Prasun Sinha

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Full Professor, IEEE Fellow, ACM Distinguished Scientist

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Focus: My research focuses on **cyber-physical systems (V2X, Connected Vehicles and Autonomous Vehicles) wireless networked systems (IoT, RFID, WiFi, Cellular)**, and **data analytics (WiFi, cable networks)**. I focus on algorithmic aspects of design and love to build systems and prototypes as a proof-of-concept. My current projects are related to analytics of WiFi and cable network data, data intelligent transportation systems, smart city, renewable energy and physical layer based wireless channel access protocols.

Brief Summary: My research has been primarily funded through National Science Foundation (NSF), DARPA, Toyota, Honda and Huawei. I have led multiple $1M+ cross-university, cross-disciplinary projects. I have advised 1 BS, 10 MS, 15 PhD students (including current 5 PhD students) and 1 postdoc during my career. The students are placed in various positions in industry, industrial research labs as well as academia. I am an IEEE Fellow and an ACM Distinguished Member. I won the prestigious NSF CAREER award in 2006. I have served in the editorial board for 2 top journals. I have chaired/co-chaired six conferences, including MobiCom 2014, which is the topmost conference in wireless networking and mobile computing. I will be TPC co-chair for IEEE INFOCOM 2018, which is the flagship conference in networking. I have authored 100+ publications and 4 patents. One of my papers was awarded the Best Student Paper Award (WiOpt 2013) and two were selected as best paper finalists (ACM Mobicom 2014, IEEE SECON 2007).

Education

1. **PhD in Computer Science**, University of Illinois, Urbana-Champaign, May 2001 (GPA: 4.0/4.0)
2. **MS in Computer Science and Engg.**, Michigan State University, East Lansing, Aug 1997 (GPA: 4.0/4.0)
3. **B. Tech. in Computer Sc. and Engg.**, IIT, Delhi, India, May 1995

Professional Experience

1.	Full Professor (with tenure)	Dept of CSE, Ohio State University	Sep 2015 – present
2.	Associate Professor (with tenure)	Dept of CSE, Ohio State University	Oct 2009 – Aug 2015
3.	Visiting Associate Professor	Dept of CS, Stanford University	Oct 2010 – June 2011
4.	Assistant Professor	Dept of CSE, Ohio State University	Oct 2003 – Sep 2009
5.	Visiting Assistant Professor	Dept of CSE, Ohio State University	Sep 2003
6.	Postdoctoral Researcher	Dept of Computer Science, UC Riverside	Feb 2003 – Aug 2003
7.	Member of Technical Staff	Bell Labs, Lucent Technologies, Holmdel, NJ	Mar 2001 – Jan 2003
8.	Research Assistant	Dr. Bharghavan, UIUC	May 1998 – Dec 2000
9.	Summer Intern	HRL Labs, Malibu, CA	May 1999 – Aug 1999
10.	Co-op student (MS thesis)	Almaden Research Center, IBM, San Jose, CA	Jan 1997 – Aug 1997
11.	Co-op student (MS thesis)	Almaden Research Center, IBM, San Jose, CA	May 1996 – Aug 1996

Teaching Experience

1.	Asst./Assoc./Full Prof.	Ohio State University	Aug 2003 – present
2.	Teaching Assistant	University of Illinois, Urbana-Champaign	Jan 1998 – May 1998
3.	Teaching Assistant	Michigan State University, East Lansing	Aug 1995 – Dec 1996

Awards and Honors

1. IEEE Fellow, 2017
2. Distinguished Scientist, ACM, 2016

3. Best Paper Finalist (Top 7), ACM MOBICOM 2014
4. Best Student Paper, WiOpt 2013
5. IEEE Senior Member, April 2010
6. Lumley Research Award, College of Engineering, Ohio State University, May 2009
7. Best Paper Finalist (Top 4), IEEE SECON, Jun 2007
8. NSF CAREER Award, 2006
9. Nominated for ACM PhD Dissertation Award, Department of Computer Science, University of Illinois at Urbana-Champaign, 2002
10. Ray Ozzie Fellowship, Department of Computer Science, University of Illinois at Urbana-Champaign, April 2000 (Established for outstanding graduate students)
11. Mavis Memorial Scholarship, College of Engineering, University of Illinois at Urbana-Champaign, April 1999 (Awarded for excellence in research and teaching)
12. Project CEDAR (PhD Thesis) was selected among the top 4 out of approx. 60 projects nationwide, by DARPA in its Quorum Integration Project, 1999
13. Distinguished Academic Achievement Award, Michigan State University, 1997 (Awarded for excellence in research and teaching)
14. Secured All India Rank of 8th (1st in North India Zone) in GATE (Entrance Examination for Graduate Studies in the field of Computer Science in India), 1995
15. Vivekvir Puraskar (for academic excellence), State of Madhya Pradesh, India, 1992

Active Grants

1. **PI**, *NeTS: Small: Infrastructure-free Robust Relative Localization of Vehicles on the Road*, **NSF**, Total Funding: $515,998 (includes $16K for REU funds), Sinha's share: $515,998, 08/01/16-07/30/19

   The automotive industry is undergoing a giant transformation as vehicles are gearing up to take control of driving away from humans. This will lead to reduced chance of accidents, stress-free driving, increased passenger comfort, increased fuel-efficiency and reduced travel time. One of the most critical pieces of information for enabling this vision of autonomous vehicles is accurate determination of locations of nearby vehicles. The overarching goal of this project is to develop robust approaches that are practically implementable for fine-grained relative localization of nearby vehicles with no support from the infrastructure. In particular, on-board sensing capabilities and RF (radio-frequency) communication between vehicles will be leveraged. The key distinguishing features of the project are as follows: 1) a comprehensive approach to the problem of fine-grained vehicular localization while considering legacy vehicles which is the most critical hurdle in rolling out autonomous vehicles; 2) innovative physical layer techniques to achieve high accuracy relative localization; and, 3) techniques to use noisy data collected by various sensors and still robustly derive the locations of the vehicles. The project is potentially transformative as it addresses the key question of accurate relative localization of vehicles while considering practical challenges, which is crucial for the autonomous driving technology. The broader impacts include enhancing undergraduate and graduate curriculum. In addition, existing collaboration with the automotive industry will be effectively leveraged for obtaining guidance on the objectives and understanding the feasibility of our solutions throughout the project.

   The specific inter-related research thrusts are as follows. 1) Frequency-Pair based Analysis for Single Antenna Vehicles: The key innovation is an approach that can robustly tackle the distance estimation error and the vagaries of a real driving environment using analysis of frequency-pairs. 2) Exploiting Spatial Diversity in Multi-Antenna Vehicles: The key innovation of this thrust is that it uses the spatial diversity offered by multiple antennas to increase robustness. 3) Collaborative Vehicle-Map Construction in Presence

of Legacy Vehicles: The key innovation is to robustly fuse noisy information obtained through cameras mounted on the participating vehicles.

