Supriya Chinthavali

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PROFFESIONAL EXPERIENCE

Supriya Chinthavali is a group leader for the Geoinformatics Engineering and Scalable Computing group at Oak Ridge National Laboratory. Over the last nine years, she has served as a principal investigator on several projects related to the energy sector's situational awareness, policy analysis, and smart grid; and in understanding cascading impacts on critical infrastructures during extreme events. She is currently the data-lead for DOE's EAGLE-I (DOE's Energy Sector Real-Time Situational Awareness Tool) project and is serving as the project manager for DOE's Outage Data Initiative Northwest (ODIN) effort. As a certified scrum master, she is actively contributing toward a multi-lab effort titled as "North American Energy Resilience Model." She has a master's degree in computer science and engineering and in automotive embedded systems. Previously, she worked for Delphi Automotive systems as an advanced software engineer for four years.

2019(May)-Present	***Group Leader, Oak Ridge National Laboratories*, Knoxville, TN**

- **NAERM (North American Energy Resilience Model)**: As a SCRUM MASTER, currently coordinating multi-national laboratories in developing the infrastructure and visualization platform for the NAERM project funded by the Department of Energy – Office of Electricity.

2013(June)-2019(April)	***R&D Associate/Computer Scientist, Oak Ridge National Laboratories*, Knoxville, TN**

- **Alabama Connected Neighborhood**: As a data analytics PI, currently working towards developing a web-based visualization and data analysis software for the Alabama Connected Neighborhood project which includes static/dynamic visualizations of streaming Internet of Things data from residential homes (e.g. HVAC, water heaters, thermostats, etc.) that support live monitoring as well as provide explorative dashboards for understanding the efficiency of residential-level optimization (used to reduce energy intensity and increase energy efficiency).
- **Deep Cyberia:** Currently conducting research into characterizing sensors, actuators and other non-IP addressable components within a Cyber-Physical System (CPS) using SCRUM. The project scope covers deepening our understanding of the tug and tradeoff between invasiveness and intelligence. Greater invasiveness into a network to gather additional data will generally provide increased information that can lead to deeper understanding of the Supervisory control and data acquisition (SCADA) system and enhance the intelligence about the system.
- **Outage Data Initiative (ODI)**: As a PI, currently working towards a pilot demonstration of regional outage map that is ODI International Electrotechnical Commission (IEC) standards compliant for the Washington state through collaboration with DOE, Electric Power Research Institute (EPRI), several electric utilities, and other utility vendor companies.
- Rapid development of **Digital Twin Framework (DTF)** for CPSs using SCRUM: Developed and demonstrated two implementations of DTF for the electric grid and a canal lock water system using state of the art technologies to help detect cyber-attacks.
- **Clean Energy Innovation Ecosystems Discovery**-Measuring Innovation through Data Analytics (**MIDAS**) (DOE-Energy Policy Systems Analysis (EPSA)): Developed and delivered an end-to-end application that uses data to determine where clean energy innovation ecosystems exist and the underlying scoring algorithm "ranks" the strength of the ecosystem for several clean energy technologies (solar, wind, hydropower, energy efficiency etc.).
- **EAGLE-I Data Lead** (DOE-Office of Electricity): Developed and implemented new ETL architecture for the National Outage Map to replace the existing Microsoft based SSIS stack. Maintenance of the existing production system and improve data quality.

- Development of the **Energy Finance Data Warehouse (EFDW)** to enable analysis and visualization of energy finance datasets.
- Development of a **Project Finance Mapping Tool** to allow stakeholders from the DOE-EPSA to quickly evaluate the financial impacts of select policy choices for new power projects.
- **Predicting Propagation Consequences within Synergistically Interacting Infrastructure Networks** (URBAN-NET): As a PI, developed novel critical infrastructure modelling and decision support system architecture using graph network theory.
- Developed and implemented new visualization interface for the Industrial Geospatial Analysis Tool for Industrial Energy Evaluation (IGATE-E-CHP) tool for DOE-Advanced Manufacturing office, Combined Heat and Power-Technology Assessment Programs office and other stakeholders.
- Development of the visualization platform for stakeholder observation based upon DOE-OE developed Visualizing Energy Resources Dynamically on Earth (VERDE) platforms and protocols for Smart Power Infrastructure Demonstration for Energy Reliability and Security (**SPIDERS**) program.

