NITISH NAGESH

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Research Interests

Internet of Things, Embedded Systems, Edge Computing, Digital and Sustainable Agriculture

Education

University of California, San Diego — San Diego, CA
Visiting Graduate Student, Dept. of Computer Science and Engineering — *Aug. 2020 – present*

University of California, San Diego, Extension — San Diego, CA
University and Professional Studies, Computer Science and Engineering; Major GPA: 3.73/4.0 — *Sep. 2019 – Jun. 2020*

Technical University of Munich — Munich, Germany
M.S. in Power Engineering, Dept. of Electrical and Computer Engineering; CGPA: 3.1/4.0 — *Oct. 2018 – Dec. 2020 (expected)*

R.V. College of Engineering — Bengaluru, India
B.E. in Electrical and Electronics Engineering; CGPA: 3.65/4.0 — *Aug. 2012 – July. 2016*

Research Experience

University of California, San Diego — San Diego, CA
Student Researcher, System Energy Efficiency Lab, Principal Investigator: Prof. Dr. Tajana Rosing — *Sep. 2019 – present*

- Validated a reliability simulation framework for IoT networks using Python and C/C++ and achieved 90% accuracy
- Built a hybrid mesh network testbed of 10 edge devices communicating via MQTT and Wi-Fi mimicking a real-world IoT network to measure impact of resource constraints on reliability
- Currently developing novel reliability-aware task allocation strategies using integer linear programming with the aim of reducing overall network maintenance cost

University of California, San Diego — San Diego, CA
Directed Research, Supervisor: Prof. Dr. Pat Pannuto — *Jan. 2020 – Jun. 2020*

- Developed a remote monitoring tool to infer relationship between soil pH, soil conditions and ambient environment unlike traditional stand-alone systems
- Effectuated targeted fertilizer application by calibrating a soil pH sensor with an average accuracy of 75%
- Researched nitrate sensing techniques in large scale deployments to measure and predict nitrate concentration
- Reviewed machine learning approaches to predict nitrate levels in groundwater useful in estimating crop yields

R.V. College of Engineering — Bengaluru India
Bachelor's Thesis, Supervisor: Prof. Dr. K Uma Rao — *Jan. 2016 – Jun. 2016*

- Developed a real-time cloud-based diagnostic tool for detecting faults in a micro-grid using expert system and artificial neural networks
- Effectuated an alert generation system based on criticality the of faults leading to improved productivity and reduced maintenance costs

Publications

- ***In Progress:*** **Nitish Nagesh**, Kazim Ergun, Tajana Rosing, **"Reliability-aware task allocation in IoT networks"**.
- Ergun, Kazim, Xiaofan Yu, **Nitish Nagesh**, Ludmila Cherkasova, Pietro Mercati, Raid Ayoub, and Tajana Rosing. **"RelIoT: Reliability Simulator for IoT Networks."** In International Conference on Internet of Things, pp. 63-81. Springer, Cham, 2020
- Ergun, Kazim, Xiaofan Yu, **Nitish Nagesh**, Ludmila Cherkasova, Pietro Mercati, Raid Ayoub, and Tajana Rosing. **"Simulating Reliability of IoT Networks with RelIoT."** In 2020 50th Annual IEEE-IFIP International Conference on Dependable Systems and Networks-Supplemental Volume (DSN-S), pp. 25-28. IEEE, 2020.
- Rao, K. Uma, Akash G. Parvatikar*, S. Gokul*, **N. Nitish***, and Pramod Rao*. **"A novel fault diagnostic strategy for PV micro grid to achieve reliability centered maintenance."** In 2016 IEEE 1st International Conference on Power Electronics, Intelligent Control and Energy Systems (ICPEICES), pp. 1-4. IEEE, 2016. *equal contribution

Industrial Experience

General Electric, Healthcare Division Bengaluru, India
Operations Management Leadership Program (OMLP) Intern *Jun. 2015 – Jul. 2015*

- Conceptualized single piece flow in an assembly line of X-Ray devices increasing productivity by 60%
- Created a data monitoring template using Failure Mode Effect and Criticality Analysis (FMECA) tool which led to reduction in equipment downtime by 30%
- Designed a new layout for the high voltage (HV) tanks equipment area enabling undisturbed access to personnel and allowing smoother flow of materials

Projects

Interactive global energy consumption dashboard San Diego, CA
Lab Project: Renewable and Sustainable Energy, Supervisor: Prof. Dr. Thomas Hamacher *Apr. 2020 – July. 2020*

- Developed first-of-its kind energy parameter visualization platform for 200+ countries using Dash
- Deployed scalable and globally accessible website using Heroku sourcing data from a structured SQL database using SQLite.
- Actualized user-friendly interface for parameters with customizable checkboxes and predictions using logistic regression in Python