2. **co-PI**, *Smart City Challenge*, **DOT and Vulcan**, Total Funding: $50m, Led by City of Columbus, Sinha's share: TBD, 08/01/16-07/30/20

   Researchers and facilities at The Ohio State University will play a central role as the collaborative Smart City team comes together under an unprecedented $140 million program to transform Central Ohio into the nations premier transportation innovation region.

   Collaboration between Columbus and local partners, including Ohio State, helped the city beat out 78 competitors to be named the nations Smart City by the U.S. Department of Transportation.

3. **PI**, *CNS-1409336*, *NeTS: Medium: Energy Efficient Operation and Control of Green Base Stations with Renewable Energy: Theory to Practice*, **NSF**, Total Funding: $1,016,000 (includes $16,000 for REU funds), Sinha's share: $517,525, 08/01/14-07/30/18, PI: Prasun Sinha, Co-PI: Ness B. Shroff

   The annual global expenditure of electricity consumed is more than $10 billion dollars, with cellular base-stations contributing to 60-80% of the energy consumption. In order to reduce the energy requirements of cellular networks, a promising new approach is to connect base-stations with energy harvesting and storage devices. The key benefits of such base-stations are threefold: (i) Green base-stations are suited for deploying off-power-grid base-stations, or where reliable power does not exist; (ii) they will reduce the operational cost for cellular providers, which could translate to lower costs for end-customers; (iii) they will reduce the carbon emission footprint of cellular infrastructure. A major challenge pursued in this project is to design a cost-effective green base-station based system that can adequately exploit these new harvesting and storage devices. Hence, the overarching goal of this project is to develop the mathematical foundations for the design and operation of cellular base-stations equipped with energy harvesting devices, and to develop practical solutions that can be implemented in real cellular systems. This project combines techniques from networking, algorithmic design, controls, optimization, and game theory to address critical issues in this important emerging area. Hence, graduate students trained on this project will be exposed to a variety of different disciplines, which in turn will be beneficial to them as they enter the global workforce. Further, the project will offer undergraduate students opportunities to be involved in the more practical aspects of the project. The PIs will also work closely with the industry to help impact real systems.

   In order to achieve the aforementioned goal, research on the project will focus on the following three critical inter-related thrust areas: (i) Dynamic Energy Control: Developing control strategies for minimizing the energy costs of base-stations in cellular networks governed by a single operator. Some of the key difficulties that will be addressed here are: how to dynamically control the battery levels at each base-station taking into account energy harvesting and user-load profile dynamics; how to form associations between users and base-stations based on energy reserves; how to ensure both energy efficiency and user experiences are satisfied. (ii) Base-Station Availability Control: Developing energy management strategies that carefully balance the energy savings and the cost incurred in ON/OFF operations by jointly considering the traffic demand and renewable energy supply. (iii) Multi-operator Base-station Management: Cooperation and Competition: Designing mechanisms to allow energy cost reductions by resource-pooling between multiple operators taking into account the practical realities of the marketplace and incentives/penalties. The analytical models and algorithms developed during the course of this project will be validated via experiments on a testbed at OSU, and trace-driven emulations.

4. **PI**, *CNS-1302620*, *NeTS: Medium: Collaborative Research: Leveraging Physical Layer Advances for the Next Generation Distributed Wireless Channel Access Protocols*, **NSF**, Total Funding: $1,125,000, Sinha's share: $375,000, 05/01/13-04/30/17, PI: Prasun Sinha, Co-PI: Kannan Srinivasan and P. R. Kumar (TAMU)

   This project aims at addressing the fundamental problem of how to maximize the efficiency of access to the wireless medium. In recent years, new information-theoretic solutions have emerged, some of which can now be implemented due to technological advances. Also, long engrained notions, such as half duplex, are being challenged. It has been shown that through a combination of strategies at the physical layer and signal processing, full duplex systems are indeed feasible. These developments have radically altered the very notion of what a spatio-temporal resource is. These developments have necessitated a thorough redefinition and appraisal of the problem of efficient access as addressed in this project.

Over the years, developments have taken place in parallel and somewhat in isolation in the physical layer community and in the protocol community. By bringing together a broad-spectrum of expertise from both areas, this project envisages fundamental advances in wireless networking at the access layer. The core challenge is how to use the scarce resources of 'space' and 'time' as efficiently as possible. In addition, distributed operation, channel fading, time-varying channel conditions, and fast time-scales of transmission opportunities and decisions, exacerbate the problem. This project has the potential of making a transformative advancement in the science of medium access.

5. **Co-PI**, *Joint Neighbor Identification and Channel Estimation for Enabling Advanced MAC-PHY Techniques in Ad Hoc Networks*, **ONR**, Total Funding: $0.3m, Sinha's share: $150,000, 06/01/17-05/31/20, PI: K. Srinivasan, Co-PI: Prasun Sinha

   Wireless ad hoc networks predominantly use random access schemes for data transmissions. Random access techniques are notoriously sub-optimal. The optimal techniques implictly assume the availability of neighborhood information –information about *who* are a node's neighbors– and the wireless channel from all neighbors. Such information is not available a priori and is expensive to collect, even for static wireless networks. For dynamic networks, this cost can be prohibitively expensive, even more expensive than data, since this information changes frequently. For this reason, our ad hoc networks use random access techniques and remain inefficient. In this research, we look at this information collection problem. We present a compressive sensing technique that allows a node to estimate its neighborhood and the channel to its neighbors by using compressive sensing techniques. Every node uses a unique preamble, generated from its own address, and sends it simultaneously with other nodes. A receiver uses our proposed technique to detect the preambles present and simultaneously estimates the channel associated with the detected preamble. Compressive sensing works only if the number of simultaneous preambles present is much smaller than all possible preambles. This is the case with ad hoc networks, where only a handful of nodes come together while the total number of all the possible nodes is extremely large (2^{48}, where 48 is the number of bits used for a node's (MAC) address). However, compressive sensing is computationally expensive even though it is very efficient in detecting many preambles in just one slot. We develop many techniques to make compressive sensing practical and study the tradeoffs thereof. Thus, our work alleviates the overhead associated with collecting neighborhood and channel information. It has a lot of potential in making theoretically-optimal solutions practical. We believe that it's appriorate for dynamic and large-scale wireless networks, and is a step towards making such networks efficient. This research effort will allow our Ph.D. students gain domain-specific knowledge in wireless ad hoc networks. It will also allow the PIs to enrich their courses.

