The title of my project is *A 3D Simulation of Conway’s Game of Life using Rules that Model Symbiotic, Parasitic, and Reproductive Behaviors*. There are 2 goals to my project:

* The first goal is to create a game of life simulation that models microscopic organisms like bacteria. I was really interested to see the SmoothLife implementation, and wanted to expand on that in 3 dimensions.
* The other goal is to explore new rules for the game of life. We’ve already seen the ability to create complex patterns and interesting configurations from the simple 2,3/3 rule. This is a small scale empirical study on the creation of new rules.

When I say 2,3/3 rule, this just means that the numbers before the slash, are the amount of neighbors needed for a live cell to live in the next generation. After the slash is the number of live neighbors needed for a dead cell to be regenerated.

My working component is a simple 3d game of life. The first example uses the 2,3/3 rule and gives seemingly infinite generations. The second example uses the 5,6,7/7 rule, and the numbers of generations appear finite.

My next step was originally to start implementing my rules for previously mentioned behaviors, but instead I’m going implement some sort of state machine. If I want to get the organic behaviors and continuous motion such as in the videos, I need to have continuous looking transitions rather than a binary on/off transition. The cells will need to have memory of their life status in the previous generation. I anticipate the challenge with maintaining state will be handling the rate of change with the framerate. I need to know how many frames it takes for a cell to reach point A and point B and adjust the framerate accordingly. Next, I will implement my rules:

* For symbiotic behavior, the rule will be that two neighbors that touch by “side” remain alive in the next generation regardless of other neighbors.
* For parasitic behavior, neighbors have to touch by corners to have this parasite-host relationship. The parasite remains immortal until it’s host dies.
* For reproductive behavior, if a cell is dead but is surrounded by live side neighbors, the four side neighbors die in the next generation and the middle cell will be regenerated

To handle duplicates, only one of each behavior can occur within a neighborhood, and the neighborhoods do not overlap. So the overall challenge is to maintain behaviors that are simple enough to allow room for complex patterns to emerge. These rules will be fluid through my experimentation, but I will use what I currently have as a starting point.