EE/CprE/SE 4910 WEEKLY REPORT #4

3/12/25 - 3/25/25

Group number 15

Vision Based Camera Motion Tracking

Advisor: Ashraf Gaffar

Team Members:
Andrew Gooding
Eric Wittrock
Isaac Kenyon
Will Ernatt

Weekly Summary

This week we continued working on potential solutions to our camera motion solving algorithm, and researched and practiced creating Blender plugins using the Blender Python API. We continue to work on both of these as our end goal is to have a product that integrates our camera motion solving algorithm into a plugin that the user can operate entirely within Blender.

Past Weekly Accomplishments

Eric Wittrock

- Worked on math to convert positions of points over time to camera coordinates
    - Assumed constraints that make the problem easier: there is no error in point motion, we know the exact focal length, we know exact depth of each point
    - Later these constraints will be relaxed after this problem is solved
- Created a program that projects points in 3D space to position on a camera sensor.
    - This will be a useful tool in creating the algorithm to solve for the camera position and orientation because it allows us to solve the problem under the constraints listed above

Isaac Kenyon

- Worked on the build pipeline in the github repository so that it is ready for people to add their code in.
    - Attempting to decide how to place everyone's code together.

Will Ernatt

- Created two blender plugins
    - One adds a simple panel to the 3D viewport to import camera motion data. With this plugin the data must be created by another program(Maya, Meshroom, etc.) or exported from another blender project.
    - The other plugin generates some dummy camera animation data and applies it to the camera within the project. The point of this plugin was to demonstrate that it is indeed possible to manipulate camera movement via a plugin using imported data, which is the goal of our final project.

Andrew Gooding

- Continued working on blender scripting in blender so that I have scripts that can start automating processes for me.

Pending Issues

- **Eric Wittrock:** I have arrived at some equations that are unsolvable by traditional means. An optimization algorithm may be used to find an approximate solution if it is reasonably performant
- **Isaac Kenyon:** Not sure if we should have specific directories for everyone in the repository at the start or try and put all the code together.
- **Will Ernatt:** Still struggling with the OpenCV environment on Windows. Will try to resolve this week.
- **Andrew Gooding:** Still having some issue making everything work correctly on my Mac.

Individual contributions

Name	Individual Contributions	Hours This Week	Hours Cumulative
Eric Wittrock	Worked on math to solve camera motion provided a list of relative movements	6	25

	in points assuming zero error Worked on a wireframe 3D renderer to use as a took later on		
Will Ernatt	Wrote blender plugins to test the functionality of the Blender plugin api and the feasibility of our final project.	6	25
Andrew Gooding	Worked on scripting in blender to automate some of the processes of the camera motion plugin	5	18
Isaac Kenyon	Worked on the build pipeline in the github repository so that it is ready for people to add their code in.	4	22

Plans for the upcoming week

Andrew Gooding

- Finish my test script that I have been working on recently.

Eric Wittrock

- Use gradient descent to solve camera motion provided point motion. This will be a proof-of-concept attempt

Isaac Kenyon

- Get the groups code they have worked on merged into the repository. So that we can start adding different parts together.

Will Ernatt

- Continue working with OpenCV to write a program that generates a camera path.
- Attempt to import the generated camera path into blender using my plugin from this week.