6. **PI**, Dynamic Bandwidth Allocation in Cable Networks, **Huawei Technologies**, Total Funding: $125,000, Sinha's share: $125,000, 10/01/16-09/30/17

Past Grants and Gifts

1. **PI**, *CNS-1161490*, *NeTS: Medium: Collaborative Research: Enabling Cellular Services over Unplanned Femto-Cell Deployments: From Theory to Implementation*, **NSF**, Total Funding: $1,200,000, OSU/Sinha's share: $380,000, 06/01/12-05/31/16, PI: Prasun Sinha, Co-PI: R. Srikant (UIUC) and Kang G. Shin (UMich)
   (REU Supplement - Sinha's share: $16,000, 07/01/13-06/30/16)

2. **PI**, *Experiments on Full-Duplex Communication across Vehicles*, **Toyota InfoTechnology Center**, Mountain View, CA $80,000, 12/01/2014 - 02/28/2016

3. **PI**, *Understanding the Performance of Full-Duplex Links in Mobile Environments: The Analysis*, **Toyota InfoTechnology Center**, Mountain View, CA Gift: $16,000, 03/01/2014 - 02/28/2015

4. **Co-PI**, *Bluetooth and WiFi Proximity and Positioning Study*, **Honda R&D Americas, Inc.**, Total Funding: $35,693, Sinha's share: $17,846, 10/01/2014 - 05/20/2015 PI: Rajiv Ramnath

5. **PI**, *Relative Localization of Vehicles on the Road*, **Toyota InfoTechnology Center**, Mountain View, CA Gift: $10,000, 04/01/2013 - 03/31/2014

6. **PI**, *CNS-1254525*, *EAGER: WideSpot: Enabling Predictable Wide-Area Coverage over Scattered Hotspots*, **NSF**, Total Funding: $100,000, 09/15/12-08/14/14,

7. **Co-PI**, *NeTS-NECO: A New Resource Management Paradigm for Sensor Networks with Energy Replenishment*, **NSF**, Total Funding: $500,000, Sinha's share: $160,000, 09/01/08-08/31/12, PI: Ness Shroff, Co-PI: Can Emre Koksal

8. **PI (at OSU)**, *NeTS-NOSS: Collaborative Research: Doing More with Less: Tracking Movements Using a Sparse Sensor Network*, **NSF**, Total Funding: $500,000, OSU/Sinha's share: $216,017, 10/01/07-09/30/10, PI: Santosh Kumar (UMemhis), Co-PI: Bela Bolobas (UMemhis)
(REU Supplement - Sinha's share: $12,000, 09/01/07-08/30/08)

9. **Co-PI**, *NeTS-NOSS: Collaborative Research: Energy-Efficient Distributed Sensor Network Control: Theory to Implementation*, **NSF**, Total Funding: $650,000, Sinha's share: $230,542, 10/01/07-09/30/10, PI: Ness Shroff, Co-PI: Xiaojun Lin (Purdue)
(REU Supplement - Sinha's share: $12,000, 09/01/07 - 08/30/08)

10. **PI**, *CAREER: On-the-fly Protocols for Data Dissemination in Wireless Mesh Networks*, **NSF**, Total Funding: $400,000, 01/01/06 - 12/31/10
(REU Supplement: $12,000, 05/25/06 - 05/24/08)

11. **PI**, *Katrina SGER: Mapping the Coverage Islands of Wireless Base-stations*, **NSF**, Total Funding: $31,274, Sinha's share: $22,000, 10/01/05 - 09/30/06

12. **Senior Personnel**, PI: Dhabaleswar K. Panda, Co-PIs: Joel Saltz, Han-Wei Shen, Stu Zweben, *High-End Computing and Networking Research Testbed for Next Generation Data Driven, Interactive Applications*, **NSF**, Total funding: $3,014,063, Sinha's share: $50,000, 07/01/04 - 06/30/09

13. **Senior Personnel**, *Project Echelon: A 10 Kilometer, 10,000 Node Sensor Network Experiment*, **DARPA-IXO**, Total funding: $899,000, Sinha's share: $32,000, 11/01/03 - 10/01/05

Pending and In preparation Proposals

1. **PI**, *NeTS: Small: Scalable RFID Scanning using Visual Cues* **NSF**, Total Funding: $0.5m, Sinha's share: $500,000, 06/01/17-05/31/20 (Pending)

   Humans have perfected the technology to communicate with other humans and to share, disseminate and access data transcending geographic boundaries. But humans still largely remain electronically disconnected from objects in the physical world surrounding us. Backscattering using harvested RF energy has been shown to be a promising approach towards meeting this objective. Applications are in diverse fields including human-computer interaction, managing inventory, tracking, and ultra low-power sensing. There is a need to rethink about how to design the next generation of RFID communication systems to achieve the vision of connecting the vast majority of objects around us. When multiple tags simultaneously transmit their signals, the response observed at the reader is a linear mixing of the bit-streams sent by the tags. The channels from the tags to the reader as well as the IDs of the tags are both unknowns. This formulation falls into the classic framework of the Blind Source Separation (BSS) problem. In particular we focus on two techniques - Independent Component Analysis (ICA) which has been shown to be effective when the data can be observed in multiple dimensions, and Compressive Sensing (CS) when the system is underconstrained. These signal processing techniques are computationally expensive and hence are quite difficult to use in most scenarios.

   In this project we focus on enhancing these signal processing tools by considering information obtained through other modalities. In particular we consider visual information obtained through cameras that may be attached to the reader or to the infrastructure. The overarching goal of this project is to make use of noisy, ambiguous and partial information obtained via video analysis to cut down the computational complexity of signal processing techniques for detecting transmissions from colliding RFID tags. The specific interrelated research avenues that we will pursue as part of the project are as follows: 1) High Dimensional Data Domain, and 2) Low Dimensional Measurement Domain. The key distinguishing features of our project

are as follows: 1) We present a comprehensive approach to the problem of RFID communication while considering electronic as well as visual data. 2) We propose innovative computational techniques to make the computation of signal processing techniques fast and practical. and, 3) We propose multiple techniques that use noisy visual data and improve the performance of reading the tags. The project is potentially transformative as it addresses the key question of fast and accurate RFID communication in practical settings.

2. **PI**, *NeTS: Large: Collaborative Research: Enabling Massive Secure Sensor Data Sharing in Vehicular Networks by Leveraging Structures* **NSF**, Total Funding: $3m, Sinha's share: $780,000, 06/01/17-05/31/22, PI: Prasun Sinha, Co-PIs: K. Srinivasan (OSU), Marco Gruteser (Rutgers) and P. R. Kumar (TAMU) (Pending)

   Each year road crashes result in 1.3 million deaths and a loss of $518 billion globally. Cooperative perception synthesis of the road ahead using emerging sensing modalities can be exploited by autonomous vehicles to lead to safer roadways in the future. But the exchange of data captured from rich sensors such as cameras, RADARs, and LIDARs between vehicles or between vehicles and the infrastructure is overwhelming for the current V2X communication and networking technologies. Further, such data can be easily manipulated to cause accidents, thus rendering any attempts to exploit the massive sensor data useless. A number of unique opportunities have been identified for vehicular networks including, 1) availability of plenty of energy for communication, 2) broadcast-centric traffic, 3) near-perfect GPS based synchronization, and 4) intermittent high-speed connection to the infrastructure. The behavior of the network can be closely tied to various structures that are exhibited in V2X communication due to logical formations, road-induced structures, 3D geometrical structures and embedded structures in the data.

   The overarching goal of this project is to leverage the interplay of logical, physical and embedded structures to design new ways for reliably and securely communicating massive amounts of data in V2X scenarios to enable the creation and maintenance of high quality perception of the road ahead and safety of motion. Towards this objective, we focus on four inter-related thrusts in this project: 1) Cascaded Compressive Sensing using Logical Structures, 2) Managing Interference in V2V Networks using Road-Induced Structures, 3) Efficient Line-of-Sight Communication with the Infrastructure using Physical World Structures, and 4) Isolating Malicious Sensors with Embedded Watermarked Structures in Sensor Data.

