PRADIPTA GHOSH

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EDUCATION

PhD in Electrical Engineering **2012 - Present**
(Concentration: Computer Engineering)
Viterbi School of Engineering, University of Southern California, USA
Expected Graduation Year: 2018
GPA: 3.97/4.0

MS in Electrical Engineering **2012 - 2016**
Viterbi School of Engineering, University of Southern California, USA
GPA: 3.97/4.0

Bachelor of Engineering, **2008 - 2012**
Electronics and Tele-Communication Engineering
Jadavpur University, India
GPA: 9.25/ 10

ACADEMIC AREAS OF INTEREST

Internet of Things, Wireless Robotic Networks, Cloud Computing, Software Defined Network, Wireless Sensor Networks, Ad-Hoc Networks, Wireless Communication, Coordinated Robotics, Antenna Design, Artificial Intelligence, Evolutionary Computation

TECHNICAL SKILLS

Languages: C, C++, Python
Languages (Beginner Level): Java, HTTP, Android, PHP, MySQL
Version Control Systems: GIT, SVN
Operating Systems: Windows 2000/ME/XP/Vista/7, Linux/Unix, MAC OS
Application Software & Hardware: MATLAB, Contiki OS, Cooja Network Simulator, RIOT OS, MBED OS, ROS, OPNET, Wireshark, Circuit Maker Professional Edition; Tmote sky, 8085 Microprocessor

ACADEMIC/ PROFESSIONAL EXPERIENCES

Teaching Assistant **Aug 2014 - Present**

- *Ming Hsieh Department of Electrical Engineering*
  University of Southern California, Los Angeles, CA-90089
  - ◇ Introduction to Embedded Systems – Spring 2017, Fall 2017
  - ◇ Wireless and Mobile Networks Design and Laboratory – Spring 2016
  - ◇ Computer Networks – Fall 2014, Spring 2015, Fall 2015

Research Assistant **Aug 2012 - Present**

- *Autonomous Networks Research Group*
  University of Southern California, Los Angeles, CA-90089
- *Advisor(s):* Prof. Bhaskar Krishnamachari

Ming Hsieh Institute Scholar **Aug 2016 - Aug 2017**

- *Ming Hsieh Department of Electrical Engineering*
  University of Southern California, Los Angeles, CA-90089

Summer Internship at Cisco Systems **Jun 2015 - Aug 2015**

- *Cisco Systems*, San Jose, CA-95134

- *Advisor(s):* Nilesh Shah, Shyam Kapadia

USC Doctoral Student Summer Institute **May 2014 - August 2014**
- *Grant Proposal Writing and Publication Workshop*
- *Organizer(s):* USC Graduate School

Research Internship at General Motors **May 2013 - July 2013**
- Electrical & Controls Integration Lab
  General Motors Research & Development, Warren, MI 48090
- *Advisor(s):* Dr. Fan Bai and Massimo Osella

Undergraduate Student Researcher **Aug 2010 - Aug 2012**
- *Advanced Digital and Embedded Systems Laboratory*
  Jadavpur University, Kolkata, West Bengal 700032, India
- *Advisor(s):* Prof. Mrinal Kanti Naskar

Undergraduate Student Researcher **Sep 2009 - Aug 2012**
- *Digital Control and Image Processing Laboratory*
  Jadavpur University, Kolkata, West Bengal 700032, India
- *Advisor(s):* Prof. Swagatam Das

Research Internship at IISc **May 2011 - July 2011**
- *Department of Aerospace Engineering*
  Indian Institute of Science, Bengaluru, Karnataka 560012, India
- *Advisor(s):* Prof. Debasish Ghose

Summer Internship at IIT Kharagpur **May 2010 - June 2010**
- Department of Electronics and Electrical Communication Engineering, and Department of Agricultural & Food Engineering,
  IIT Kharagpur, Kharagpur, West Bengal 721302, India
- *Advisor(s):* Prof. Raja Datta and Prof. Bijoy Chandra Ghosh

ACADEMIC/ PROFESSIONAL SERVICES

Mentor for Directed Research Students: **2015 - Present**
- *Autonomous Networks Research Group*
  University of Southern California, Los Angeles, CA-90089
- *Student(s):* Harish H. V., Rajasekar Raja, Palash Agrawal, Yash Goyal, Ankith Shashikanthreddy, Aashiq Ahmed, and Ling Ye
- *Advisor(s):* Prof. Bhaskar Krishnamachari

Review Experiences: **2010 - Present**
- Served as reviewer in many the peer-reviewed conference and journals such as IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), IEEE GLOBECOM, and IEEE Transactions on Mobile Computing.

