

Sougata Sen

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RESEARCH OBJECTIVE

I am interested in designing and building systems that can automatically and unobtrusively monitor various activities of daily living performed by individuals in free-living conditions. To achieve this goal, I primarily focus on applying suitable machine-learning techniques on sensor data extracted from various personal devices (smartwatches, smartphones, etc.), IoT devices and infrastructure sensors, to derive meaningful information.

EDUCATION

Jan 2012 – May 2017: Singapore Management University, Singapore

Ph.D. in Information Systems

Dissertation: Fusing Mobile, Wearable and Infrastructure Sensing for Immersive Daily Lifestyle Analytics

Committee: Prof. Archan Misra (SMU, chair), Prof. Rajesh K. Balan (SMU), Prof. Youngki Lee (SMU), Prof. Andrew T. Campbell (Dartmouth College)

Aug 2014 – May 2015: Carnegie Mellon University, Pittsburgh, PA, USA

Exchange Student

Advisor: Prof. Jason I. Hong

Sep 2001 – June 2005: Visveswararajah Technological University, KA, India

B.E. in Electronics and Communication

WORK EXPERIENCE

Dec 2017 – Present: Dartmouth College, Hanover, NH, USA

Position: Postdoctoral Scholar

Supervisor: Prof. David F. Kotz

Responsibilities: Develop techniques to achieve reliable and trustworthy mHealth solutions.

July 2017 – Nov 2017: Livelabs, Singapore Management University, Singapore

Position: Research Fellow

Supervisor: Prof. Archan Misra

Responsibilities: Build systems that can monitor an individual's daily life activities.

May 2015 – Aug 2015: Samsung Research America, Mountain View, CA

Position: Summer Intern

Mentor: Shalinder Sidhu

Responsibilities: Opportunistically collecting sensor data from personal devices of the visitors of a shopping mall to determine semantic label of areas in the mall.

May 2013 – July 2013: IBM India Research Lab, New Delhi, India

Position: Summer Intern

Mentor: Dr. Dipanjan Chakraborty

Responsibilities: Identifying high level shopping behavioral traits of shoppers visiting a shopping mall by analyzing the smartphone's sensor traces.

Sep 2005 – Dec 2011: SETLabs, Infosys Ltd., Bangalore, India

Position: Technology Lead

Supervisor: Dr. Kumar Padmanabh

Responsibilities: Conceptualizing ideas and creating proof of concepts in the areas of 'Wireless Sensor Networks', 'Sustainability' and 'Internet of Things'.

FUNDING

PI: **NIH/NIDA** via **Dartmouth Center for Technology and Behavioral Health**, \$20,000 for 2018–19. Development of a Mobile Application for the Auracle Wearable System for Eating Behavior Monitoring Studies. With Prof. David Kotz.

THESIS

Sougata Sen. *Fusing mobile, wearable and infrastructure sensing for immersive daily lifestyle analytics*. Ph.D. thesis advised by Prof. Archan Misra, at School of Information Systems, Singapore Management University, 2017.

JOURNAL, CONFERENCE AND WORKSHOP PUBLICATIONS

Sougata Sen, Archan Misra, Vigneshwaran Subbaraju, Karan Grover, Meera Radhakrishnan, Rajesh K. Balan, Youngki Lee, I⁴S: *Capturing Shopper's In-store Interactions*. In Proceedings of the International Symposium on Wearable Computers (ISWC '18). Pages 156-159. <http://dx.doi.org/10.1145/3267242.3267259>.

Shengjie Bi, Tao Wang, Nicole Tobias, Josephine Nordrum, Shang Wang, George Halvorsen, **Sougata Sen**, Ronald Peterson, Kofi Odame, Kelly Caine, Ryan Halter, Jacob Sorber, and David Kotz. *Auracle: Detecting eating episodes with an ear-mounted sensor*. Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT) (UbiComp), 2(3), September 2018, <http://dx.doi.org/10.1145/3264902>.

Varun Mishra, Gunnar Pope, Sarah Lord, Stephanie Lewia, Byron Lowens, Kelly Caine, **Sougata Sen**, Ryan Halter, and David Kotz. *The case for a commodity hardware solution for stress detection*. In Workshop on Mental Health: Sensing & Intervention (UbiComp '18 Adjunct). Pages 1717-1728. <http://dx.doi.org/10.1145/3267305.3267538>.

Sougata Sen, Vigneshwaran Subbaraju, Archan Misra, Rajesh Balan, Youngki Lee, *Annapurna: Building a Real-World Smartwatch-based Automated Food Journal*. In Proceedings of the IEEE International Symposium on A World of Wireless, Mobile and Multimedia Networks (WOWMOM '18). Pages 1-6. <http://dx.doi.org/10.1109/WoWMoM.2018.8449755>.

Meera Radhakrishnan, **Sougata Sen**, Archan Misra, Rajesh Balan, Youngki Lee, *Smart Monitoring via Participatory BLE Relaying*. In Proceedings of the IEEE International Conference on COMMunication Systems & NETWORKS (COMSNETS '18). Pages 312-319. <http://dx.doi.org/10.1109/COMSNETS.2018.8328213>.

