

SAPTARSHI DAS

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PROFESSIONAL OBJECTIVE

ECE Ph.D. candidate looking for challenging **Full-Time** opportunities (**Research Scientist / Data Scientist / Applied Scientist / Machine Learning Engineer**) starting **Dec 2019**.

RESEARCH INTERESTS

Wireless Networking, Embedded Systems, Energy-Efficient and Energy-Harvesting-Aware Networking Protocol Design (Medium Access Control, Routing), **Machine Learning, Neural Networks** (Deep Recurrent / Reinforcement Learning, Spiking Neural Networks) for **Prediction / Pattern Recognition, Evolutionary Multi-Objective Optimization, Autonomous / Continuous Structural Health Monitoring**

EDUCATION

Michigan State University (MSU), East Lansing, MI, USA Aug 2013 – Present
Ph.D. Candidate, Electrical and Computer Engineering **GPA: 3.75 / 4.0**
Advisor: Prof. Subir K. Biswas **Planned Graduation:** Dec 2019
Thesis Title: “Towards Energy-Efficient and Harvesting-Aware Sensor Networking and Event Detection Architectures for Energy-Harvesting-Powered Structural Health Monitoring Systems”

Heritage Institute of Technology (HITK), Kolkata, WB, India 2007 – 2011
Bachelor of Technology (B.Tech), Electronics and Communication Engineering **GPA: 8.88 / 10.0**

TECHNICAL SKILLS / PLATFORM EXPERIENCE

Languages: C / C++ / Java / Python / Scala (General Purpose), MATLAB / R (Computational / Statistics), Awk / Bash / Groovy / JavaScript (Scripting), NesC / Arduino / Assembly (Embedded Systems)
Platforms: Keras / TensorFlow / Torch / Google Cloud (Machine Learning), Nest (Spiking Neural Nets), NS3 / ONE (Network Simulation), Avida / NSGA (Genetic Algorithms), Android SDKs / AngularJS / HTML5 / CSS3 (Mobile / Web App Design), Blender (3D Printing / Design), D3.js (Data Visualization), OracleDB / SQLite / MongoDB / PL-SQL / Firebase (Database Systems), Spark / Pandas (Big Data)

WORK EXPERIENCE

NETWORKED EMBEDDED AND WIRELESS SYSTEMS (NEEWS) LAB, MSU (East Lansing, USA) Aug 2013 – Present
Graduate Research Assistant / Teaching Assistant

Worked in a number of projects funded by NASA, NSF etc. involving design / implementation of networked, embedded sensing devices / systems for varied applications and energy-efficient network communication protocols / architectures for these, in collaboration with diverse teams, Instructed multiple ECE undergrad labs (Digital Control, Electronic Instruments, RF Circuits) and mentored two undergrad researchers

RESEARCH OUTPUT

15 peer-reviewed publications (95 citations, h-index: 6, i-10 index: 5, Google Scholar: <https://scholar.google.com/citations?user=BL1ZY88AAAAJ>), 3 conference presentations, 1 U.S. Patent granted (2018), 1 applied (2019), Multiple Research / Travel Fellowships (Domestic / International) received

SELECTED PROJECTS

- 1) **Energy-Aware Through-Substrate Ultrasonic Pulse Communication for Structural Health Monitoring Systems** – Developed state-of-the-art energy-efficient communication protocol (pulse time-based encoding) and structural anomaly detection (binary event data) paradigms, System architecture and protocols development, event-driven simulation (C++) and evaluation, Hardware prototype.
- 2) **Energy-Efficient Event Pattern Recognition using Spiking Neuron-Based Learning and Pulse Networking** – Developed novel learning and networking paradigm, Brain-inspired Spiking Neuron-based Learning Adaption with energy-light Pulse Networking for optimal performance.

- 3) **Wearable Networked Multi-Modal Sensing System for Cost-Effective and Privacy-Friendly Detection and Measurement of Meaningful Behavioural Interactions in Limited Space Environments (Space Station / Space Settlement analogues for team cohesion studies – NASA HERA / HI-SEAS projects, Early childhood classrooms for detection of early childhood social development and autism indicators – MSU Child Development Lab)** – Novel System Architecture and Application Paradigm (Indoor Behavioural Tracking using infrastructure-free ultrasonic sensing) development, Sensing and communication Software / Hardware (Embedded) development, 3D Case Design (Blender), Realtime GUI (Visual Basic) design.
- 4) **Ultra-Energy-Efficient Solar-Harvesting-Powered Distributed Wireless Sensing System for Greenhouse Environment Monitoring and Control** – Developed novel energy-efficient communication paradigm (pulse interval encoding), maintenance-free operation, end-to-end system dev (greenhouse to cloud), Long Short-Term Memory (LSTM) Neural Network-based prediction of harvesting availability for communication protocol adaptation, Realtime Online GUI (Firebase / AngularJS).

TECHNICAL EXPOSURE

Substantial experience in systems / architecture / communication protocol design and programming on various software (full stack) and hardware (embedded devices such as Mica2, IRIS, Cricket, Arduino Uno / Yun / Pro Mini / Raspberry Pi etc.) platforms. Development familiarity with a large variety of sensors (piezoelectric, IR, audio, temperature, CO2 detection, Photosynthetically Active Radiation etc.) and embedded sensor communication interfaces (I2C, SPI, UART)

INFOSYS LTD. (Chennai / Bangalore / Mysore, India)

Aug 2011 – Aug 2013

Systems Engineer (2011-13) and **Systems Engineer Trainee** (2011)

Worked as a developer in the Financial Services (banking) domain, delivering projects for a Big-4 U.S. Bank

PROJECTS

- 1) **Automatic Check Image Processing and Handling**
- 2) **Customer Information, Risk and Offers Management**

Involved in all phases of the software development life cycle (design, coding, testing, maintenance) across multiple projects

Handled the responsibilities of Configuration Controller for a multi-city project team (20-30 members)

TECHNICAL EXPOSURE

Extensive full-stack development experience on the Java platform, Oracle / IBM Database systems, SOAP / REST Web Services etc. and wide exposure to a range of established programming frameworks, tools and design patterns

SELECTED PUBLICATIONS / PATENTS

- 1) **S. Das**, H. Salehi, Y. Shi, S. Chakrabartty, R. Burgueño, and S. Biswas, “Towards Packet-less Ultrasonic Sensor Networks for Energy-harvesting Structures”, **Computer Communications Journal**, 2016
- 2) H. Salehi, **S. Das**, S. Chakrabartty, S. Biswas, and R. Burgueño, “Structural damage identification using image-based pattern recognition on event-based binary data generated from self-powered sensor networks”, **Structural Control and Health Monitoring Journal**, 2017
- 3) S. Biswas, D. Feng, F. H. Memar, **S. Das**, “Method and Device for Transmitting Data using Inter-Pulse Interval Modulation Technique”, **U.S. Patent, US 10051663 B2**, 2018

SELECTED PH.D. COURSEWORK

Neural Networks and Deep Learning, Advanced Computer Architecture, **Advanced Operating Systems**, **Stochastic Processes and Applications**, Evolutionary Computation, Evolutionary Multi-Criterion Optimization and Decision-Making, **Design and Theory of Algorithms**, Algorithmic Graph Theory

LEADERSHIP / AFFILIATIONS

Secretary for League of Electrical Engineering Graduate Students (LEEGS)

2014 - 2016

Organized monthly meetings, peer-help sessions, technical workshops and social gatherings to help the ECE community in MSU and foster collaboration and camaraderie among them