

# Dr. Manas Khatua

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## Work Experience

Present: Assistant Professor, Dept. of CSE, Indian Institute of Technology Guwahati  
2016-2018: Assistant Professor, Dept. of CSE, Indian Institute of Technology Jodhpur  
2015-2016: Post-Doctoral Research Fellow, Singapore University of Technology and Design, Singapore  
2010-2013: Senior Research Fellow, SRIC, Indian Institute of Technology Kharagpur  
2008-2010: Assistant System Engineer, Tata Consultancy Services Ltd.  
2008-2008: Sr. Lecturer, Dept. of IT, Dr. B. C. Roy Engineering College, West Bengal  
2005-2008: Lecturer, Dept. of CSE, Bankura Unnayani Institute of Engineering (BUIE), West Bengal  
2003-2004: Faculty at Bakhrabad Bharati Vidyapith, West Bengal

## Education

2015: Ph.D. (Wireless Networks) from Indian Institute of Technology Kharagpur  
2006: M.Tech. (IT) from Bengal Engineering and Science University (renamed as IEST, Shibpur)  
2003: B.Tech. (CSE) from University of Kalyani, West Bengal

## Research Publication

International Journal: 14  
International Conference: 7  
Book Chapter: 1  
Colloquium: 1

## Teaching Experience

- As Instructor
  - Theory
    - CS348 Computer Networks (Winter 2019)
    - CS343 Data Communication (Monsoon 2018)
    - CS321 Computer Networks (Spring 2017, 2018)
    - CS322 Database Systems (Spring 2018)
    - CS311 Data Communication (Autumn 2017)
    - CS661 Selected Topics in Networking and Communication (Autumn 2017)
    - CS311 Data Communication (Summer Course 2017)
    - CS302 Data Structure & Algorithm (Spring 2008)
    - CS501 Operating System (Spring 2006,2007)

CS604 System Software & Administration (Autumn 2006,2007)

CS605 Object Technology & UML (Autumn 2006,2007)

– Laboratory

CS349 Networks Lab. (Winter 2019)

CS321 Computer Networks (Spring 2017, 2018)

CS392 Data Structure & Algorithm (Spring 2008)

CS391 Programming Practice Lab (Spring 2006,2007)

CS591 Operating System Lab (Spring 2006,2007)

CS694 System Software & Administration Lab (Autumn 2006,2007)

CS695 Object Technology Lab (Autumn 2006,2007)

– Workshop

Knowledge Finishing School for C,C++,JAVA,OS,DS,Algo,DBMS,CN (Spring 2006)

• As Teaching Assistant

IT60119 Wireless Ad-Hoc & Sensor Networks (Autumn 2012)

IT69103 Information System Design Laboratory (Autumn 2011)

## Thesis Supervision

• **PhD:** one (ongoing)

• **BTech:** 1 Student at IIT Guwahati; 16 Students at IIT Jodhpur; 14 Students at BUIE, West Bengal

## Collaborative Research

- Working with **Ms. Dipanwita Thakur**, Assistant Professor, Banasthali University, Rajasthan, in the domain of Software Defined Networking.
- Worked with **Prof. Ngai-Man Cheung**, Assistant Professor, Singapore University of Technology and Design, Singapore, in the domain of Network Security.
- Worked with **Mr. Tarun Trivedi**, Guest Lecturer, Sardar Patel University of Police Security and Criminal Justice, Jodhpur, and **Prof. B. M. Mehtre**, Professor, IDRBT Hyderabad, in the domain of Cyber Intelligence.
- Assisted in **M.S.(by Research) Thesis** work of four students, Ms. Snigdha Das, Mr. Tamoghna Ojha, Mr. Samaresh Bera, and Mr. Ayan Mondal, who were students of Dr. Sudip Misra, Associate Professor, IIT Kharagpur.
- Assisted in **M.Tech. Thesis** work of six students, Mr. Satyadeep Mishra, Mr. Sukhchain Singh, Mr. Chejerla Rajesh, Ms. Shukla Banik, Mr. Suresh Bollabathula, and Mr. A. P. Sagar P., who were students of Dr. Sudip Misra, Associate Professor, IIT Kharagpur.
- Assisted in project works of four **Visiting Students**, Mr. Nishant Kumar, Mr. Abhishek Jain, Mr. Suraj Dash, and Mr. Manajit Chakraborty, who were students of Dr. Sudip Misra, Associate Professor, IIT Kharagpur.