Tianli Mo, Lipyeow Lim, **Sougata Sen**, Archan Misra, Rajesh Balan, Youngki Lee. *Cloud based query evaluation for energy-efficient mobile sensing*. Pervasive and Mobile Computing, Volume 38, 2017. Pages 257-274. <http://dx.doi.org/10.1016/j.pmcj.2016.12.005>.

Sougata Sen, Vigneshwaran Subbaraju, Archan Misra, Rajesh Balan and Youngki Lee. *Experiences in Building a Real-World Eating Recogniser*. In Proceedings of the International Workshop on Physical Analytics (WPA '17). Pages 7-12. <http://dx.doi.org/10.1145/3092305.3092306>.

Sougata Sen, Karan Grover, Vigneshwaran Subbaraju, and Archan Misra. *Inferring smartphone keypress via smartwatch inertial sensing*. In Proceedings of the WristSense Workshop on Sensing Systems and Applications Using Wrist Worn Smart Devices (PerCom '17 Workshops). Pages 685-690. <http://dx.doi.org/10.1109/PERCOMW.2017.7917646>.

Sougata Sen, Kiran K. Rachuri, Abhishek Mukherji, and Archan Misra. *Did you take a break today? Detecting playing foosball using your smartwatch*. In Proceedings of the WristSense Workshop on Sensing Systems and Applications Using Wrist Worn Smart Devices (PerCom '16 Workshops). <http://dx.doi.org/10.1109/PERCOMW.2016.7457165>.

Meera Radhakrishnan, **Sougata Sen**, S. Vigneshwaran, Archan Misra, and Rajesh Balan. *IoT+ Small Data: Transforming in-store shopping analytics & services*. In Proceedings of the IEEE International Conference on COMMunication Systems & NETWORKS (COMSNETS '16). <http://dx.doi.org/10.1109/COMSNETS.2016.7439946>.

Sougata Sen. *Pervasive physical analytics using multi-modal sensing.* In Proceedings of the IEEE International Conference on COMMunication Systems & NETworkS (COMSNETS '16). <http://dx.doi.org/10.1109/COMSNETS.2016.7439998>.

Vigneshwaran Subbaraju, **Sougata Sen**, Archan Misra, Satyadip Chakraborty, Rajesh Balan. *Using Infrastructure-provided Context Filters for Efficient Fine-grained Activity Sensing.* In Proceedings of the IEEE International Conference on Pervasive Computing and Communication (PerCom '15). Pages 87-94. <http://dx.doi.org/10.1109/PERCOM.2015.7146513>.

Sougata Sen, Vigneshwaran Subbaraju, Archan Misra, Rajesh Balan, Youngki Lee. *The Case for Smartwatch-based Diet Monitoring.* In Proceedings of the WristSense Workshop on Sensing Systems and Applications Using Wrist Worn Smart Devices (PerCom '15 Workshops). Pages 585-590. <http://dx.doi.org/10.1109/PERCOMW.2015.7134103>. [Best Paper Award].

Sougata Sen. *Opportunities and Challenges in multi-modal sensing for regular lifestyle tracking.* In IEEE International Conference on Pervasive Computing and Communication PhD Forum (PerCom '15 PhD Forum). <http://dx.doi.org/10.1109/PERCOMW.2015.7134030>.

Sougata Sen, Dipanjan Chakraborty, Vigneshwaran Subbaraju, Dipyaman Banerjee, Archan Misra, Nilanjan Banerjee, Sumit Mittal. *Accommodating User Diversity for In-Store Shopping Behavior Recognition.* In Proceedings of the ACM International Symposium on Wearable Computers (ISWC '14). Pages 11-14. <http://dx.doi.org/10.1145/2634317.2634338>.

Tianli Mo, **Sougata Sen**, Lipyew Lim, Archan Misra, Rajesh Balan, Youngki Lee. *Cloud-based Query Evaluation for Energy-Efficient Mobile Sensing.* In Proceedings of the IEEE International Conference on Mobile Data Management (MDM '14). <http://dx.doi.org/10.1109/MDM.2014.33>.

Sougata Sen, Kartik Muralidharan. *Putting 'Pressure' on Mobile Authentication.* In Proceedings of the IEEE International Conference on Mobile and Ubiquitous networking (ICMU '14). Pages 56-61. <http://dx.doi.org/10.1109/ICMU.2014.6799058>.

Sougata Sen, Archan Misra, Rajesh Balan, and Lipyew Lim. *The case for cloud-enabled mobile sensing services.* In Proceedings of the MCC workshop on Mobile Cloud Computing (SIGCOMM Workshops '12). Pages 53-58. <https://doi.org/10.1145/2342509.2342521>.