2012(March)-2013(May)	*R&D Assistant, Oakridge National Laboratories*, Knoxville, TN

- Visualization of time domain simulations using ORNL's Toolkit for HYbrid Modeling of Electric power systems (THYME) simulator operating on ORNL's Keeneland cluster, and providing an user interface to display the grid components' statuses and their assessed alerts to the power system operators via Google Earth geographic platform to individual tablets.
- Configuration of general query frontend prototype against Medicare claims data with geographic drilldown using Tableau.
- User interface setup of an interactive web-based BI tool to display correlation between Medicare and Medicaid costs for dual eligibles using Tableau Software.
- Webpage development and data management for real-time energy data pertinent to the Solar, Electric Vehicles, and battery for ORNL campus obtained from multiple websites.
- Setup and maintenance of test and production Geoservers for the Energy Awareness Resiliency Standardized Services program.

2010 (Mar) –2012(Mar)	*Post Master's Research Associate, Oakridge National Laboratories*, Knoxville, TN

- Development of a complete application that displays the distribution level outages for the USA at county level on the Google Earth using Java platform (J2EE) and Tomcat Web servers.
- Development of critical applications for the Electric grid using Space-time Awareness Tool (STAS) such as displaying real-time status of the US Electric Grid (Transmission level).
- Development of a complete application that displays the distribution level outages for the USA at county level on the Google Earth using Java platform (J2EE), Tomcat and Mysql, postgresql database.
- Development of critical applications for the US Electric grid using STAS such as displaying real-time status of the US Electric Grid (Transmission level).
- Development of visualization layers for the Strategic Materials supply and production chain worldwide to provide wide area situational awareness.
- Extraction of the latest tweets with US distribution outage details from all the utility boards posted on twitter, selective filtering to get critical outage information and provide them as real-time feeds.
- Visualizing the General Electric GridLAB-D distribution power flow models as heat-maps, time animations at a distribution level on Google Earth platform.

2008 (April) –2008(Sept)	*Advanced Software Engineer, Delphi Automotive Systems*, Bangalore, India

- HWI interface development for the DCM2.5 program using 16 bit XC2786 microcontroller for communication, port and analog to digital converter modules.

- Device Driver Development for the 32bit Renesas Microcontroller (SH27513)for the Toyota MY011 program using the CDSW architecture.
- Integration of the AUTOSAR Device Drivers with the platform layer software of the Toyota MY011 program ECU.
- Implementation of the Digital Signal Processing Knock Algorithm from Toyota using the Renesas Microcontroller for the MY011 program.

2005(June) – 2008 (March)	*Software Engineer, Delphi Automotive Systems*, Bangalore, India

- Complete Configurable Device Driver Software (CDSW) device drivers development for the Renesas Microcontroller used in the Toyota MY011 ECU's.
- Tested Device Driver Software with Hardware Test Software using the Lauterbach Debugger.
- Support production development programs –Toyota MY011, E78, D1, BAS+ for device driver configuration.
- Developed device drivers for Timer modules of various microcontrollers (eSYS,used for GM, Renesas).
- Implemented Serial Peripheral Abstraction layer (SPAL) driver modules, PORT, General purpose Timers (GPT) and Electronic Control Unit (ECU) State Manager using AUTOSAR specification documents and tested completely on the S12X evaluation board.
- Was responsible for serial communication modules for D1(Power train Diesel Project for GM and E78 programs).
- Implemented Direct Memory Access (DMA) and Analog to Digital converter interrupt related interfaces for the eSyS microcontroller used for GM programs.
- Tested the Ford Entertainment System Software using the MXVDEV tool provided by Micromax. Developed test plans and executed the tests on the tool.

