**The Intellect’s Journey**

**Introduction**

For well over a decade, I have been fascinated with the idea that computers could achieve the same level of intelligence as humans. I would often ask my friends, “How cool would it be to combine human-level intelligence with the massive computing power of computers? Imagine the possibilities if we had a machine that could think like us, but infinitely faster!” Usually my friends responded by rolling their eyes, or started talking about how that kind of Artificial Intelligence (AI) would kill us all. (Thanks to Terminator, and about every other popular movie that features a nefarious AI!) Since I have never been content to just *think* about what an Artificial Intelligence would be capable of, I set out on a long journey to figure out how I could help make a not-so-nefarious AI a reality in my lifetime.

**Previous Experiences**

My fascination with AI largely remained a hobby until I took a course during my undergraduate studies, called “AI for Game Programming.” Up until that point, AI seemed to me an impossible problem to work on that only veteran Computer Science researchers could possibly contribute to. As my undergraduate advisor (Dr. Kenneth Stanley) can attest, I quickly discovered the power of evolutionary computation and its potential application in Artificial Intelligence. After I finished the course, I began working on my undergraduate thesis with Dr. Stanley (described in my Previous Research statement), and in less than a year had taken what I learned in the classroom and applied it to a challenging problem in AI.

After graduating, I moved to Georgia to work as a software engineer at the Robins Air Force Base as a part of the Department of Defense SMART Scholarship I had been awarded. There I solidified my core set of software engineering skills that I still use in my research today, and learned how to work on large projects as a member of an integrated software development team. After a year of working as a software engineer, I read Jeff Hawkins’ book “On Intelligence,” in which he eloquently described how I felt about AI ever since that undergraduate course: in order to build an AI, we must first understand the neurobiological processes underlying human-level intelligence. Inspired by Hawkins’ book, I decided to pursue my research goals in graduate school with Dr. Christoph Adami, who is pioneering a new artificial brain model based off of Hawkins’ book.

In graduate school, I have synthesized all of my previous experiences into my research today. Together with my colleagues in Dr. Adami’s lab, we have developed a new computational method for studying the evolution of animal behavior using evolving artificial brains, which is the first step of many on my long journey to “reproduce the evolutionary path to human-level intelligence.”

**Intellectual Merit**

Perhaps the most noticeable trait about me that makes it clear I belong in academia is my inquisitive nature. Much to my parents’ and teachers’ chagrin, I would always ask “why?” or “how?” and would not settle until I had a suitable answer. This inquisitive nature drives my passion to ask and then find the answer to questions that currently have no answer, thus making research a natural state of mind for me. As an example, during my undergraduate research project, I became curious how the topology of artificial brains (i.e., how the neurons are connected) would affect their performance. Following this, I implemented an evolving artificial brain development rule that enforced a more human-like brain topology. At the conclusion of the experiment, I discovered that having a human-like brain topology does indeed improve the performance of artificial brains, which became one of the key findings in my undergraduate thesis.

Furthermore, over the years I have developed a keen appreciation of working in teams. During all of my previous experiences, I have experienced firsthand that humans are capable of accomplishing far more as an organized collective than as individuals. Most notably, over the previous summer I collaborated with Dr. Arend Hintze, a computational biologist who specializes in the evolution of nervous systems, and Dr. Fred Dyer, a behavioral biologist who specializes in collective animal behavior. Due to our diverse skillsets and knowledge, as a group we were able to advance a project from conception to experiment to manuscript in a five-month period, which would have been impossible had we not worked as a group. Thus, my personal and professional experiences have prepared me well for a successful career in graduate school, as well as a professional career in academia after graduation.

**Broader Impacts**

I believe it is absolutely vital to educate the next generation of adults on the importance of science and science education. Thus far, I have pursued this belief by publishing posts about science education, evolutionary biology, AI, and my own research on my personal blog (http://www.randalolson.com/blog/), Twitter (https://twitter.com/randal\_olson), and NSF BEACON’s blog (http://beacon-center.org/), which are visited by hundreds of scientists and members of the general public every day. Furthermore, I regularly educate young adults and K-12 students on topics related to science and evolution at the local museum and science fairs as a part of NSF BEACON’s outreach efforts, which are attended by hundreds of visitors and rated by the visitors as an excellent public education opportunity. Likewise, I mentor undergraduate students interested in AI and digital evolution-related research to provide guidance and encourage them to pursue academic and professional careers in STEM.

Professionally, I have actively promoted NSF BEACON’s goal of interdisciplinary research by focusing half of my graduate curriculum on Biology so I can better act as an intermediary between Computer Science, Engineering, and Biology. As a part of this, I support the Software Carpentry movement (http://software-carpentry.org/) to train scientists in basic computational skills (e.g., basic programming, data exploration and analysis, and project management) by co-hosting hands-on workshops at universities and writing blog posts on my personal blog to teach scientific computing, Python, productivity tools, and statistics (http://www.randalolson.com/category/tutorial/). These workshops and blog posts have been exceedingly successful in training thousands of scientists the skills they require to complete their research, and I plan to continue supporting these efforts during my graduate career and beyond.

**Conclusion**

Given my unorthodox approach to AI, I continually push against the boundary of what is possible when computational systems are combined with biological experiments. Thus in the short term, I plan to complete my training in Michigan State University’s Ecology, Evolutionary  
Biology, and Behavior program. This training will better enable me to more effectively collaborate with biologists and behavioral scientists, which will be a key component of my research career. In the long term, I hope to continue my journey along the long and winding path toward an evolved AI. As suggested in this statement, my professional home will always be academia, and I hope to pursue a career as a professor after completing my doctoral studies.