A Thesis Envisioned

Aaron Beach
for Intro to PhD class

November 27, 2006
Abstract

I plan to fuse algorithms and systems knowledge, to design, evaluate, and implement novel protocols/algorithms for all areas of systems. While many systems researchers have a solid understanding of algorithms, it seems that the algorithms theory supporting many emerging areas of systems is rather disconnected from applicable research already existing within the algorithms community.

1 Subject Area

I plan to fuse algorithms and systems knowledge, to design, evaluate, and implement novel protocols/algorithms for all areas of systems. While many systems researchers have a solid understanding of algorithms, it seems that the algorithms theory supporting many emerging areas of systems is rather disconnected from applicable research already existing within the algorithms community.

In particular, my current focus has been on routing/mac protocols for wireless networks targeting real-world sensor network applications as well as very general ad-hoc network theory. I feel that many of the current “classics” in wireless routing protocols are intrinsically flawed or impractical due to immature understanding of a very complex system (wireless networks). While many would consider routing protocols a mature area with too much redundancy already, I would like to see more convergence towards standards that actually work (and make sense).

On top of this, I am very open to new areas or applications of design. I have been very interested and worked on applications of algorithms to hardware design, scheduling algorithms, and bioinformatics.

2 General Goals Outline

- **Year 1:** Hone my skills in all aspects applying to my future research projects, this includes: literature surveys, problem formulation, algorithm/solution design, protocol description, theoretical analysis, implementation, real-world and simulated evaluation, presentation of conclusions and related writing/publication.

- **Year 2:** Goal of publishing a few papers, preferably finding the right conference for publications and projects resulting from work in my first year, and to identify a long term problem to which I may apply my learned research skills.

- **Year 3:** Publish a “hot” paper presenting, describing, and justifying the long-term problem identified in year 2. I would also, like to have early solutions published or at least developed in some presentable form during this year.

- **Year 4:** Publish necessary solutions for the long term problem throughout this year. Finish the year by aggregating work into a final polished solution, aimed for journal publication.

- **Year 5:** Tie research together and prepare defense, while grabbing any low hanging fruit that is publishable by defense time.