TECHNICAL SKILLS

Languages:	C programming on 8-bit, 16-bit and 32-bit micros, Java, C#, C++, XML
Scripting Languages:	Perl, Python, JavaScript, D3.js
Visualization tools:	Tableau, Space Time Insight, QlikView, FME, mySCADA
Software:	MATLAB/SIMULINK, R, OCTAVE
Database:	MySQL, Postgresql, Green plum, Microsoft SQL
Operating Systems:	Windows, Linux-Ubuntu, RHEL5, Mac OS
Technologies:	Machine learning, Blockchain

Microcontrollers:	Renesas, XC2786, PowerPC – Taipan, Viper, Cuhead.
Development Tools	Lauterbach, Tasking Cross Pro, CodeWarrior, PSoC Designer.
Communication Protocols:	SPI, CAN and LIN (basics)
Testing Tools:	MXVDEV, RTRT
Static Verification Tools:	QAC, MTS-SMART
Configuration Management:	CM synergy, Subversion (SVN)
Networking:	ZeroMQ, NATS

INVENTION DISCLOSURES, PATENTS, COPYRIGHTS

- 2 invention disclosures for MIDAS and URBAN-NET project. Provisional Patent submitted for MIDAS.
- 2 copyright filings – For URBAN-NET LDRD and the MIDAS project.

AWARDS AND ACHIEVEMENTS

- **Certified SCRUM master** (2018)

- "Certificate of completion" for a Blockchain online course titled "**MIT Sloan Blockchain Technologies: Business Innovation and Application**"(2018).

- Significant Event Award for "**Seamless transition of EAGLE-I from DOE HQ to ORNL**" (Dec 2016)

- "Innovation and Creativity Award" quarterly award for CCSD directorate for outstanding contributions to **Clean Energy Innovation Ecosystems Discovery**- Measuring Innovation through Data Analytics (**MIDAS**)

- "**Directors Club Award**" in appreciation of commitment, dedication and contribution towards the continuing success of TCI working for the Configurable Development Software (CDSW) team.

- "Certificate of Appreciation" for contribution to the Powertrain Diesel D1 program.

- "**AUTOSAR PREMIUM AWARD**" for developing the SPAL module drivers for the S12X microcontroller used for testing the IO HARDWARE ABSTRACTION module owned and developed by Delphi.

EDUCATION

2012 – 2015   **(M.S) in Georgia Institute of Technology**
Atlanta, Georgia, Tennessee, USA

2006 – 2008   **(M.S) in Automotive Embedded Systems**
Manipal Academy of Higher Education,, Karnataka, India.

2001 – 2005   **B.E. in Electronics and Communications Engineering**
Vishweshwariah University of Technology,, Karnataka, India

GRADUATE AND UNDERGRADUATE RESEARCH PROJECTS

Thesis: "To develop a low cost programmable vehicle simulator for ECU (Electronic Control Unit) testing".

Programmable Miniature Simulator (Level 2)
- GUI part of the vehicle simulator developed using Visual Basic (6.0) and Visual C++ which provides a facility to create a set of signals required for testing the ECU.
- CY8C29466 (PSoC) programming in C to generate discrete/analog/PWM signals by decoding the data received from the GUI.
- PC to PSoC communication using Parallel Port which supports 7 PSoC chips.

Miniature Simulator (Level 1)
- Development of a Miniature vehicle simulator controlled by the SoC used for ECU testing and Validation concept.
- Generated the appropriate signals using the PSoC chip which were fed to the hardware module for signal conditioning. PC to PSoC communication using Serial Port.

ACTIVITIES

- Member of the ACM.

- Member of the ORNL CCSD Software Council and lead for the software attribution and metrics development.

