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

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| **FELLOWSHIPS AND AWARDS** | **Best PhD Student Pitch Award at MHI Research Festival** | **2017** |
| | **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, "*RiverSwarm: 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**, Jason A Tran, and Bhaskar Krishnamachari, *"ARREST: A RSSI Based Approach for Mobile Sensing and Tracking of a Moving Object,"*, in **IEEE Transactions on Robotics (T-RO)**, Under Review (Publisher: IEEE, Impact Factor (2016): 4.036).

2. **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. (Publisher: Elsevier, Impact Factor (2016): 2.516)

3. **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).

4. **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).

5. **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).

### Patents:

1. **Pradipta Ghosh** and Bhaskar Krishnamachari, *"ARREST: A Rssi Based Approach For Relative Positioning And Tracking Of A Moving Object,"* provisional patent, 2017-18, Application number 62/420,451

**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**

- Received the Best Graduating PhD Student Pitch award at MHI Research Festival 2017
- 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