

Meeting Notes for 2017-12-13  
Team PolyVox

Members present: Dr. Mike Bailey, Chris Bokkam, Richard Cunard, Braxton Cuneo, D. Kevin McGrath, Bryan Pawlowski, Dr. Kirsten Winters

Action Requirements:

- Update Bryan every two weeks. - Project Team
- Meet with Bryan once a month. - Project Team
- Link Bryan to the documentation. - Project Team

Meeting Notes

1. The meeting began with Bryan asking the team to explain the basic concept of the project. The team began by explaining the inception of the project, then went on to explain the way the group has interpreted the original concept.
2. The group then explained the current, high-level design of the program.
3. Bryan then asked about the design of the graphical back-end, specifically regarding data representation. Braxton explained the manner in which individual voxels are stored and represented.
4. Bryan then explained that there is new hardware architecture known as 3D crosspoint optane that could be used to optimize the current data representation model.
5. Following this, Bryan suggested that the team become familiar with using dynamically linked lists in Unity, as it would make the program more easily modifiable.
6. Bryan then asked if the team was set on the current implementation of voxels, or if the team would want to allow users to create their own rendering solutions. Braxton responded by discussing the current model of code injection.
7. Richard asked what Bryan would suggest the team do to be able to interface OpenCL to Unity. Bryan suggested using a DLL.
8. Bryan asked if the team was planning on implementing compatibility for Windows mixed reality. Richard responded that the team had not seriously discussed it, but that it could be a possibility in the future. Bryan suggested that the team focus on using SteamVR, and solutions to when the system loses tracking, as there is now a wrapper for the mixed reality systems to work in the SteamVR runtime.
9. Chris brought up how the team considered the use of MoCap systems as a stretch goal for increased scalability. Bryan asked Chris about how many more points of reference would be needed to accomplish this. Chris explained that it would likely take at least three additional reference points for full body coverage.
10. The discussion then turned to the HoloLens. Bryan stated that the HoloLens technology was not very advanced at this point. Richard inquired about this, mentioning a conversation he'd had with a Rockwell-Collins engineer, who had praised the HoloLens technology. Bryan explained that while it has some significant advances, that the field of view was prohibitively small. He then asked how the group might scale the voxel display

of the program if they were to implement HoloLens compatibility. The team was unsure how to handle this challenge.

11. Bryan asked if the team was set on using OpenGL for the graphical back-end. The team explained that they were planning on using Khronos API's, such as OpenCL, and possibly Vulkan.
12. Kevin asked if it would be possible for non-GPU hardware acceleration for the graphics, suggesting the use of FPGA's.
13. Chris asked how the group wanted to handle parallel design, such as allowing the users to work with multiple sculptures at a time. Braxton explained how the group was planning on implementing 'layers' within the program, and how it would be implemented in a four-dimensional octree structure.
14. When discussing this structure, the group agreed to refer to individual box structures as 'boxel'.
15. Bryan asked if the group was planning on using MoCap for interface design, giving the example of allowing the user to 'kick' an object to delete it. The group explained that gesture-based controls were not part of core design, but that it was something that the group has thought about implementing as a stretch goal.
16. Bryan also asked about different theoretical features, such as implementing physics. The group then began discussing various ideas, such as destroyable geometry, the ability to convert geometry into physics objects in the VR space.
17. Braxton then continued the discussion, suggesting the possible technical solutions to the suggested features.
18. Kevin asked who was responsible for implementing code injection. Braxton explained that he was primarily in charge of designing the API, and that its implementation would be covered by Richard.
19. Bryan asked if the group was set on working in Vulkan, suggesting that Intel may be able to supply an 18 core processor if the team was working with DirectX 12 or Vulkan.
20. Kevin inquired about the use of alternate processors or GPU's to take advantage of multiprocessing, asking why the only hardware being suggested was Nvidia, however Bryan explained that Intel would not be able to supply other hardware.
21. Bryan opened up the discussion for questions. Braxton asked if Bryan had any suggestions for design. Chris asked how often Bryan wanted the team to update him/Intel.
22. Bryan responded that he was available to talk up to once a week, and asked the team how often they were able to meet. The group agreed to meet in person approximately once a month, with smaller updates every two weeks.
23. Bryan stated that he was hoping to get updates on the progress of the project in the biweekly updates, including technical issues that the team is facing.
24. Bryan suggested that in the month leading up to the project finish, that the team lock their tool chain.
25. The team agreed to allow Bryan to bring in his team's software architect for challenging graphical problems.