

NIRUPAM ROY

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Research Interests **Core:** Ambient Sensing, Embedded-AI, Wireless Networking, Mobile Computing
Application: IoT, Localization, Healthcare, Security, Wearables

Current Appointments **Assistant Professor**, Jan 2019 - present
Dept. of Computer Science and UMIACS
University of Maryland, College Park

Affiliate Assistant Professor, Jul 2019 - present
Dept. of Electrical and Computer Engineering
University of Maryland, College Park

Education **Ph.D.**, Electrical and Computer Engineering, 2018
University of Illinois at Urbana-Champaign
Advisor: Prof. Romit Roy Choudhury
(CSL Ph.D. Thesis Award)

Master of Science, Computer Science and Engineering, 2013
University of South Carolina
Advisor: Prof. Srihari Nelakuditi
(Outstanding Thesis Award)

Bachelor of Engineering, Computer Science and Technology, 2007
IEST (formerly B.E.College), Shibpur
Advisor: Prof. Abhik Mukherjee
(Best Thesis Award)

Awards & Honors

- Best paper award MobiSys 2022
- Best demo award MobiSys 2021
- Best poster runner-up award SenSys 2020
- CSL Ph.D. Thesis Award 2019
- UIUC Dissertation Completion Fellowship 2018
- Best paper award at MobiSys, 2017
- Research selected for SIGMOBILE Highlights 2017
- Qualcomm Innovation Fellowship (QInF), 2016 finalist
- Joan and Lalit Bahl Fellowship, 2015-2017
- M. E. Van Valkenburg Graduate Research Award and Fellowship, 2015
- Outstanding MS thesis award, 2013
- Best poster runner-up at HotMobile, 2013
- Best undergraduate thesis award, 2007 at IEST (formerly B.E.College), Shibpur
- 10th rank in West Bengal Board of Secondary Education, 2001

Publications

SPiDR: Ultra-low-power Acoustic Spatial Sensing for Micro-robot Navigation
Yang Bai (co-primary), Nakul Garg (co-primary), **Nirupam Roy**
ACM MobiSys 2022

VoiceFind: Noise-Resilient Speech Recovery in Commodity Headphones
Irtaza Shahid, Yang Bai, Nakul Garg, **Nirupam Roy**
ACM IASA 2022

Personal active soundfield control (PASCAL) framework
Shoken Kaneko, Irtaza Shahid, **Nirupam Roy**, Nail Gumerov, Ramani Duraiswami
AES AVAR 2022

Owlet: enabling spatial information in ubiquitous acoustic devices
Nakul Garg (co-primary), Yang Bai (co-primary), **Nirupam Roy**
ACM MobiSys 2021

Enabling Self-defense in Small Drones
Nakul Garg, **Nirupam Roy**
ACM HotMobile 2020

Spying with Your Robot Vacuum Cleaner: Eavesdropping via Lidar Sensors
Sriram Sami, Yimin Dai, Sean Rui Xiang Tan, **Nirupam Roy**, Jun Han
ACM SenSys 2020

MUTE: Bringing IoT to Noise Cancellation
Sheng Shen, **Nirupam Roy**, J. Guan, Haitham Hassanieh, Romit Roy Choudhury
SIGCOMM 2018

Inaudible Voice Commands: The Real-World Attack and Defense
Nirupam Roy, Sheng Shen, Haitham Hassanieh, Romit Roy Choudhury
NSDI 2018

BackDoor: Making Microphones Hear Inaudible Sounds
Nirupam Roy, Haitham Hassanieh, Romit Roy Choudhury
ACM MobiSys 2017

Ripple II: Faster Communication through Physical Vibration
Nirupam Roy, Romit Roy Choudhury
NSDI 2016

Listening through a Vibration Motor
Nirupam Roy, Romit Roy Choudhury
ACM MobiSys 2016

Compressing Backoff in CSMA Networks
Mahanth Gowda, **Nirupam Roy**, Romit Roy Choudhury, Srihari Nelakuditi
IEEE ICNP 2016

Ripple: Communicating through Physical Vibrations
Nirupam Roy, Mahanth K Gowda, Romit Roy Choudhury
NSDI 2015

I am a Smartphone and I can Tell my User's Walking Direction
Nirupam Roy, He Wang, Romit Roy Choudhury
ACM MobiSys 2014

