# Artificial life

Artificial life, also called A-life or alife, computer simulation of life, often used to study essential properties of living systems (such as evolution and adaptive behaviour). (<https://www.britannica.com/technology/artificial-life>). By mimicking the mechanics of evolution we can gain an insight into the process and help develop understanding in the field.

(Artificial life is the field of study focusing on modelling natural life and its processes though computerised systems in order to gain an insight into the workings of evolution and other natural systems.)

# Game of life

One such example of an evolution simulation is Conway's Game of Life. Created in 1970 by John Conway, the simulation takes place on an infinitely sized grid where each cell is either live or dead. It progresses according to a set of simple rules \cite{guardian}:

\begin{itemize}

\item A live cell with less than two live neighbours becomes dead

\item A live cell with more than four live neighbours becomes dead

\item A dead cell with three live neighbours becomes alive

\end{itemize}

Conway's Game of Life is often praised for its ability to show how simple rules can spawn complex evolutionary patterns \cite{callahan}. This project will tackle evolution simulating by taking inspiration from Conway's Game of Life to produce a piece of software it terms an ``evolution sandbox``; a simulation with emphasis on real-time manipulation and customization which will allow the user to observe the outcome of their actions on the ecosystem.

# Biology

Biologically the process of evolution is both simple and overwhelmingly complex. Simply, environmental selection pressures favour certain characteristics in organisms. The organisms with favourable adaptations for a particular environment have a higher chance of mating to produce offspring, passing on their DNA and their favourable features to the next generation. Organisms with unfavourable adaptations are less likely to survive and therefore not pass on their genes to the next generation, shaping a particular species to have better characteristics to survive their environment.

Though the process has more factors and complexity than described above, simplifying evolution to base elements such as these allow it to be modelled by a computer and, as in Conway’s game of life, be used to explore evolution and how the process works.