3. **Co-PI**, *S&AS: INT: Model-Driven Resource Management for Autonomous UAV in Agriculture*, **NSF**, Total Funding: $1.4m, Sinha's share: $450,000, 08/01/17-07/31/20, PI: Chris Stewart, Co-PI: Shearer (Pending)

   Autonomous unmanned aerial vehicles (AUAVs) can fly to precise GPS coordinates, capture detailed images and use cyber-physical resources without involving humans. In agriculture, AUAVs provide an economical approach to capture high-res images of farms and to deliver small, targeted payloads of chemicals (e.g., herbicide). However, many runtime factors, e.g., payload weight, battery capacity, and density of local crops, affect AUAVs workload, throughput and total cost. We contend that AUAVs should sense runtime factors and use them to manage cyber-physical resources and flight paths. The proposed research will create benchmarks and analytic models that can guide AUAV task executions across a wide range of agricultural runtime factors. Early results suggest that agricultural workloads differ from other autonomous workloads. Images in agriculture differ subtely. Image processing needs detailed feature extraction that exceeds the processing needs of other workloads. Also, tasks that affect the use of chemicals face ethical issues. The proposed research will be evaluated on a real testbed: AUAVs will execute agricultural tasks on research farmland owned by OSU (over 300 acres). Benchmarks and models produced will enable computer systems research on AUAV systems. At the same time, data collected by our AUAVs will be used by researchers in many fields, from agriculture to economics to computer architecture to databases.

4. **PI**, *SCC-IRG Track 1: Towards Inclusive Smart Communities for Individuals with Visual Disabilities* **NSF**, Total Funding: $5m, Sinha's share: $800,000, 09/01/17-08/31/22
   PI: Prasun Sinha, Co-PIs: Emre Ertin (OSU), Tiffany Wild (OSU), Kris Kitani (CMU), Anind Dey (CMU), Chris Atchison (UC), Stacy Kelly (NIU) (In Preparation)

   285 million people worldwide are estimated to have a visual disability, of which 39 million are blind and 246 have low vision. Many day-to-day tasks that the rest of the population considers routine, are in fact exces-

sively complex for these individuals to perform. Without any visual information about the surroundings, it is difficult to have a perception of space and to navigate safely, confidently or effectively either indoors or outdoors. As a result their quality of life is negatively impacted. *How can we empower individuals with visual disabilities to become truly independent navigators by use of smart technologies that can be integrated seamlessly into their lifestyle?*

The overarching goal of this project is to enable individuals of a community to be better equipped to navigate and interact with their immediate surroundings using technological breakthroughs in the design of lightweight, power efficient and inexpensive solutions. To this end, we focus on a key sector of the community - individuals with visual disabilities. While the solutions we develop will be targeted to individuals with visual disabilities, we emphasize here that the technology developed through this work will have a broader impact to people in the community.

Our study will focus on the following use cases: 1) Indoor obstacle avoidance and on-demand guided navigation; 2) Accurate outdoor positioning beyond GPS (Global Positioning System); 3) High accuracy navigation in instrumented spaces; and, 4) Navigation for field-based learning environments, adventure sports and recreational activities. The solution will strive to create and maintain an accurate map of the scene ahead based on information collected from a dynamically selected group of sensors and prior static 3D maps of the environment, when available.

5. **PI**, *AitF: Collaborative Research: Context-Aware Energy Management in Smartphones under Imprecise Information: Theory to Practice* **NSF**, Total Funding: $0.8m, Sinha's share: $260,000, 08/01/17-07/31/20, PI: Prasun Sinha, Co-PIs: Ness Shroff (OSU), Pankaj Agarwal (Duke) (In Preparation)

   Smartphones are increasingly making various timely and critical decisions in our day-to-day lives. Hence, it is critical that energy management schemes are designed to minimize battery outage and provide fast access to information when needed. The problem of scheduling the apps and components to optimize their cumulative energy cost is challenging because of the following reasons: non-trivial startup and operating costs of apps and components; complex interdependencies between them; and, imperfect knowledge of future behavior of apps. Information about context as obtained by processing data collected from various on-board sensors can be further used to make smarter decisions on when to transition the apps/components to which state.

   The focus of this proposal is to take a principled approach to develop the foundations for scheduling the various elements in smartphones based on practical energy and latency models, and to demonstrate its efficacy. Our models will be derived from measurements and analysis of intricate interactions of apps and components in real systems.

(Note: * indicates my student)

Journals

1. Zizhan Zheng*, Zhixue Lu*, Prasun Sinha, and Santosh Kumar, "Ensuring Predictable Contact Opportunity for Scalable Vehicular Internet Access On the Go". **IEEE/ACM Transactions on Networking (TON)**, 23 (3), pp 768-781, June 2015

2. Shengbo Chen*, Prasun Sinha, Ness Shroff and Changhee Joo "A Simple Asymptotically Optimal Joint Energy Allocation and Routing Scheme in Rechargeable Sensor Networks", **IEEE/ACM Transactions on Networking (TON)**, 22 (4), pp 1325-1336, Feb. 2014

3. Tarun Bansal*, Dong Li*, and Prasun Sinha "Opportunistic Channel Sharing for Improved Throughput in Cognitive Radio Networks", **IEEE Transactions on Mobile Computing (TMC)**, 13 (4), pp. 852-865, 2014

4. Shengbo Chen*, Prasun Sinha, and Ness Shroff, "Heterogeneous Delay Tolerant Task Scheduling and Energy Management in the Smart Grid with Renewable Energy", **IEEE JSAC Smart Grid Communications**, 31 (7), pp 1258-1267, 2013

5. Dong Li* and Prasun Sinha. "RBTP: Low Power Mobile Discovery Protocol through Recursive Binary Time Partitioning", **IEEE Transactions on Mobile Computing (TMC)**, 13 (2), Feb. 2014

6. Zhixue Lu*, Tarun Bansal*, and Prasun Sinha. "Achieving User-Level Fairness in Open-Access Femtocell based Architecture", **IEEE Transactions on Mobile Computing (TMC)**, 12 (10) pp. 1943-1954, 2013

7. Zizhan Zheng*, Prasun Sinha, and Santosh Kumar, "Sparse WiFi Deployment for Vehicular Internet Access With Bounded Interconnection Gap", **IEEE/ACM Transactions on Networking (TON)**, 20 (3), pp 956-969, Jun 2012

8. Ren-Shiou Liu*, Kai-Wei Fan*, Zizhan Zheng* and Prasun Sinha, "Perpetual and Fair Data Collection for Environmental Energy Harvesting Sensor Networks", **IEEE/ACM Transactions on Networking (TON)**, 19 (4), pp 947-960, August 2011

9. Santosh Kumar, Ten H. Lai, Marc E. Posner, and Prasun Sinha, "Maximizing the Lifetime of a Barrier of Wireless Sensors", **IEEE Transactions on Mobile Computing (TMC)**, 9 (8), pp 1161 - 1172, August 2010

