

Pralhad Deshpande

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Ph.D. (Computer Science)
Computer Science Department,
Stony Brook University
Advisor: Professor Samir R. Das

Ongoing

M.S. (Computer Science)
Computer Science Department,
Stony Brook University
Advisor: Professor Samir R. Das

May 2008
GPA: 3.9/4.0

B.E (Computer Science and Engineering)
Department of Computer Science and Engineering,
Goa College of Engineering, Goa, India

May 2005
Distinction with Honors
(Highest Grade awarded by University)

Research Interests

- Wireless Networking, Computer Systems, Measurements and Performance Evaluation

Honors and Awards

- *Scholarship under Goa Scholar Scheme* awarded by the Government of Goa, India, for excellence in academics and to pursue graduate schooling in an institution of repute.
- *University Fellowship* for the academic year 2008–2009 at Stony Brook University

Teaching Experience

Teaching Assistant – *Fundamentals of Computer Networking*, Computer Science Department, Stony Brook University – *Fall, 2008*

Research Experience

- **Research Assistant**, Wireless Networking and Simulation Laboratory (WINGS), Stony Brook – *Spring 2007 to present*
- **Research Assistant**, Center of Excellence in Wireless and Information Technology (CEWIT), Stony Brook – *Summer 2007*

Research Focus

- Devising techniques for localization of wireless devices in real-world scenarios
- Devising better connectivity mechanism for Vehicular communication exploiting high quality links using directional antennas
- Devising predictive methods for providing WiFi access to moving Vehicles from road-side Access Points

Papers

- Pralhad Deshpande, Anand Kashyap, Chul Sung, Samir R. Das, "Predictive Methods for Improved Vehicular WiFi Access" 7th ACM International Conference on Mobile Systems, Applications, and Services (**MobiSys 2009**), Krakao, Poland, June 22-25, 2009.
- Anand Prabhu Subramanian, Vishnu Navda, Pralhad Deshpande, Samir R. Das, "A Measurement Study of Inter-Vehicular Communication Using Steerable Beam Directional Antenna", Vehicular Inter-NETworking (**VANET 2008**), San Francisco, USA, September 15, 2008.
- A.P. Subramanian, Pralhad Deshpande, J. Gao, S. R. Das, "Driveby Localization of Roadside WiFi Networks", (**IEEE INFOCOM 2008**), Phoenix, Arizona, USA, April 13-18, 2008

Research Projects

Vehicle- to-Infrastructure Communication - Predictive Methods for Improved Vehicular WiFi Access

With the proliferation of WiFi technology, many WiFi networks are accessible from vehicles on the road making vehicular WiFi access realistic. However, several challenges exist: long latency to establish connection to a WiFi access point (AP), lossy link performance, and frequent disconnections due to mobility. We argue that people drive on familiar routes frequently, and thus the mobility and connectivity related information along their drives can be predicted with good accuracy using historical information – such as GPS tracks with timestamps, RF fingerprints, and link and network-layer addresses of visible APs. We exploit such information to develop new handoff and data transfer strategies. The handoff strategy reduces the connection establishment latency and also uses pre-scripted handoffs triggered by change in vehicle location. The data transfer strategy speeds up download performance by using pre-fetching on the APs yet to be encountered. Experimental performance evaluation reveals that the predictability of mobility and connectivity is high enough to be useful in such protocols. In our experiments with a vehicular client accessing road-side APs, the handoff strategy improves download performance by roughly a factor of 2 relative to the state-of-the-art. The data transfer strategy further improves this performance by another factor of 2.5.

Vehicular-to-Vehicle Communication - A Measurement Study of Inter-Vehicular Communication Using Steerable Beam Directional Antenna

In this work, we investigate the use of steerable beam directional antennas in the context of communication between moving vehicles. We study the performance of a single Vehicle-to-Vehicle (V2V) link at a microscopic level and try to improve the quality and duration of connectivity by using directional communication.

Based on our measurement study, we see that there is a good potential of using directional communication and optimal beam steering can give a median SNR improvement of about 11dB and 14dB over omnidirectional communication in suburban and highway scenarios respectively. Due to the practical difficulty of achieving the best beam combination always along the road, we propose a simple beam steering technique - steer-to-LOS - where each communicating node steers its beam towards the line-of-sight (LOS) direction of the other node. The LOS beam combination performs extremely well matching the best beam combination about 71% and 86% of times in suburban and highway scenarios respectively.

Localization - Drive-by Localization of Roadside WiFi Networks

We use a steer-able beam directional antenna mounted on a moving vehicle to localize roadside WiFi access points (APs), located outdoors or inside buildings. Localizing APs is an important step towards understanding the topologies and network characteristics of large scale WiFi networks that are deployed in a chaotic fashion in urban areas. The idea is to estimate the angle of arrival of frames transmitted from the AP using signal strength information on different directional beams of the antenna. This information together with the GPS locations of the vehicle is used in a triangulation approach to localize the APs. We show how the triangulation method must be extended using a clustering approach to account for multi-path reflections in cluttered environments.

Technical Skills

Operating Systems:

Languages:

Network Simulators:

Other:

LINUX (User/Kernel Programming), WINDOWS

C, C++, VB.NET, Perl, Shell Scripting, HTML

ns-2

Ethereal, Kismet, tcpdump, iperf, experience in hacking Atheros MADWiFi Driver

Personal Information

Visa Status: F1

Citizenship: India