Mentor for Summer Interns: **Summer 2017**
- *Autonomous Networks Research Group*
  University of Southern California, Los Angeles, CA-90089
- *Student(s):* Yutong Gu, Daniel D'Souza, Richard Kim, and Bennet Cowdin
- *Advisor(s):* Prof. Bhaskar Krishnamachari

Shadow PC Member (IPSN 2016): **2016**

- Served as a shadow PC member in the 5th International Conference on Information Processing in Sensor Networks (IPSN 2016)

Mentor for Summer Interns: **Summer 2016**

- *Autonomous Networks Research Group*
  University of Southern California, Los Angeles, CA-90089
- *Student(s):* Antonio Teixeira, Jenny Xie and Saksham Agarwal
- *Advisor(s):* Prof. Bhaskar Krishnamachari

Viterbi Graduate Mentorship Program: **Spring 2016**

- *University of Southern California*, Los Angeles, CA-90089

Mentor for Summer Interns: **Summer 2014**

- *Autonomous Networks Research Group*
  University of Southern California, Los Angeles, CA-90089
- *Student(s):* Raktim Pal and He Ren
- *Advisor(s):* Prof. Bhaskar Krishnamachari

FELLOWSHIPS AND AWARDS

Ming Hsieh Institute Scholar **2016 - 2017**
NSF and SigMobile Student Travel Grant for Mobicom 2017 **2017**
NSF Student Travel Grant for IEEE SEC 2017 **2017**
USC Provost's Ph.D. Fellowship **2012 - 2016**
USC Graduate School Ph.D. Fellowships Travel Award **Fall 2014**
IEEE MASS 2014 Travel Grant **Oct 2014**
USC Summer Institute Grant **Summer 2014**
UGC Infrastructure Grant for Undergraduate Research **2011 - 2012**

SELECTED RESEARCH PROJECTS

Wireless Robotic IoT Systems:

- Survey of Networking Issues and Potential areas of Research in Wireless Network of Mobile Robots
- Robotic Router Placement Optimization Based on Practical Communication Model Including Interference
- ARREST: A RSSI Based Approach for Relative Positioning and Tracking of a Moving Object
- IRIS: A Robotic Wireless Networking Testbed
- ROMANO: Overlay Lightweight Communication Protocol for Unified Control and Sensing of a Network of Robots

Dispersed Mobile Computing for Edge Devices

- Develop Realtime Task Profilers and Network Profilers for a Dispersed Computing platforms (DCP)
- Optimal Scheduling Algorithm for DCPs
- Distributed Scheduler Implementation with Kubernetes.

Efficient Low Power Routing for Internet of Things

- Distributed Hole Detection Methods in IoT and WSN
- Heat Diffusion Collection Protocol Implementation for Energy Efficient Data Collection in any IoT Network

Integration of Bare-metal Servers with Programmable Fabric (CISCO Internship Project)

- Bare-metal Server Integration with OpenStack for CISCO Fabric

- Design of a new system architecture for seamless deployment of bare-metals side-by-side with the Virtual Machines.

Cloud Computing and Application Offloading for Vehicular Networks (GM Internship Project):

- Survey of Cloud Computing and Application Offloading
- Application of Computation Offloading in Vehicular Networks

Undergraduate Research Project on Optimizations and Evolutionary Algorithms:

- Hybridization of Various Unimodal & Multi-modal Optimization Algorithms to Develop New Improved Algorithms
- Study of Various Evolutionary Algorithms in Optimizing Antenna Structures and Antenna Array Design Using Optimization Algorithms Like DE and PSO

Undergraduate Research Project on Wireless Sensor Networks:

- Handoff Reduction Algorithms in WLAN, Mobile Communication Systems and Low Earth Orbit Satellites
- Clustering Methods in Wireless Sensor Network by Proper Utilization of the Available Energy and Predefined Parameters and Hybridization of Various Clustering Algorithms in Wireless Sensor Networks to Develop a New Improved Algorithm

SELECTED ACADEMIC PUBLICATIONS

Book Chapters & Conference Papers:

