bandwidth so in order to maximize the framerate that each Kinect could achieve, I used a separate computer for each kinect and used OSC to control when they started/stopped recording, and had them upload all of their recordings to the cloud.

The real problem arose when I tried to merge all of the three recordings into one. Each recording needs to be rotated and translated a certain amount in 3D space to be where it should be in relation to the other recordings. This can be done by hand for one point cloud, or frame, of a 3D recording but takes time and is not feasible for video applications where there would be 10-30 frames per second to work through. So I spent a few weeks attempting to write some code to do the rotations programmatically. I wrote something in Processing that I felt should work- it allowed a user to manually align two point clouds and then applied the same transformation to the rest of the frames in a recording- but the point clouds always came out with different translations entirely from the ones the user selected. After a few weeks of being unable to come up with a solution to this problem, Professor Pond and I eventually felt the need to move on to a task that would produce more results.

Using just one kinect instead of multiple ones, I was able to write some programs that used kinect data to make visual and sculptural art. In one Processing program, a bunch of lines move around and disappear when a person walks by; this could be projected on a wall in a lobby or somewhere else with high foot traffic for the best visual effect. Another successful program, one that would be most worth revisiting with a dancer, was one where as a person moves, they create an abstract 3D shape (that is viewable or printable in 3D). This sketch accomplishes one of the goals of the summer, to create something printable from movement.

In the final week of my internship, I wired up a LilyPad arduino microcontroller and some sensors to a garment to enable further data collection about the dancer or

user's position. In each elbow of the shirt I placed a homemade flex sensor created with some masking tape, conductive thread and a semi-conductive black material. Near the wrist in each shirt, I put in an accelerometer to measure the pitch and yaw of the user's hand position.

In this internship, I learned so much. I met people, built things, improved my coding ability, got experience emailing experts and forums for advice, learned about navigating 3d space, and explored the way form relates to meaning. The projects I worked on will also definitely help my portfolio- I am interested in continuing to learn about the intersection of coding and art, and there are some super interesting but highly competitive graduate programs that require a great portfolio in a successful application. Professor Pond also invited some people to come have a look at what we were working on, including a man who is selling a business that did visual effects shows for huge events/ music festivals like Bonnaroo, and another who is starting up a business in Virtual Reality products. It was a real privilege to be able to meet those people and get a little view into jobs that involve technology and visual media.

In conclusion, this internship reaffirmed my desire to explore the art, technology, and new media world, and I will continue to find projects to add to my portfolio and hopefully either enter a great grad school or find work doing something like what I've been doing this summer. I want to thank everyone who makes research assistantships at Sewanee possible- especially in the arts! This has been an incredible opportunity. For pictures and videos relating to this internship, please visit https://mariannesanders.wordpress.com/2016/08/16/videos-for-summer-2016-internship