

**Team Number:****School Name:** Sandia Preparatory School**Area of Science:** Computer Science**Project Title:** Sustained Complexity of Intelligent Systems

The universe is governed by a simple set of generally deterministic rules which create seemingly infinite complexity. Understanding complexity is crucial for modeling the universe. We will build a system of particles which interact with each other through deterministic rules to create complex patterns. The particles will start in a low entropy state, which will generally increase over time as opposed to Conway's game of life, which starts in a high entropy state and decreases until it reaches equilibrium. Our project is similar to "Life", but instead starts in a low entropy state and increases, ideally never hitting any stable point (or at the very least avoiding equilibrium for as long as possible).

We hope to begin with a very simple simulation that follows similar rules to Conway's game of life, and then add rules and tweak parameters until we are satisfied with the flow of complexity that is produced by the simulation. For example, Conway's game of life only accounts for over-population, under-population, and reproduction, but the cells do not make any "intelligent" moves towards or away from each other. We hope to implement intelligent movement in a similar way to Boids, where creatures move towards or away from their neighbor's center of mass. We plan on adding a simple genetic component to the cells or particles that controls their behavior. From these additions, we hope to observe emergent complexity on a larger and more sustained scale than that in Boids or Conway's game of life.

**Team Members**

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