10. Joohwan Kim, Xiaojun Lin, Ness Shroff, and Prasun Sinha "Minimizing Delay and Maximizing Lifetime for Wireless Sensor Networks with Anycast", **IEEE/ACM Transactions on Networking (TON)**, 18 (2), pp 515-528, April 2010

11. Thang Le, Prasun Sinha, and Dong Xuan "Turning Heterogeneity into an Advantage in Wireless Ad-hoc Network Routing", **Elsevier Ad Hoc Networks (ADHOC)**, Volume 8, Number 1, pp 108-118, January 2010

12. Sha Liu*, Kai-Wei Fan* and Prasun Sinha, "CMAC: Energy Efficient MAC Layer Design for Sensor Networks with Anycasting," **ACM Transactions on Sensor Networks (TOSN)**, Volume 5, Number 4, November 2009

13. Ren-Shiou Liu*, Kai-Wei Fan*, and Prasun Sinha, "Locally Scheduled Packet Bursting for Data Collection in Wireless Sensor Networks", **Elsevier Ad Hoc Networks (ADHOC)**, Volume 7, Number 5, pp 904-917, July 2009

14. Hongwei Zhang, Anish Arora, and Prasun Sinha, "Link Estimation and Routing in Sensor Network Backbones: Beacon-based or Data-driven?", **IEEE Transactions on Mobile Computing (TMC)**, Volume 8, Number 5, pp 653-667, May 2009

15. Ai Chen*, Dongwook Lee and Prasun Sinha, "Efficient Multicasting over Large-Scale WLANs through Controlled Association," **Elsevier Computer Networks (COMNET)**, Volume 53, Number 1, pp 45-59, January 2009

16. Kai-Wei Fan*, Sha Liu*, and Prasun Sinha, "Dynamic Forwarding over Tree-on-DAG for Scalable Data Aggregation in Sensor Networks", **IEEE Transactions on Mobile Computing (TMC)**, Volume 7, Number 10, pp 1271-1284, October 2008

17. Ai Chen*, Gayathri Chandrasekaran*, Dongwook Lee, and Prasun Sinha, "High Throughput MAC Layer Multicasting over Time-Varying Channels", **Elsevier Computer Communications (COMCOM)**, Volume 32, Number 1, pp 94-104, January 2009

18. Zizhan Zheng*, and Prasun Sinha, "Buffer Coding for Reliable Transmissions over Wireless Networks", **Elsevier Computer Communications (COMCOM)**, Volume 32, Number 1, pp 111-123, January 2009

19. Sha Liu*, Rahul Srivastava, Can Emre Koksal, and Prasun Sinha, "Pushback: A Hidden Markov Model Based Scheme for Energy Efficient Data Transmission in Sensor Networks", **Elsevier Ad Hoc Networks (ADHOC)**, Volume 7, Number 5, pp 973-986, July 2009

20. Dongwook Lee, Gayathri Chandrasekaran*, Mukundan Sridharan and Prasun Sinha "Association Management for Data Dissemination over Wireless Mesh Networks", **Elsevier Computer Networks (COMNET)**, Volume 51, Number 15, pp 4338-4355, October 2007

21. Haiyun Luo, Xiaqiao Meng, Ram Ramjee, Prasun Sinha, and Li (Erran) Li, "The Design and Evaluation of Unified Cellular and Ad-Hoc Networks", **IEEE Transactions on Mobile Computing (TMC)**, Volume 6, Number 9, pp 1060-1074, September 2007

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Conference Publications

28. Gopi Krishna Tummala*, Dong Li* and Prasun Sinha "Live View of On-Road Vehicular Information," in **Proc. of SECON**, San Diego, Jun 2017 (Acceptance rate: 26.5% = 45/170)

29. Rupam Kundu*, Gopi Krishna Tummala* and Prasun Sinha "Navigation assistance for Individuals with Visual Impairments in Indoor Environment (Invited Paper)", in **Proc. of COMSNETS**, Bangalore, India, Jan 2017

30. Jiashang Liu*, Yang Yang, Prasun Sinha and Ness Shroff "Load-Adaptive Base-Station Management for Energy Reduction including Operation-Cost and Turn-on-Cost", in **Proc. of IEEE WCNC**, San Francisco, CA, Mar 2017

31. Wenjie Zhou*, Tanmoy Das*, Lu Chen, Kannan Srinivasan and Prasun Sinha, "BASIC: Backbone-Assisted Successive Interference Cancellation", in **Proc. of ACM MOBICOM**, New York, Oct 2016 (Acceptance rate: 14.2% = 32/226)

32. Yang Yang, Jiashang Liu*, Prasun Sinha and Ness B. Shroff, "Dynamic User Association and Energy Control in Cellular Networks with Renewable Resources", in **Proc. of IEEE CDC**, Osaka, Japan, Dec 2015

33. Yousi Zheng*, Bo Ji, Ness B. Shroff and Prasun Sinha, "Forget the Deadline: Scheduling Interactive Applications in Data Centers", in **Proc. of IEEE Cloud**, New York, Jun 2015 (Acceptance rate: 17%)

34. Yousi Zheng*, Ness B. Shroff, R. Srikant and Prasun Sinha, "Exploiting Large System Dynamics for Designing Simple Data Center Schedulers", in **Proc. of IEEE INFOCOM**, Hong Kong, Apr 2015 (Acceptance rate: 19.3% = 316/1640)

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42. Wenjie Zhou*, Kannan Srinivasan, and Prasun Sinha. "RCTC: Rapid Concurrent Transmission Coordination in Full Duplex Wireless Networks", in **Proc. of IEEE ICNP**, Germany, Oct 2013 (Acceptance rate: 18.3% = 46/251)

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48. Shengbo Chen*, Prasun Sinha, and Ness Shroff, "Scheduling Heterogeneous Delay Tolerant Tasks in Smart Grid with Renewable Energy", in **Proc. of IEEE CDC (Conference on Decision and Control)**, Maui, Hawaii, Dec 2012 (Acceptance rate (approx): 50%, papers submitted = 2363)

49. Dong Li* (co-primary), Tarun Bansal* (co-primary), Zhixue Lu* (co-primary), and Prasun Sinha, "MARVEL: Multiple Antenna based Relative Vehicle Localizer", in **Proc. of ACM MOBICOM**, Istanbul, Turkey, Aug 2012 (Acceptance rate: 15.1% = 32/212)

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71. Anish Arora, Rajiv Ramnath, Emre Ertin, Prasun Sinha et. al. "ExScal: Elements of an Extreme Scale Wireless Sensor Network," Invited Paper, In **Proc. of RTCSA (11th IEEE International Conference on Embedded and Real-Time Computing Systems and Applications)**, Hong Kong, pp 102-108, Aug. 2005

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81. Prasun Sinha, Raghupathy Sivakumar and Vaduvur Bharghavan, "CEDAR: a Core-Extraction Distributed Ad-hoc Routing algorithm", in **Proc. of IEEE INFOCOM**, New York, NY, pp 202-209, Apr. 1999. (Acceptance rate: 184/600 = 30.7%)