Algorithm design and benchmarking for FPGA San Diego, CA
Course Project: Validation and Testing of Embedded Systems, Supervisor: Prof. Dr. Ryan Kastner *Jan. 2020 – Mar. 2020*

- Achieved average 85% throughput for FIR filter, DFT, FFT using on PYNQ-Z2 FPGA using Vivado High Level Synthesis (HLS).
- Added a new benchmark to the Spector HLS benchmark suite for FPGA by implementing canonized Huffman Encoding in C++
- Optimized design space with 15% higher throughput range and 60% greater pareto points compared to baseline

Real-time soil environment monitor with pest deterrence San Diego, CA
Course Project: Introduction to Embedded Computing, Supervisor: Prof. Dr. Tajana Rosing *Jan. 2020 – Mar. 2020*

- Outperformed traditional sensing techniques with remote soil sensing and active real-time pest deterrence using Linux, C/C++
- Introduced predictive capabilities within 10% sensing range based on linear regression using the Scikit-learn library in Python
- Visualized soil vitals on an interactive online dashboard developed using HTML, CSS, Flask and JavaScript

Contactless trash weight estimator San Diego, CA
Course Project: Embedded Computing and Communication, Supervisor: Prof. Dr. Aaron Schulman *Sep. 2019 – Dec. 2019*

- Attained 70% accuracy in determining an unknown amount of grocery waste using C/C++ and principles of RF attenuation
- Observed less than 25% standard deviation during prototype testing using received signal strength indicator (RSSI) metric
- Realized hands-off food waste estimation without modifying existing trash bin structure by simple retrofitted add-ons

Honors and Awards

- Best Outgoing Student (1st in 70), R.V. College of Engineering, Bengaluru, India, 2016
- Silver Medal for Academic Excellence (2nd in 70), R.V. College of Engineering, Bengaluru, India, 2016
- Most Innovative Bachelor's Thesis (2nd in 70), R.V. College of Engineering, Bengaluru, India, 2016
- TUM Scholarship for International Students for all-round excellence, 1 among 200 students, Government of Bavaria in Germany, 3 consecutive times, 2019 – 2020
- TUM Young Academy Scholarship for passion towards science, 1 among 40 students, Technical University of Munich, Germany, 2019
- PROMOS Scholarship – travel grant for writing master thesis abroad, 1 among 50 students, German Academic Exchange Service (DAAD), 2020
- Richard Newton Student Fellow Program (1 among 80), Grant to attend (virtual) 57th Design Automation Conference (DAC), San Francisco, USA, 2020
- Travel grant to attend Advanced Technology Higher Education Network (ATHENS) Week (1 among 80) at the Technical University of Delft, Netherlands, 2019

Skills

- **Programming:** MATLAB, Python, C, Embedded C, C++, Java, Tcl
- **Software Tools and Packages:** Simulink, Arduino IDE, Git, Vivado HLS, SQL, HTML, CSS, Dash, I2C, UART, SPI, Code Composer Studio, Pandas, NumPy, Scikit-learn, Matplotlib
- **Hardware:** Oscilloscope, Logic Analyzers, Arduino, Raspberry Pi, NodeMCU, PYNQ-Z2
- **Languages:** English (Native/Bilingual proficiency), German (Limited working proficiency), Telugu (Mother Tongue), Kannada (Native/Bilingual proficiency), Hindi (Limited working proficiency), Tamil (Elementary proficiency)

Volunteering and Outreach

Community Service Bengaluru, India
SMVA Trust, NGO *Aug. 2016 - Sep. 2018*

- Actively engaged in "Feeding the Hungry" project for 20 hours/month where my team and I distributed freshly cooked meals to the destitute and homeless in Bengaluru
- Involved in visiting villages outside Bengaluru, feeding the poor, distributing clothes, environmental stewardship, and offering humanitarian assistance during natural calamities

Mentoring Munich, Germany
Technical University of Munich *May 2019 – Aug. 2019*

- Buddy for TUM Practical Research Experience Program (PREP) students - Assisted undergraduate student from UC Berkeley in overcoming logistical and cultural challenges while at TUM
- Mentor for International Exchange Student, Department of Electrical and Computer Engineering - Supported student from National Chiao Tung University, Taiwan with program-specific questions

Activities and Leadership

- Secretary, Torrey Pines Toastmasters Club, University of California San Diego, USA, 2020
- Micro MBA, Rady School of Management, University of California San Diego, USA, 2020
- Member, Association of Indian Graduate Students (AIGS), University of California San Diego, USA, 2019
- Hackathon experience - Science Hack, 3rd out of 7 teams, TUM, 2018; Akraino hackathon, 3rd out of 50 participants, Qualcomm, 2019; SD Hacks, 2nd out of 200 participants, UCSD, 2019
- Organizer - Science Hack, Hackathon at TUM, 2020; RE-City, Techfest at RVCE, 2015
- Debating - Won multiple awards at the national level for adjudication in parliamentary debating in India, 2012 - 2014