

## Statement of Research and Teaching Interests

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As an apprentice researcher in graduate school I have developed a solid foundation in the essential elements of research, and applied them to turn research ideas into solid scientific contributions. This apprenticeship culminates with my formal entry into academia as an Assistant Professor. My doctoral studies have focused on research related to routing in *wireless ad-hoc networks*, which are highly dynamic networks consisting of mobile hosts *without* any fixed or wired infrastructure. Ad-hoc networks present a broad range of research challenges that offer rich opportunities to obtain funding and publish innovative work in top scholarly journals. Furthermore, although there are several unique challenges, many of the contributions to the field of ad-hoc networks can be generalized to other areas of wireless communications and mobile computing. The areas of research that I plan to focus on in my first several years include: (1) wireless ad-hoc networks, (2) routing algorithms, (3) mobility modeling and management, and (4) probabilistic quality-of-service (QoS) guarantees in wireless networks. I am also keenly interested in communications protocols, internetworking, distributed system design, network design and implementation, and distributed telemedicine systems.

My exploration of the unknown was fostered at an early age. I sought to explain those things unseen and was encouraged in my unabashed curiosity at every stage of life by my parents and teachers. With a family tradition as scholars and educators, I developed a love, enthusiasm and talent for *seeking answers*, and *explaining* what I learned to those around me. This synergy has grown into a commitment that couples research and teaching, and has motivated my aspiration to pursue a career in academia. The job of a professor can be compared to a marriage. It requires flexibility, sacrifice, willingness to adapt, and a strong desire to be improved and strengthened. As a professor I shall seek to develop continued excellence in both research and teaching, by treating them as a mutually beneficial partnership that can, and will grow and improve together.

My focused research interests and broad technical experiences will enable me to establish a strong research program that attracts the interest of students, and develops into collaborative relationships with other faculty and institutions. Furthermore, both academic and commercial interest in ad-hoc networks is growing. Consequently, I expect considerable opportunities to obtain outside funding. My initial objective shall be to write grant proposals that build upon my doctoral research in order to aggressively pursue both NSF and corporate sponsorship. Specifically, my goal is obtain funding to extend my work in three related areas, these are: (1) the extension of the mobility adaptive clustering scheme to support QoS based routing—based on the probabilistic knowledge of cluster internal path availability; (2) the generalization and addition of group movement into the ad-hoc network mobility models; and, (3) the investigation of strategies for dynamically optimizing the system parameters of the adaptive clustering algorithm. In addition, a proposal based on my doctoral research and co-authored with my dissertation advisor, Professor Taieb Znati as the PI, recently received \$250,000 support from NFS. Finally, I am also developing several new research ideas, ranging from *early re-routing of QoS connections based on mobility information* to *adaptive learning models for predicting group mobility*, that I expect to develop into high-quality research papers.

Collaborative relationships are crucial elements of a successful research program. Hence, I shall continue to focus on collaboration by forging research relationships with other faculty members who share common or related interests. I have helped build several collaborative research relationships during my time at the University of Pittsburgh. These have involved partnerships with the following institutions: (1) Bellcore: for the study of mobility management; (2) Oregon Health Sciences University: for the study of disease in critical care units; and, (3) Hewlett-Packard: for the application of systems and networking technology in the development of large health-care systems. Naturally, establishing a quality research program takes many years to achieve. It is, therefore, important to have reasonable expectations regarding how much can be accomplished in a short amount of time. These objectives must also be balanced against the equally important need to develop and teach courses, mentor students, and become active in service to the school and research community.

My teaching experience and interests are strongly focused in the areas of computer networking and telecommunications, specifically in the following areas: (1) fundamentals of networks and communications; (2) network architectures and protocols: design and evaluation; (3) internetworking: routing algorithms and protocols; (4) local-area-networks; (5) wide-area and broadband networks; (6) network performance analysis; (7) simulation modeling and analysis; (8) distributed systems; and, (9) UNIX network programming. Undergraduate courses including probability and random processes, fundamentals of electrical engineering and computer science, programming, and digital logic could also readily be incorporated into my teaching program. In addition to these specific areas of strength, I expect to continue exploring new areas of teaching as I acquire experience and continuously expand my knowledge base through research and work with students and faculty. Furthermore, I expect to develop a research seminar in my first two years around the topic of ad-hoc networks—focusing largely on routing issues in dynamic environments, and also the latest developments in the areas of QoS support and network management.

As the son of a professor who was a devoted teacher, I acquired a unique sense of my ability to guide others to a common understanding of my point-of-view, and to re-experience my own process of learning through others. Thus, I bring to my teaching a natural empathy and enthusiasm that has nearly always earned me the respect, as well as captured the attention of my students. I enjoy teaching and have a great respect and appreciation for the effort that it takes to be an excellent teacher. I am not under the illusion that having the equivalent of two semester long courses of University level teaching makes me an expert teacher; however, it has begun the process of shaping the wonderful potential that I do have to engage students, and has added immeasurably to my perspective of what a career in academia is about.

My objective as a teacher is to develop a strong core set of courses, including lectures and other course materials, that emphasize fundamentals, while also focusing on evolving state-of-the-art developments. My teaching philosophy is simple—keep each student engaged and challenged. However, this is a very difficult task that requires enthusiasm for and knowledge of the topics, coupled with an interest and ability to develop personal relationships with students. This is particularly important at the undergraduate level. This is a time when the transition from childhood to adulthood frequently challenges the brightest, most committed students to stay focused and confident. Although it is difficult to imagine a deep involvement with *every* student, I believe that teaching involves guiding students through the learning *and* growing processes. Hence, I intend to be vigilant to the broader needs of my students, while retaining realistic expectations regarding my own time, and the varying commitment levels and abilities of individual students.

Finally, I view mentoring and student advising as crucial elements of both research and teaching programs. I am strongly committed to advising students at all levels, graduate and undergraduate, and have had an ease and enjoyment in developing a professional rapport with students. Furthermore, a natural propensity to adopt a mentoring role has been a cornerstone of my professional and personal life. I also have a broad enough range of professional and life experiences to be helpful to students with many different goals, interests and levels of experience. Therefore, I expect to continue growing in this role, and to attract students to my research program where I can help guide them through the process of applying their own skills and knowledge in becoming excellent engineers, researchers, and teachers themselves.