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Mini-Conference Publications

84. Zizhan Zheng*, Prasun Sinha, and Santosh Kumar, "Alpha Coverage: Bounding the Interconnection Gap for Vehicular Internet Access", **Proc. of IEEE INFOCOM Mini-Conference**, Rio de Janeiro, Brazil, Apr. 2009 (Acceptance rate: 26.7% = 383/1453)

85. Yigal Bejerano, Dongwook Lee, Prasun Sinha, and Lisa Zhang, "Approximation Algorithms for Scheduling Real-Time Multicast Flows in Wireless LANs", **Proc. of IEEE INFOCOM Mini-Conference**, Phoenix, Arizona, pp 151-155, Apr. 2008 (Acceptance rate: 27.9% = 321/1152)

Symposium Publications

86. Shengbo Chen*, Tarun Bansal*, Yin Sun, Prasun Sinha and Ness Shroff, "Life-Add: Lifetime Adjustable Design for WiFi Networks with Heterogeneous Energy Supplies", In **Proc. of the 11th Intl. Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt)**, Tsukuba Science City, Japan, 8 pages, 2013, **Best Student Paper Award**, (Acceptance rate: 44.3% = 58/131)

87. Vinayak Naik, Anish Arora, Prasun Sinha and Hongwei Zhang, "Sprinkler: A Reliable and Scalable Data Dissemination Service for Wireless Embedded Devices", In **Proc. of the 26th IEEE Real-Time Systems Symposium (RTSS)**, Miami, Florida, 10 pages, 2005 (Acceptance rate: 21% = 37/176)

88. Kiran Kumar, Prasun Sinha and P. C. P. Bhatt, "Distributed and Object Oriented Geographical Information System (DO_GIS)", **7th International Symposium on Spatial Data Handling (SDH)**, Netherlands, pp 263-275, Aug 1996.

Workshop Publications

89. RoadMap: Mapping Vehicles to IP Addresses using Motion Signatures Gopi Krishna Tummala*, Dong Li*, and Prasun Sinha in **Proc. of ACM CarSys (MobiCom Workshop)**, New York, Oct 2016 (Acceptance Rate 40% = 8/20)

90. Vision-Track: Vision based indoor tracking in anchor-free regions Gopi Krishna Tummala*, Rupam Kundu*, Prasun Sinha, and Rajiv Ramnath in **Proc. of ACM HotWireless (MobiCom Workshop)**, New York, Oct 2016 (Acceptance Rate 75% = 9/12)

91. Tarun Bansal*, Wenjie Zhou*, Kannan Srinivasan, and Prasun Sinha, RobinHood: Sharing the Happiness in a Wireless Jungle, in **Proc. of HotMobile**, Jekyll Island, Feb. 2014 (Acceptance rate: 30.6% = 22/72)

92. Sha Liu*, Rahul Srivastava, Can Emre Koksal, and Prasun Sinha, Achieving Energy Efficiency with Transmission Pushbacks in Sensor Networks in **Proc. of IEEE IWQoS**, The Netherlands, Jun. 2008 (Acceptance rate: 35.6% = 26/73)

93. Dongwook Lee, Gayathri Chandrasekaran*, and Prasun Sinha, "Optimizing Broadcast Load in Mesh Networks using Dual Association", Invited Paper, In **Proc. of WiMESH (First IEEE Workshop on Wireless Mesh Networks)**, Santa Clara, 10 pages, Sep. 2005

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95. Li Li and Prasun Sinha, "Throughput and Energy Efficiency in Topology-Controlled Multi-hop Wireless Sensor Networks", In Proc. of **Second ACM International Workshop on Wireless Sensor Networks and Applications (WSNA)**, (Held in conjunction with ACM MOBICOM), pp 132-140, Sep. 2003.

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97. Jeff Monks, Prasun Sinha and Vaduvur Bharghavan, "Limitations of TCP-ELFN for Ad-hoc Networks", **IEEE MOMUC (Mobile Multimedia Communications)**, Tokyo, 6 pages, Oct. 2000.

98. Thyagarajan Nandagopal, Tan-Eun Kim, Prasun Sinha and Vaduvur Bharghavan, "Service Differentiation Through End-to-end Rate Control in Low Bandwidth Wireless Packet Networks", **IEEE MOMUC (Mobile Multimedia Communications)**, San Diego, pp 211-220, Nov. 1999.

Demonstrations with Abstract

99. Dong Li* (co-primary), Tarun Bansal* (co-primary), Zhixue Lu* (co-primary), and Prasun Sinha, "Demo Abstract: MARVEL: Multiple Antenna based Relative Vehicle Localizer", **Proc. of ACM MOBICOM**, 3 pp, Istanbul, Turkey, Aug 2012,

100. Somnath Mitra, Zizhan Zheng, Santanu Guha, Animikh Ghosh, Prabal Dutta, Bhagavathy Krishna, Kurt Plarre, Santosh Kumar, and Prasun Sinha, "Demo Abstract: An Affordable, Long-Lasting, and Autonomous Theft Detection and Tracking System", in **Proc. of ACM SENSYS**, 2 pp, Nov. 2009

Poster Publications

101. Soft-Swipe: Enabling High-Accuracy Pairing of Vehicles to Lanes using COTS Technology Gopi Krishna Tummala*, Derrick Cobb, Prasun Sinha and Rajiv Ramnath in **Proc. of ACM CarSys (MobiCom Workshop) Poster**, New York, Oct 2016 (Acceptance Rate 58.3% = 7/12)

102. Anish Arora, Rajiv Ramnath, Prasun Sinha, et. al. "Project Exscal" **DCOSS (International Conference on Distributed Computing in Sensor Systems**, Invited Poster, 2005.

103. Anish Arora, Prasun Sinha, Emre Ertin, Vinayak Naik, Hongwei Zhang, Mukundan Sridharan and Sandip Bapat, "ExScal Backbone Network Architecture", **MOBISYS (The Third International Conference on Mobile Systems Applications and Services) Poster**, Seattle, June 2005.

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Internet Draft

105. Raghupathy Sivakumar, Prasun Sinha and Vaduvur Bharghavan, "CEDAR: a Core-Extraction Distributed Ad-hoc Routing algorithm", **IETF MANET working group**, draft-ietf-manet-cedar-spec-00.txt, October 1998.

Bookchapters

106. Hongwei Zhang, Anish Arora, Prasun Sinha and Loren J. Rittle, "Messaging in Sensor Networks: Bridging Wireless Communications and Applications", *Chapter in* Handbook of Real-Time and Embedded Systems, Edited by Insup Lee, Joe Leung, and Sang Son, ISBN: 1-58488-678-1, Chapman and Hall/CRC, Jul. 2007

107. Sha Liu, Kai-Wei Fan, and Prasun Sinha, "Protocols for Data Aggregation in Sensor Networks", **Chapter** in book titled **Wireless Sensor Networks and Applications**, Edited by Yingshu Li, My Thai, and Weili Wu, Springer Verlag's book series *Network Theory and Applications*, ISBN: 0-387-49591-6 and 978-0-387-49591-0, Mar. 2007

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110. Prasun Sinha, "QoS Issues in Ad-hoc Networks", *Chapter* in book titled **Ad-hoc Networks: Technologies and Protocols**, Edited by P. Mohapatra and S. Krishnamurthy, ISBN: 0-387-22689-3, Springer, 2004

111. Satish K. Tripathi and Prasun Sinha, "Challenges in the Evolution from Single-hop to Multi-hop Wireless Networks", *Chapter* in book titled **Performance Evaluation - Stories and Perspectives Symposium**, Editor – G. Kotsis, Austrian Computer Society, Volume 175, pp 333-352, Series OCG Schriftenreihe, ISBN 3-85403-175-0, Vienna, Austria, December 5-6, 2003.

