

# The Emergence Program

**The Project:** Using genetic algorithms in an agent-based system, the Emergence Program seeks to create a digital environment in which the real-life behavior of ants naturally evolves. This system will be used to test the hypothesis that ants process information the same way that cellular automata do, and if this proves to be true then this program will be used to test the validity of proposed ‘rules’ that govern ant behavior. Ergo, if adding a rule results in more natural behavior in the virtual colony, that rule could be governing the behavior of real ants.

While similar programs have been written in the past, this program will have an architecture that should be able to compute a larger variety of scenarios that other programs have not yet been able to conquer. This will be done with what I am tentatively calling the “subjective probability device” or the changing probability that an ant will choose one behavioral response over others. The genetic algorithms written into the program will target these probabilities, and by changing these across mental states within an individual ant the colony as a whole should be able to tackle any problem.

**The Job:** I am looking for 1-3 undergraduate or graduate students who already have a robust background in programming and have a strong understanding of cellular automata, agent-based programming, and genetic algorithms. While I have the basic architecture in mind, I need someone who can turn my idea into code and create a virtual interface we can use to “see” what the virtual colony is doing. It would also be helpful to have individuals who can help me write any scientific publications that may result from this program.

**The Benefits:** Unfortunately, I am only an undergraduate student myself and am unable to provide financial compensation for this work. However, this opportunity can be used as the subject of an honors thesis, a senior project, or any other school work you might have. This work may also result in scientific publications, and you will be listed as an author for these publications.

**Contact Information:** If you are interested in this job, please email me at [colinlynch@email.arizona.edu](mailto:colinlynch@email.arizona.edu) and we will find a place and time to meet.