1. **Pradipta Ghosh**, Jason A Tran, Daniel Dsouza, Nora Ayanian, and Bhaskar Krishnamachari, "*ROMANO: A Novel Overlay Lightweight Communication Protocol for Unified Control and Sensing of a Network of Robots,*", in **arXiv preprint** arXiv:1709.07555 (Submitted to **ICRA** 2018)
2. Quynh Nguyen, **Pradipta Ghosh**, and Bhaskar Krishnamachari, "*End-to-End Network Performance Monitoring for Dispersed Computing,*", in **International Conference on Computing, Networking and Communications (ICNC 2018)** (To appear)
3. **Pradipta Ghosh**, Jason A Tran, and Bhaskar Krishnamachari, "*ARREST: A RSSI Based Approach for Mobile Sensing and Tracking of a Moving Object,*", in 8th **International Workshop on Wireless Networking and Control for Unmanned Autonomous Vehicles (WiUAV), GLOBECOM**, 2017
4. **Pradipta Ghosh**, Jenny Xie, and Bhaskar Krishnamachari, "*miniRadar: A Low Power IEEE 802.15.4 Transceiver Based Implementation of Bistatic Radar,*" in 4th **ACM Workshop on Hot Topics in Wireless (HotWireless'17), MobiCom**, 2017
5. Aleksandra Knezevic, Quynh Nguyen, Jason A. Tran, **Pradipta Ghosh**, Pranav Sakulkar, Bhaskar Krishnamachari, and Murali Annavaram, "*DEMO: CIRCE – A runtime scheduler for DAG-based dispersed computing,*" in the **Second ACM/IEEE Symposium on Edge Computing (SEC)**, 2017
6. **Pradipta Ghosh**, Andrea Gasparri, Jiong Jin, and Bhaskar Krishnamachari, "*Robotic Wireless Sensor Networks, *" Book Chapter, in **The Philosophy of Mission-Oriented Wireless Sensor Networks,** Springer (To Appear)
7. **Pradipta Ghosh** and Bhaskar Krishnamachari, "*Interference Power Bound Analysis of a Network of Wireless Robots, *" in **Communication Systems and Networks,** LNCS 10340, 7 - 23, 2017 (Invited Paper)

8. **Pradipta Ghosh** Nachikethas A. Jagadeesan, Pranav Sakulkar, and Bhaskar Krishnamachari, "*LOCO: A Location Based Communication Scheme*", in **Workshop on New Wireless Communication Paradigms for the Internet of Things (MadCom), International Conference on Embedded Wireless Systems and Networks (EWSN)**, 2017
9. **Pradipta Ghosh**, Raktim Pal and Bhaskar Krishnamachari, "*Towards Controllability of Wireless Network Quality using Mobile Robotic Routers,* in **arXiv preprint** arXiv:1607.07848 [cs.RO]
10. Pedro Henrique Gomes, Thomas Watteyne, **Pradipta Ghosh** and Bhaskar Krishnamachari, "*Competition: Reliability through Timeslotted Channel Hopping and Flooding-based Routing,*" in Proceedings of the **International Conference on Embedded Wireless Systems and Networks (EWSN 2016),** February 15-17, Graz, Austria
11. **Pradipta Ghosh**, Jie Gao, Andrea Gasparri and Bhaskar Krishnamachari, "*Distributed Hole Detection Algorithms for Wireless Sensor Networks,*" in **IEEE International Conference on Mobile Ad hoc and Sensor Systems (MASS 2014)**, October 27-30, Philadelphia, Pennsylvania, USA.
12. **Pradipta Ghosh**, Jie Gao, Andrea Gasparri and Bhaskar Krishnamachari, "*River-Swarm: Topology-Aware Distributed Planning for Obstacle Encirclement in Connected Robotic Swarms,*" in **First Workshop on Robotic Sensor Networks 2014 (RSN2014)**, April 14, Berlin, Germany.
13. **Pradipta Ghosh**, Hamim Zafar and Ankush Mandal, "*Modified Local Neighborhood Based Niching Particle Swarm Optimization for Multimodal Function Optimization,*" in **Proceedings of Swarm Evolutionary and Memetic Computing Conference (SEMCCO)** 2011, Dec 19-21, Visakhapatnam, Andhra Pradesh, India.
14. **Pradipta Ghosh**, Hamim Zafar, Joydeep Banerjee and Swagatam Das, "*Design of Two-Channel Quadrature Mirror Filter Banks Using Differential Evolution with Global and Local Neighborhoods,*" in **Proceedings of Swarm Evolutionary and Memetic Computing Conference (SEMCCO)** 2011, Dec 19-21, Visakhapatnam, Andhra Pradesh, India.
15. Ankush Mandal, Hamim Zafar, **Pradipta Ghosh**, Swagatam Das and Ajith Abraham,"*An Efficient Memetic Algorithm for Parameter Tuning of PID Controller in AVR System,*" in **Proceedings of IEEE Hybrid Intelligent Systems (HIS)** 2011, December 5-8, Malacca, Malaysia.
16. **Pradipta Ghosh**, Hamim Zafar, Swagatam Das and Ajith Abraham,"*Hierarchical Dynamic Neighborhood Based Particle Swarm Optimization for Global Optimization,*" in **Proceedings of IEEE Congress on Evolutionary Computation (CEC)** 2011, June 5-8, 757 764, New Orleans.
17. Joydeep Banerjee, Souvik Kumar Mitra, **Pradipta Ghosh** and Mrinal Kanti Naskar, "*Memory Based Message Eficient Clustering (MMEC) for Enhancement of Lifetime in Wireless Sensor Networks Using a Node Deployment Protocol,*" in **Proceedings of International Conference on Communication, Computing & Security (ICCCS)** 2011, Feb 12-14, Orissa, India.
18. Joydeep Banerjee, Swarup Kumar Mitra, **Pradipta Ghosh** and Mrinal Kanti Naskar, "*An Optimized Reduced Energy Consumption (OREC) Algorithm for Routing in Wireless Sensor Networks*," in **Communications in Computer and Information Science**, 1, Volume 192, Advances in Computing and Communications, Part 2, Pages 82-92