## Post-Doctoral Research

*Project: Cross-functional Information System for Decision Making (CISDeM) (2015 – 2016)*

*Sponsor: Ministry of Defence, Govt. of Singapore*

*Duration: 1.8 Year*

CISDeM is a cyber-information research program for decision making against network security threats. It adopts an inter-disciplinary research view spanning security, natural language processing, machine learning, signal processing, and networking to protect mission-critical network infrastructures.

- Proposed a machine learning and signal processing-based scheme for detecting anomaly in network traffic

## Doctoral Thesis

*Title: Analysis of Collisions in Contention-Based Wireless Networks* (2011 – 2015)

The objective of the research work was to analyse different aspects of frame collision in wireless MAC protocol design, specifically in the area of Wireless Local Area Network (WLAN). For achieving this, it was required to analyse the theoretical performance of the standard IEEE 802.11 MAC protocol followed by the design and analysis of performance tuning mechanisms from the frame collision view point. It was also important to analyse frame collision from the network security view point.

- Proposed an absorbing Markov chain-based model for analysing theoretical performance of the IEEE 802.11 DCF MAC protocol from the packet-centric view point.
- Designed a new backoff scheme followed by a new MAC protocol for delay sensitive applications.
- Identified the advantages of anomalous slots and proposed a scheme for exploiting those slots.
- Proposed an estimation approach for observing experienced delay status of a station.
- Proposed a channel observation-based probabilistic update of CW in backoff selection.
- Proposed a joint optimization scheme for improving the throughput and delay of a MAC protocol.
- Established that correct detection of controllable reactive jamming is possible in wireless networks.
- Performed theoretical analysis of all the proposed solution schemes.

## R&D Project

1. *Project: Adaptive Resource Allocation for Rapid Formation of 6TiSCH Network in Industrial IoT*  
*Duration: 2 Years* (2019 – 2020)  
*Sponsor: IIT Guwahati*  
*Designation: Principal Investigator*

The main objective of the project is to resolve the issues related to rapid formation of 6TiSCH network effectively and efficiently in industrial environment. Explicitly, the objectives of this project are designing and development of:

- adaptive and faster resource allocation protocol for enhanced beacon scheduling
- coordination protocol between RPL and network formation for resource optimal beaconing
- a working prototype of IoT network testbed
- implementation of proposed protocols in the developed testbed

2. *Project: Towards Robust Efficient and Secure Data Acquisition in Underwater Sensor Networks*  
*Duration: 2.10 Years* (2010 – 2013)  
*Sponsor: Department of Information Technology (presently known as Ministry of Electronics and Information Technology), Government of India*  
*Designation: Senior Research Fellow*  
*Organization: Sponsored Research and Industrial Consultancy (SRIC), IIT Kharagpur*

- Proposed a scheme to detect jamming style DoS attack in UWSNs
- Proposed an energy-efficient and self-organising virtual network architecture for UWSNs
- Designed and developed a MATLAB-based UWSN simulator
- Extended the underwater module of NS-3 network simulator

## Industry Projects

1. *Project: Insurance Solution Development* (2009 – 2010)  
*Client: DLF Pramerica, Noida, India*  
*Designation: Assistant Systems Engineer*  
*Organization: Tata Consultancy Services Ltd.*  
*Duration: 1.3 Year*
  - Supervised a small development team of four employees.
  - Developed different types of Insurance Products and customized the associated modules such as Party, Business, Accounting, Work-flow Automation, etc.
  - Developed many SQL Packages for reducing product deployment overhead.
2. *Project: Insurance Solution Development* (2008 – 2009)  
*Client: Scania BSM, China*  
*Designation: Assistant Systems Engineer*  
*Organization: Tata Consultancy Services Ltd.*  
*Duration: 1.2 Year*
  - Developed different types of Insurance Products and customized the associated modules such as Party, Business, Accounting, Work-flow Automation, etc.
  - Designed the managerial work-flow as well as the work-flow automation process for approving an insurance application.

## Master's Thesis

*Title: GSPIN: Gradient-based Sensor Protocol for Information via Negotiation in Wireless Sensor Networks* (2004 – 2006)

The objective of the project work was to reduce communication activity and energy consumption during information dissemination among sensor nodes in wireless sensor networks (WSNs).

- Proposed GSPIN for improving the performance of existing SPIN protocol by utilizing relative positioning information of sensor nodes specifically the position of a sink w.r.t. the source.