AccelPrint: Imperfections of Accelerometers Make Smartphones Trackable
Nirupam Roy, S. Dey (Co-primary author), W. Xu, R. Roy Choudhury, S. Nelakuditi
NDSS 2014

Infrastructure Mobility: A What-if Analysis
Mahanth K Gowda, **Nirupam Roy**, Romit Roy Choudhury
ACM HotNets 2014

Backing out of Linear Backoff in Wireless Networks
Mahanth K Gowda, **Nirupam Roy**, Romit Roy Choudhury, Srihari Nelakuditi
ACM HotWireless 2014

Journal Articles

On Smart Soccer Ball as a Head Impact Sensor
T. Stone, N. Stone, **Nirupam Roy**, W. Melton, J. B. Jackson, Srihari Nelakuditi
IEEE Transactions on Instrumentation and Measurement, 2018

Loop-Free Convergence with Unordered Updates
Glenn Robertson, **Nirupam Roy**, P. K. Penumarthi, Srihari Nelakuditi, Jason O’Kane
IEEE Transaction on Network and Service Management, 2017

RFID Enabled Navigation System of an Autonomous Robotic Guide
S. Bandyopadhyay, **Nirupam Roy**, A. Banerjee, A. Chanda, A. Mukherjee, S. Barat
CSI Communications, November 2008, Computer Society of India

Posters & Demos

ACM MobiSys 2022

Poster: Ultra-low-power Acoustic Imaging
Portland, Oregon, United States

ACM MobiSys 2021

Demo: Microstructure-guided Spatial Sensing for Low-power IoT
Virtual, Wisconsin, United States

ACM HotMobile 2020

Poster: Acoustic Sensing for Detecting Projectile Attacks on Small Drones
Texas, United States

ACM SenSys 2020

Poster: LidarPhone: Acoustic Eavesdropping using a Lidar Sensor
Yokohama, Japan

SIGCOMM 2018

Poster: Bringing IoT to Noise Cancellation
Budapest, Hungary

NSDI 2018

Poster: Inaudible Voice Commands: The Long-Range Attack and Defense
Washington, United States

ACM MobiCom 2018

Poster: Networked Acoustics Around Human Ears
New Delhi, India

ACM MobiSys 2017

Demo: Riding the Non-linearities to Record Ultrasound with Smartphones
Niagara Falls, New York, United States

ACM MobiCom 2016

Poster: Assessing Header Impacts in Soccer with Smartball
New York, United States

NSDI 2016

Poster: Vibration: A new mode of communication
Mountain View, California, United States

Google Faculty Mobile Summit 2015

Poster: Ripple: Communicating through Physical Vibration
Mountain View, California, United States

ACM MobiSys 2014

Demo: I am a Smartphone and I can Tell my User's Walking Direction
Bretton Woods, New Hampshire, United States

ACM HotMobile 2013

Poster: Leveraging Imperfections of Sensors for Fingerprinting Smartphones
Jekyll Island, Georgia, United States

**Selected
Talks**

Boston University Research Seminar

Talk: Ultra-low-power Acoustic Perception in IoT
Apr 8, 2022
Online, United States

UW Allen School of Research Colloquium: Internet of Robotics Things

Talk: Acoustic Perception in IoT: Opportunities and Perils
Feb 16, 2021
Online, United States

Global Summit of Overseas and Resident Indian Scientists & Academicians

Panel: Communication Technologies for IoT/CPS
Oct 13, 2020
Online, Govt. of India

Laboratory for Telecommunication (LTS)

Talk: The Internet of Acoustic Things
May 30, 2019
College Park, Maryland, United States

ACM HotWireless

Talk: Opening a Microphone's Backdoor: Hype, Threats, and Opportunities
October 16, 2017
Snowbird, Utah, United States

Microsoft Student Summit on Mobility, Systems and Networking

Talk: Communicating through Physical Vibration
February 1-2, 2016
Petaluma, California, United States

Huawei University Day

Talk: Physical Vibration: A New Modality of Communication
August 6-7, 2015
Rolling Meadows, Illinois, United States

Feedback Friday in Computer Engineering, UIUC

Talk: Ripple: Communicating through Physical Vibration
March 20, 2015
Champaign, Illinois, United States