19. **Pradipta Ghosh**, Joydeep Banerjee, Swarup Kumar Mitra, Souvik Kumar Mitra and Mrinal Kanti Naskar,"*Sequential Multi-Clustering Protocol Using a Node Deployment Protocol for Efficient Multi-Clustering in Wireless Sensor Networks,*" in **Communications in Computer and Information Science**, 1, Volume 196, Advances in Network Security and Applications, Part 2, Pages 526-536.

Journal Papers:

1. **Pradipta Ghosh**, He Ren, Reza Banirazi, Bhaskar Krishnamachari, and Edmond Jonckheere "*Empirical Evaluation of the Heat-Diffusion Collection Protocol for Wireless Sensor Networks, "* in **Elsevier Computer Networks**, Volume: 127, Page(s): 217-232, 2017. (Publusher: Elsevier, Impact Factor (2016): 2.516)
2. **Pradipta Ghosh**, Swagatam Das and Hamim Zafar,"*Adaptive differential evolution based design of two-channel quadrature mirror filter banks for sub-band coding and data transmission,*" in **IEEE Transactions on Systems, Man, and Cybernetics, Part - C**, Volume: 42, Issue: 6, Page(s): 1613-1623, 2012. (Publisher: IEEE, Impact Factor (2016):2.493).
3. **Pradipta Ghosh**, Joydeep Banerjee, Shelly Sinha Chowdhury and Swagatam Das, "*Design of non-uniform circular antenna arrays — an evolutionary algorithm based approach,*" in **Progress In Electromagnetics Research B**, Vol. 43, 333-354, 2012. (Publisher: EMW Publishing, Impact Factor (2010): 3.745).
4. **Pradipta Ghosh** and Swagatam Das,"*Synthesis of Thinned Planar Concentric Circular Antenna Arrays — A Differential Evolutionary Approach,*" in **Progress In Electromagnetics Research B**, Vol. 29, 63-82, 2011. (Publisher: EMW Publishing, Impact Factor (2010): 3.745).

CONFERENCE AND POSTER PRESENTATIONS

- "*A Novel System for Localization and Tracking in Robotic Networks,*" in **7th Annual Ming Hsieh Department of Electrical Engineering Research Festival**, University of Southern California, Los Angeles, California, USA.
- "*Implementation and Performance Evaluation of the Heat-Diffusion Collection Protocol for Wireless Sensor Networks,*" in **6th Annual Ming Hsieh Department of Electrical Engineering Research Festival**, University of Southern California, Los Angeles, California, USA.
- "*Distributed Hole Detection Algorithms for Wireless Sensor Networks,*" in **IEEE International Conference on Mobile Ad hoc and Sensor Systems (MASS 2014)**, Philadelphia, Pennsylvania, USA.
- "*RiverSwarm: Topology-Aware Distributed Planning for Obstacle Encirclement in Connected Robotic Swarms,*" in **5th Annual Ming Hsieh Department of Electrical Engineering Research Festival**, University of Southern California, Los Angeles, California, USA.

ACHIEVEMENTS

- Research Proposal was accepted in the NeTS Early Career Workshop 2017
- Selected as one of the five MHI Scholars. Only 4-5 students are selected from a competitive process each year from the department
- Research was featured in USC News
- Accepted for USC Doctoral Student Summer Institute, a program administered by the USC Graduate School, Academic Professional Development (APD) & Enhancing Diversity in Graduate Education (EDGE) with summer funding.
- Accepted for Ph.D program at USC with USC Provost's Fellowship

- Ranked 55th (General) in Engineering in WBJEE (2008) among about 1,00,000 students.
- Ranked 168th (General) in Medical in WBJEE (2008) among about 60,000 students