## Intern-ship

*Project: Development of an Inventory Control System* (2002)  
*Duration: 2 Months*  
*Organization: Regional Computer Centre, Kolkata*

- Designed and Developed different modules of the Inventory Control System of a Book Shop
- Designed and Developed GUI using Visual Foxpro, and processing tasks using Microsoft Access

## Awards

- NIXI Ph.D. Fellowship for the year 2014-2015
- Sumana Smriti Puraskar for acquiring highest marks in Higher Secondary Examination 1998 in Narayangarh R.R.C.L.U.S. Niketan
- Nominated for Merit Scholarship from West Bengal Board of Secondary Education for acquiring more than 75% marks in Secondary Examination 1996
- Sumana Smriti Puraskar for acquiring highest marks in Secondary Examination 1996 in Narayangarh R.R.C.L.U.S. Niketan

## Guest Lecture

- Lecture on “Recent Research Trends in Wireless Sensor Networks” in “Seminar on Computing and Informatics”, organized by St. Thomas College of Engineering and Technology, Kolkata, on June 2013.
- Lecture on “Recent Research Trends in Wireless Networks”, organized by University of Engineering & Management, Jaipur, on October 2017.

## Guest Editor

- 2018: Guest editor for the special issue “Security and Privacy in India” in *Security and Privacy* (Wiley) journal.

## TPC Member

- 2018: AINA, NCC
- 2017: ISDDC, ICIT, INDICON
- 2016: NCC

## Reviewer

- IEEE Transactions on
  - Mobile Computing; Cloud Computing; Vehicular Technology; Wireless Communications; Knowledge and Data Engineering; Signal Processing
- IEEE Systems Journal
- Ad Hoc Networks (Elsevier)
- Journal of Network and Computer Applications (Elsevier)
- International Journal of Communication Systems (Wiley)
- Journal on Wireless Communications and Networking (Springer)
- Photonic Network Communications (Springer)
- Multimedia Systems (Springer)
- International Journal of Communication Networks and Distributed Systems (Inderscience)
- IHCI 2012, TechSym 2014,2016, INDOCRYPT 2014, VTC 2016, 2017

## Professional Membership

- IEEE Member since January 2013 (ID:92558724)

## Academic Responsibilities

- 2018: Faculty Coordinator for the registration process of B.Tech.(CSE), IIT Jodhpur
- 2017: PhD Recruitment Exam coordinator in the Dept. of CSE, IIT Jodhpur
- 2012-14: Website Development for SWAN Laboratory, IIT Kharagpur
- 2006-07: Development of Computer Network Laboratory, BUIE, Bankura, West Bengal
- 2006-07: WBUT (presently known as MAKAUT, West Bengal) University Examiner for 3 Semesters

## Other Responsibilities

- 2018: Organizing committee member of “National Workshop on Human-Centered Robotics” at IIT Jodhpur in collaboration with *The Robotic Society*, India

## Research Interests

Wireless Networks, Sensor Networks, Internet of Things, Network Security, Smart Grid