**Teaching &
Tutorials****Instructor**

Course: Computer Networks (CMSC-417)
Spring 2022, UMD

Instructor

Course: Wireless and Mobile Systems for the IoT (CMSC-715)
Fall 2021, UMD

Instructor

Course: Wireless and Mobile Systems for the IoT (CMSC-818W)
Fall 2020, UMD

Instructor

Course: Computer Networks (CMSC-417)
Spring 2020, UMD

Instructor

Course: Wireless and Mobile Systems for the IoT (CMSC-818W)
Fall 2019, UMD

Instructor

Course: Wireless and Mobile Systems for the IoT (CMSC-818W)
Spring 2019, UMD

Teaching Assistant

Course: Mobile Sensing, Computing, and Applications (ECE/CS-498)
Spring 2016, UIUC

Tutorial workshop

Topic: Android Programming and Smartphone Sensors
February 8, 2016, UIUC

Guest Lecture: Sensing Out-of-band Sound through Channel Nonlinearity

Course: Embedded Digital Signal Processing (ECE-420)
Fall 2017, UIUC

Guest Lecture: Sound and Vibration Sensing

Course: Mobile Sensing and Sensor Fusion (ECE-598RR)
Spring 2017, UIUC

Guest Lecture: Short-distance Communication Modalities

Course: Wireless Networks and Mobile Systems (ECE-598HH)
Fall 2016, UIUC

Guest Lecture: Walking Direction Estimation with On-body Sensors
Course: Mobile Sensing, Computing, and Applications (ECE/CS-498)
Spring 2016, UIUC

Guest Lecture: Communication through Physical Vibration
Course: Mobile Sensing, Computing, and Applications (ECE/CS-498)
Spring 2016, UIUC

Patents

Causing microphones to detect inaudible sounds and defense against inaudible attacks
Nirupam Roy, Romit Roy Choudhury, Haitham Al Hassanieh
Patent pending: US 20190122691 A1

Communicating through Physical Vibration
Nirupam Roy, Romit Roy Choudhury, Mahanth K. Gowda
Patent granted: US 9608848 B2

Unsupervised Indoor Localization and Heading Direction Estimation
Romit Roy Choudhury, H. Wang, **Nirupam Roy**, S. Sen, M. Youssef, et al.
Patent granted: US 9730029

Vibrational Devices as Sound Sensors
Romit Roy Choudhury, **Nirupam Roy**
Patent pending: US 20180336274 A1

Media Coverage

- AccelPrint: MIT Technology Review, The Telegraph UK, The Voice of Russia, ...
- VibraPhone: TechCrunch, Engadget, Slashdot, ...
- BackDoor: Curiosity, The Science Times, EE-News Europe, ...
- LipRead: The New York Times, The Morning Paper, ...
- MUTE: BBC Radio, IEEE Spectrum, NAE Radio, CACM, Yahoo News, ...
- DopplerDodge: The Economist, Robotics Industry News, ...
- LidarPhone: Forbes Magazine, Hacker News, CNA, SCMP, ZDNet, ...

Activities & Services

- Workshop organizer:
 - ACM IASA: Intelligent Acoustic Systems and Applications 2022
 - IEEE/ACM STEERS: Serverless To sErVE moRE at Scale 2021, 2022
- Technical Program Committee (TPC) member:
 - MobiSys 2019, 2020, 2021, 2022
 - MobiCom 2020, 2021
 - HotMobile 2021, 2022
 - SMARTCOMP 2020
 - COMSNETS 2019
 - ACM WearSys 2019
 - IEEE SmartComp Ph.D. Forum 2019, Chair
 - ACM MobiSys Ph.D. Forum 2017
 - ACM S3 Workshop 2017

- Reviewer:
 - ACM MobiCom 2019 (external)
 - ACM IMWUT 2018
 - UbiComp 2016 (ACM Conference on Pervasive and Ubiquitous Computing)
 - IEEE Transactions on Mobile Computing (TMC)
 - IEEE Transactions on Information, Forensics, and Security
 - Elsevier Pervasive and Mobile Computing journal
- Volunteer at ‘Illini Fighting Hunger’ initiative for underprivileged children
- Student president of the Computer Engineers’ Society of Bengal Engineering College (CoEnSoBEC) from 2005 to 2007
- A cartoonist by hobby