FUNDING PROFILE

Project Name and Sponsor: **Alabama Connected Neighborhood** – DOE OE, DOE-EERE
Role: Sub-PI
Funding Amount: **~1M**
Period of Performance: FY19- FY20

Project Name and Sponsor: **Outage Data Initiative** – DOE OE-AGR
Role: PI
Funding Amount: **400K**

Period of Performance: FY18- FY19

Project Name and Sponsor: **Alabama Connected Neighborhood** – DOE OE, DOE-EERE
Role: PI
Funding Amount: **400K**
Period of Performance: FY18- FY19

Project Name and Sponsor: **EAGLE-I** – DOE OE-ISER
Role: Data Lead
Funding Amount: **800K**
Period of Performance: FY16- FY17

Project Name and Sponsor: **Clean Energy Innovation Ecosystems Discovery** - DOE EPSA
Role: Principal Investigator
Funding Amount: **200K**
Period of Performance: FY16- FY17

Project Name: **URBAN-NET** – ORNL LDRD
Role: Principal Investigator
Funding Amount: **700K**
Period of Performance: FY16-FY17

Project Name: Energy Finance Data warehouse(EFDW)– ORNL LDRD
Role: Principal Investigator
Funding Amount: **200K**
Period of Performance: FY15-FY16

SELECTED PUBLICATIONS

Lin, J., Chinthavali, S., Stahl, C. D., Stahl, C., Lee, S., & Shankar, M. (2016). Ecosystem discovery: Measuring clean energy innovation ecosystems through knowledge discovery and mapping techniques. *The Electricity Journal*, *29*(8), 64-75.

Duan, S., Lee, S., Chinthavali, S., & Shankar, M. (2016, August). Reliable communication models in interdependent critical infrastructure networks. In *Resilience Week (RWS), 2016* (pp. 152-157). IEEE.

Lee, S., Chinthavali, S., Duan, S., & Shankar, M. (2016, June). Utilizing semantic big data for realizing a national-scale infrastructure vulnerability analysis system. In *Proceedings of the International Workshop on Semantic Big Data* (p. 3). ACM.

Zeng, C., Hendrickson, S., Lee, S. M., Chinthavali, S., Lin, J., Hsieh, E., & Shankar, M. (2017). Energy finance data warehouse: Tracking revenues through the power sector. *The Electricity Journal*, *30*(3), 4-9.

Duan, S., Lee, S., Chinthavali, S., & Shankar, M. (2017, January). Best Effort Broadcast under Cascading Failures in Interdependent Networks. In *Proceedings of the 18th International Conference on Distributed Computing and Networking* (p. 27). ACM.

Lee, S., Chen, L., Duan, S., Chinthavali, S., Shankar, M., & Prakash, B. A. (2016, December). URBAN-NET: A network-based infrastructure monitoring and analysis system for emergency management and public safety. In *2016 IEEE International Conference on Big Data (Big Data) (pp. 2600-2609).* IEEE.

Barker, A. M., Freer, E. B., Omitaomu, O. A., Fernandez, S. J., Chinthavali, S., & Kodysh, J. B. (2013, April). Automating natural disaster impact analysis: An open resource to visually estimate a hurricane's impact on the electric grid. In *2013 Proceedings of IEEE Southeastcon* (pp. 1-3). IEEE.

M. Olama, K. Spafford, O. Omitaomu, S. Chinthavali, and S. Fernandez, "High Performance Computing for Real-Time Detection of Large Scale Power Grid Disruptions," In *Proceedings of the Modeling, Simulation, and Optimization for the 21st Century Electric Power Grid Conference, Oct. 21-25, 2012.*

M. Shankar, S. Chinthavali, "An Information Overlay for Grid Stability Alerts", In *Proceedings of the 7th Annual CIGRÉ Canada Conference on Power Systems, Sept 24-25, 2012*

FIELDS OF INTEREST

- Information visualization and analysis of the electric grid and complex infrastructure systems
- Data and visual analytics, Machine learning, Deep Learning
- Automotive embedded systems, Digital Signal Processing

REFERENCES

- Jessica Lin, Senior Fellow, DOE Office of Energy Policy and Systems Analysis
- Budhendra Bhaduri, Corporate Fellow, ORNL
- Jibonananda Sanyal, Staff Scientist and Team Lead