## Publications

### Journals

1. **M. Khatua**, S. H. Safavi and N.M. Cheung, "Sparse Laplacian Component Analysis for Internet Traffic Anomalies Detection," *IEEE Transactions on Signal and Information Processing over Networks*, Vol. PP, No. 99, pp. 11, March 2018.
2. S. Misra and **M. Khatua**, "Packet-Centric Trade-off and Unfair Success Region in IEEE 802.11 WLANs," *IEEE Transactions on Vehicular Technology*, Vol. 66, No. 5, pp. 4223-4230, May 2017.
3. S. Das, **M. Khatua**, and S. Misra, "Cheating-Resilient Bandwidth Distribution in Mobile Cloud Computing," *IEEE Transactions on Cloud Computing*, Vol. PP, No. 99, pp. 11, December 2016.
4. **M. Khatua** and S. Misra, "Exploiting Anomalous Slots for Multiple Channel Access in IEEE 802.11 Networks," *Journal of Network and Computer Applications*, Vol. 74, pp. 56-65, August 2016.
5. S. Misra, S. Singh and **M. Khatua**, "MIRACLE: Mobility Prediction Inside a Coverage Hole Using Stochastic Learning Weak Estimator," *IEEE Transactions on Cybernetics*, Vol. 46, No. 7, pp. 1486-1497, July 2016.
6. **M. Khatua** and S. Misra, "D2D: Delay-aware Distributed Dynamic Adaptation of Contention Window in Wireless Networks," *IEEE Transactions on Mobile Computing*, Vol. 15, No. 2, pp. 322-335, February 2016.
7. S. Das, **M. Khatua**, S. Misra and M. S. Obaidat, "Quality-assured Secured Load Sharing in Mobile Cloud Networking Environment," *IEEE Transactions on Cloud Computing*, Vol. PP, No. 99, pp. 11, July 2015.
8. S. Misra and **M. Khatua**, "Semi-Distributed Backoff: Collision-Aware Migration from Random to Deterministic Backoff," *IEEE Transactions on Mobile Computing*, Vol. 14, No. 5, pp. 1071-1084, May 2015.
9. S. Misra, S. Mishra and **M. Khatua**, "Social Sensing-based Duty Cycle Management for Monitoring Rare Events in Wireless Sensor Networks," *IET Wireless Sensor Systems*, Vol. 5, No. 2, pp. 68-75, April 2015.
10. S. Misra, S. Singh, **M. Khatua** and M. S. Obaidat, "Extracting Mobility Pattern from Target Trajectory in Wireless Sensor Networks," *International Journal of Communication Systems*, Vol. 28, No. 2, pp. 213-230, January 2015.
11. **M. Khatua** and S. Misra, "CURD: Controllable Reactive Jamming Detection in Underwater Sensor Networks," *Pervasive and Mobile Computing*, Vol. 13, pp. 203-220, August 2014.
12. S. Misra, S. Das, **M. Khatua** and M. S. Obaidat, "QoS-Guaranteed Bandwidth Shifting and Redistribution in Mobile Cloud Environment," *IEEE Transactions on Cloud Computing*, Vol. 2, No. 2, pp. 181-193, April-June 2014.
13. T. Ojha, **M. Khatua** and S. Misra, "Tic-Tac-Toe-Arch: A Self-organizing Virtual Architecture for Underwater Sensor Networks," *IET Wireless Sensor Systems*, Vol. 3, No. 4, pp. 307-316, December 2013.
14. S. Misra, S. Dash, **M. Khatua**, A. V. Vasilakos and M. S. Obaidat, "Jamming in Underwater Sensor Networks: Detection and Mitigation," *IET Communications*, Vol 6, No. 14, pp. 2178-2188, September 2012.

### Conferences

1. A. Kalita and **M. Khatua**, "Faster Joining in 6TiSCH Network using Dynamic Beacon Interval," *Proc. of COMSNETS*, Bengaluru, India, January 7-11, 2019, pp. .
2. D. Thakur and **M. Khatua**, "Cellular Learning Automata-based Virtual Network Embedding in Software-Defined Networks," *Proc. of the ICCCN*, NITTTR Chandigarh, India, March 29-30, 2018, pp. .
3. T. Trivedi, V. Parihar, **M. Khatua**, and B. M. Mehtre, "Threat Intelligence Analysis of Onion Websites using Sublinks and Keywords," *Proc. of the IEMIS*, UEM Kolkata, India, February 23-25, 2018, pp. .
4. **M. Khatua**, S. H. Safavi and N.M. Cheung, "Detection of Internet Traffic Anomalies using Sparse Laplacian Component Analysis," *Proc. of the IEEE GLOBECOM*, Singapore, December 4-8, 2017, pp. 1-6.

5. **M. Khatua** and S. Misra, "Exploiting Partial-Packet Information for Reactive Jamming Detection: Studies in UWSN Environment," *Proc. of the ICDCN*, TIFR, Mumbai, January 3-6, 2013, pp. 118-132.
6. S. Das, S. Misra, **M. Khatua** and Joel J. P. C. Rodrigues, "Mapping of Sensor Nodes with Servers in a Mobile Health-Cloud Environment," *Proc. of the Healthcom*, Lisbon, October 9-12, 2013, pp. 481-485.
7. S. Misra, A. Mondal, S. Banik, **M. Khatua**, S. Bera and M. S. Obaidat, "Residential Energy Management in Smart Grid: A Markov Decision Process-Based Approach," *Proc. of the IEEE iThings*, Beijing, August 20-23, 2013, pp. 1152-1157.

#### Book Chapter

1. S. Misra and **M. Khatua**, "Cross-Layer Techniques and Applications in Wireless Sensor Networks," In: H. F. Rashvand and Y. S. Kavian (Eds.), *Using Cross-Layer Techniques for Communication Systems*, USA, IGI Global, 2012, pp. 94-119.

#### Colloquium

1. **M. Khatua** and S. Misra, "Realizing Virtual MIMO through Opportunistic Parallelism for Increasing Revenue in Enterprise Wireless Local Area Networks." In: *The Second IDRBT Doctoral Colloquium*, IDRBT, Hyderabad, December 20-21, 2012.

**Date:** March 5, 2019

**Place:** IIT Guwahati



Signature