Kumar Padmanabh, Adi Malikarjuna, V, **Sougata Sen**, Siva Prasad Katru, Amrit Kumar, Sai Pawankumar C, Sunil Kumar Vuppala, and Sanjoy Paul. *iSense: a wireless sensor network based conference room management system.* In Proceedings of the ACM Workshop on Embedded Sensing Systems for Energy-Efficiency in Buildings (BuildSys '09). Pages 37-42. <https://doi.org/10.1145/1810279.1810288>.

Kumar Padmanabh, Adi Malikarjuna, V, **Sougata Sen**, Puneet Gupta, *Random Walk on Random Graph based Outlier Detection in Wireless Sensor Networks.* In Proceedings of the IEEE International Conference on Wireless Communication and Sensor Networks. (WCSN '07). Pages 45-49. <https://doi.org/10.1109/WCSN.2007.4475745>.

DEMOS AND POSTERS

Sougata Sen, Vigneshwaran Subbaraju, Archan Misra, Youngki Lee, and Rajesh Krishna Balan, *Demo: Smartwatch based Food Diary & Eating Analytics.* In Proceedings of the International Conference on Mobile Systems, Applications, and Services (Mobisys '16). <https://doi.org/10.1145/2938559.2938569>

Meeralakshmi Radhakrishnan, Sharanya Eswaran, **Sougata Sen**, Vigneshwaran Subbaraju, Archan Misra, and Rajesh Krishna Balan. *Demo: Smartwatch based shopping gesture recognition.* In Proceedings of the International Conference on Mobile Systems, Applications, and Services (Mobisys '16). <https://doi.org/10.1145/2938559.2938572>.

Sougata Sen, Dipanjan Chakraborty, Dipyaman Banerjee, Archan Misra, Nilanjan Banerjee, Vigneshwaran Subbaraju, and Sumit Mittal. *Poster: SHOP: Store Habits Of People.* In Workshop on Mobile Computing Systems and Applications (HotMobile '14). http://www.hotmobile.org/2014/papers/posters/sen_shop.pdf

PATENTS

Kumar Padmanabh, Puneet Gupta, **Sougata Sen**, *System and method for forming application dependent dynamic data packet in wireless sensor networks* (US Patent 8,588,192).

Kumar Padmanabh, Adi M. R. Vanteddu, **Sougata Sen**, Amrit Kumar, Puneet Gupta, Lakshya Malhotra, Sunil Vuppala, *Method and system for creating a virtual wireless sensor network* (US Patent 8,649,298).

Sougata Sen, Ketan Patil, Animikh Ghosh, Parag Chauhan, Kumar Padmanabh, *Method and system to dynamically detect and form a master slave network* (US Patent 8,873,429).

BOOK CHAPTER

Kumar Padmanabh, **Sougata Sen**, Sanjoy Paul. *ZigBee versus Other Protocols and Standards*. In *ZigBee® Network Protocols and Applications* (pp. 301-344). Auerbach Publications. 2014. ISBN-13: 978-1439816011

PROFESSIONAL ACTIVITIES AND SERVICES

Program Committee: COMSNETS Graduate Forum 2019, International Conference on COMmunication Systems and NETworkS.

Program Committee: WristSense 2019, Workshop on Sensing Systems and Applications Using Wrist Worn Smart Devices (Co-located with IEEE PerCom).

Program Committee: IEEE MASS 2018, IEEE International Conference on Mobile Ad-hoc and Sensor Systems.

Program Committee: WristSense 2018, Workshop on Sensing Systems and Applications Using Wrist Worn Smart Devices (Co-located with IEEE PerCom).

Program Committee: UbiComp Doctoral Colloquium 2018, International Conference on Pervasive and Ubiquitous Computing.

Web Chair UbiComp 2018, International Conference on Pervasive and Ubiquitous Computing.

Reviewer: IMWUT 2018, Interactive, Mobile, Wearable and Ubiquitous Technologies Journal.

Reviewer: SAGE Publications International Journal of Distributed Sensor Networks (IJDSN).

Reviewer: IEEE Transactions on Mobile Computing (TMC).

Reviewer: Elsevier Pervasive and Mobile Computing (PMC).

Student Volunteer: COMSNETS 2016, International Conference on COMmunication Systems and NETworkS.

External Reviewer: MobiQuitous 2016, EAI International Conference on Mobile and Ubiquitous Systems: Computing, Networking and Services.

Student Volunteer: SECON 2014, IEEE International Conference on Sensing, Communication and Networking.

External Reviewer: ISWC 2013, ACM International Symposium on Wearable Computers.

AWARDS AND RECOGNITION

Junior Faculty/Postdoc Grant for UbiComp 2018

Postdoctoral Scholar Professional Development Award at Dartmouth for travel to UbiComp 2018

Best paper award at WristSense 2015 for paper titled *The Case for Smartwatch-based Diet Monitoring*

Carnegie Mellon University Overseas Exchange, funded by the Living Analytics research Center in SMU

Singapore Management University PhD scholarship (Full)

REFERENCES

Available upon request.

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