Patents

1. Gopi Krishna Tummala*, Derrick Ian Cobb, Prasun Sinha, and Rajiv Ramnath. Methods and apparatus for enabling mobile communication device based secure interaction from vehicles through motion signatures, Filed: March 3 2016. US Patent App. 15/060,494.

2. Shengbo Chen*, Tarun Bansal*, Yin Sun, Prasun Sinha and Ness Shroff, "Energy Efficient Control for Wireless Devices", Filed: May 2013

3. Santosh Kumar, Prasun Sinha, Kurt Plarre, Somnath Mitra, Zizhan Zheng, Santanu Guha, Animikh Ghosh, Prabal Dutta and Bhagavathy Krishna, "Theft Detection Systems and Methods", Filed: Sep 2010, Application No.: 2013-289 (OSU-022280 US PRO)

4. Srikanth Krishnamurthy and Prasun Sinha,"Scalable Unidirectional Routing for Mobile Ad-hoc Networks", European Patent 01904908.9-2413-US0101624 (Sep 2002), US6990075 (Jan 24, 2006)

5. Prasun Sinha, Yuval Shavitt, Ramachandran Ramjee, Danny Raz and Sneha Kasera,"Fair Sharing of Multi-Access Channels", Bell Labs, Lucent Technologies, Holmdel, NJ, US7317686 (Jan 8, 2008)

Invited Talks

1. "Exploiting Wired Backbones for Faster Wireless Networks," CEWIT 2014 (at Stony Brook), New York, Oct 2014

2. "Exploiting Wired Backbones for Faster Wireless Networks," TAMU, College Station, Texas, Oct 2014

3. "Exploiting Wired Backbones for Faster Wireless Networks," UT Dallas, Dallas, Texas, Oct. 2014

4. "Navigating the Taxi Driver to Find the Passenger", UKC (US Korea Collaboration) organized by KSEA (Korean-American Scientists and Engineers Association), East Rutherford, New Jersey, Aug 2013

5. "MARVEL: Multiple Antenna based Relative Vehicle Localizer", MIT, Boston, Massachusetts, Oct 2013

6. "MARVEL: Multiple Antenna based Relative Vehicle Localizer", GE Research, San Ramon, CA, July 2013

7. "Symphony: Cooperative Packet Recovery over the Wired Backbone in Enterprise WLANs", Stanford University, June 2013

8. "Targeted V2V Communication", Toyota InfoTechnology Center, Mountain View, CA, Feb. 2013

9. "Relative Localization of Vehicles", Toyota InfoTechnology Center, Mountain View, CA, Dec. 2012

10. "Performance Analysis of Work-Conserving Schedulers in Minimizing the Total Flow Time with Phase Precedence", Allerton Conference, Urbana-Champaign, Oct. 2012
11. "Relative Localization of Vehicles", GM Reseach, Warren, MI, Oct. 2012
12. "Enabling Fair Sharing of Resources in Femtocell based Architectures", DoCoMo Research Labs, Mountain View, CA, Mar. 2011
13. "Fast Smartphone Discovery in your Neighborhood", Deutsche Telekom, Mountain View, Mar. 2011
14. "Enabling Fair Sharing of Resources in Femtocell based Architectures", Stanford University, Feb. 2011
15. "Fast Smartphone Discovery in your Neighborhood", Nokia Research labs, Palo Alto, Jan. 2011
16. "Enabling Fair Sharing of Resources in Femtocell based Architectures", Huawei Technologies, Santa Clara, Jan. 2011
17. "Enabling Fair Sharing of Resources in Femtocell based Architectures", Sprint Labs, Burlingame, CA, Nov. 2010
18. "Perpetual Sensor Networks", Robert Bosch Labs, Palo Alto, CA, Nov. 2010
19. "Perpetual Operation in Renewable Energy based Sensor Networks", University of Illinois, Urbana-Champaign, Spring 2010
20. "Rethinking Network Protocol Design for Large Scale Sensor Networks", Cornell, Spring 2008
21. "Rethinking Network Protocol Design for Large Scale Sensor Networks", UIUC, Spring 2008
22. "Rethinking Network Protocol Design for Large Scale Sensor Networks", UCLA, Spring 2008
23. "Rethinking Network Protocol Design for Large Scale Sensor Networks", USC, Spring 2008
24. "Rethinking Network Protocol Design for Large Scale Sensor Networks", University of Michigan, Spring 2008
25. "Data Aggregation in Sensor Networks", BBN Technologies, Summer 2007
26. "Energy-Efficient Protocol Design for Sensor Networks", Bosch Research, Summer 2007
27. Tutorial on Wireless Networking, The Advanced Science and Technology Adjudication Resource (ASTAR) Program, Supreme Court of Ohio, Columbus, May 2006
28. Research Presentation and Demonstration on "Wireless Sensor Networks" to High School Students, Summer Institute (SI) Program, Ohio Supercomputer Center, Summer 2004

External Professional Activities

1. Technical Program Committee (TPC) Co-Chair: IEEE INFOCOM 2018, IEEE SECON 2016, ACM MOBICOM 2014, IEEE ICDCN 2013, IEEE IWQoS 2011, ICST QShine 2009
2. Technical Program Committee (TPC) Chair: ICST BROADNETS 2010
3. Invited Panelist, Future Directions in Smart Networking and Communication, Atlanta, May 2017
4. Guest Co-Editor, Special Section on ICDCN, Elsevier Pervasie and Mobile Computing (PMC), 2013
5. Guest Co-Editor, Special Section on IWQoS, IEEE Transactions on Network and Service Management (TNSM), 2012
6. Steering Committee Member: IEEE IWQoS, April 2011 – present

7. Area Chair, IEEE INFOCOM 2017
8. Invited Session Organizer: WICON 2008
9. Student Poster Judge: ACM MobiCom 2016
10. Session Chair: IEEE INFOCOM 2017, ACM MobiCom 2016, IEEE INFOCOM 2008, IEEE ICCCN 2005, ACM MobiDE 2003
11. Publicity Chair: Mobiquitous 2006
12. Registration Chair: MobiHoc 2005
13. Publicity Co-Chair: ICDCS 2005
14. Panels Chair: QShine 2004
15. Co-Organizer: Special Session on Actor based Sensor Networks, SANPA 2004
16. Submissions Chair: ACM SenSys 2004
17. TPC member: ACM MOBICOM 2004-2005,2008,2010,2016; IEEE ICNP 2010; ACM MOBIHOC 2006-2009; IEEE INFOCOM 2004-2016; ACM Carsys 2016, WICON 2008, IEEE ICPP 2008, Createnet, IEEE PERCOM 2005; ACM MobiDE 2003; ACM WMASH 2003; IEEE ICC 2003; IEEE PERCOM 2007; ICPADS 2007;
18. NSF Panelist, 2005, 2006, 2009, 2010, 2012, 2013
19. Proposal reviewer for Louisiana Board of Regents, 2006
20. Proposal reviewer for SBIR (Argonne National Labs), 2006
21. Proposal reviewer for Indiana 21st Century Research and Technology Fund (2006)
22. Proposal reviewer for Kentucky Commercialization Fund (2008,2014,2015,2016)

Editorship

1. Editorial Board, IEEE Transactions on Mobile Computing (TMC), July 2008 - June 2013
2. Editorial Board, IEEE Transactions on Wireless Communications (TWC), Feb 2010 - Feb 2011

Internal Professional Services

1. Tutorial on Wireless Networking, ASTAR (The Advanced Science and Technology Adjudication Resource) Program for the Supreme Court of Ohio, On request from Dean Washington, May 19th, 2006
2. Offered a collaborative course on *Advanced Mobile Computing* with University of Cincinnati, Autumn 2007.
3. Final Exam (Dissertation Chair): Wenjie Zhou (2015), Yousi Zheng (2015), Dong Li (2014), Tarun Bansal (2014), Zhixue Lu (2014), Shengbo Chen (2013, co-advised with Ness Shroff), Ren-Shiou Liu (2010), Zizhan Zheng (2010), Sha Liu (2008), Kai-Wei Fan (2008)
4. Final Exam (Dissertation Committee Member): Shansi Ren (2009), Vinod Kulathumani (2008), Hui Cao (2008), Vinayak Naik (2006), Hongwei Zhang (2006)
5. Graduate Faculty Representative, Thesis Committee: Yi Guo (Interdisciplinary Program on Nuitrition, 2014), Yan Chen (Mechanical and Aerospace Engineering, 2013), E. Paska (Geodetic Sc, 2009), Mehmet Emre Yavuz (ECE, 2007)
6. MS Thesis Committee Member: Juan Santa Cruz (2014)

7. BS Honors Thesis Committee Member: Chad Sowald (2009)
8. Candidacy Exam, Committee Member: Nusrat Islam (2016), Bo Chen (2014), Yating Hsu (2010), Fang Yu (2010), Feng Chen (2009), Na Li (2008), Shansi Ren (2008), Mukundan Sridharan (2008) Gopalakrishnan Santhanaraman (2008), Vinod Kulathumani (2007), Tan Apaydin (2007), Hui Cao (2007), Lei Guo (2007), Wenjun Gu (2007), Sha Liu (2007), Kai-Wei Fan (2007), Thang Nam Le (2006), Vinayak Naik (2005), Hongwei Zhang (2005)
9. Candidacy Exam, Department Representative: Feng Chen (2009), Weikuan Yu (2005), Jiesheng Wu (2004)
10. Member, Graduate Admissions Committee, CSE, Ohio State University, 2012, 2011, 2009, 2007, 2003-2006 item Member, Faculty Search Committee, CSE, Ohio State University, 2014, 2013, 2008
11. Member, Computer Committee, CSE, Ohio State University, 2004-2007
12. Member, Department Co-secretary, CSE, Ohio State University, 2003-2004

Supervision

- Current PhD Students
  1. Ananya Mahanti, Joined: Au '16
  2. Jiashang Liu, Joined: Au '14
  3. Tanmoy Das, Joined: Au '14
  4. Rupam Kundu, Joined: Au '14
  5. Gopi Krishna Tummala, Joined: Au '13
- Alumni (Postdoc)
  1. Dongwook Lee, Postdoc: Sep '04 - Jan '07, Senior Engineer, Samsung, Suwon, Korea
     Research Topic: "Network Support for Multimedia Streaming over Wireless Access Networks"
- Alumni (PhD)
  1. Wenjie Zhou (co-advised with Kannan Srinivasan), Graduated: Au '15, Google, Mountain View, CA
     Thesis Title: "Cross MAC-PHY layer Channel Access Mechanism for Enterprise Wireless LANs"
  2. Yousi Zheng (co-advised with Ness B. Shroff), Graduated: Sp '15, Oracle, Redwood City, CA
     Thesis Title: "Scheduling and Design in Cloud Computing Systems"
  3. Tarun Bansal, Graduated: Sp '14, Google, Seattle
     Thesis Title: "Network-Centric Mechanisms for Better Network-Experience on Mobile Devices"
  4. Dong Li, Graduated: Sp '14, LinkedIn, CA
     Thesis Title: "Enabling Smart Driving through Sensing and Communication in Vehicular Networks"
  5. Zhixue Lu, Graduated: Sp '14, Two Sigma Investments, New York
     Thesis Title: "Deployment, Management, and Access Acquisition of Smallcell based Networks"
  6. Shengbo Chen (co-advised with Ness B. Shroff), Graduated: Su '13, Qualcomm Research, San Diego
     Thesis Title: "Resource Allocation and Control in Communication and Cyberphysical Networks with Renewable Energy"
  7. Zizhan Zheng, Graduated: Sp '10, Asst. Prof., Tulane University
     Thesis Title: "Deployment of Large-Scale Wireless Networks for Mobile Targets"
  8. Ren-Shiou Liu, Graduated: Sp '10, Currently: Assistant Professor, Dept. of Industrial and Information Management, National Cheng Kung University
     Thesis Title: "Towards Perpetual Operation in Renewable Energy based Sensor Networks"
  9. Kai-Wei Fan, Graduated: Sp '08, VMWare, CA
     Thesis Title: "On Structure-Less and Everlasting Data Collection in Wireless Sensor Networks"

10. Sha Liu, Graduated: Sp '08, Walmart Labs, San Francisco
    Thesis Title: "Energy Efficient MAC Layer Design for Wireless Sensor Networks"

- Alumni (MS)

1. Wenjie Zhou, MS, Sp '14 (Automatic MS after PhD candidacy exam)
2. Yousi Zheng, MS, Sp '13 (Automatic MS after PhD candidacy exam)
3. Tarun Bansal, MS, Sp '13 (Automatic MS after PhD candidacy exam)
4. Dong Li, MS, Sp '13 (Automatic MS after PhD candidacy exam)
5. Zhixue Lu, MS, Sp '13, (Automatic MS after PhD candidacy exam)
6. Shengbo Chen, MS, Sp '12 (Automatic MS after PhD candidacy exam)
7. Daeyoung Choi, Sp '10
8. Zizhan Zheng, MS, Sp '09 (Automatic MS after PhD candidacy exam)
9. Ren-Shiou Liu, MS, Sp '09 (Automatic MS after PhD candidacy exam)
10. Sha Liu, MS, Sp '08 (Automatic MS after PhD candidacy exam)
11. Kai-Wei Fan, MS, Au '07 (Automatic MS after PhD candidacy exam)