

# Shree Hari Sureshbabu

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Purdue University

School of Electrical and Computer Engineering  
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## EDUCATION

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2018 – Present	<b>Ph.D.</b> in Electrical and Computer Engineering Purdue University, West Lafayette, Indiana, USA GPA: 3.49
2014 - 2018	<b>B.E</b> in Electrical and Electronics Engineering M.S. Ramaiah Institute of Technology, Bangalore, Karnataka, India GPA: 9.52/10.0

## SKILLS

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**Programming Languages:** C/C++, Java, HTML, JavaScript, Python, Bash, PHP

**Libraries:** PyTorch, TensorFlow, Keras, NumPy, PennyLane, Qiskit

**Software and Tools:** Silvaco TCAD, MATLAB, LabVIEW, Origin, Git, Cadence Virtuoso

**Fabrication Techniques:** Spin coating, Electron beam lithography (EBL), Thermal and e-beam evaporation, Sputtering, Chemical Vapor Deposition, Atomic Layer Deposition

**Characterization Techniques:** Capacitance-Voltage, IV-CV, Scanning Electron Microscopy, Ultraviolet spectroscopy, X-ray Diffraction.

## RESEARCH EXPERIENCE

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Aug'18 – Present	<b>Graduate Research Assistant</b> , School of Electrical and Computer Engineering, Purdue University, West Lafayette <i>Advisors: Prof. Sabre Kais &amp; Prof. Zubin Jacob</i> <i>Research:</i> <ul style="list-style-type: none"><li>• Quantum Machine Learning for electronic structure calculations.</li><li>• Design and Fabrication of BP based FETs.</li><li>• Worked on atomistic simulation of III-V devices.</li></ul>
Nov'17 – April'18	<b>Research Student, Undergraduate Thesis</b> , Centre for Nano Science and Engineering Indian Institute of Science, Bangalore <i>Advisor: Prof. Digbijoy N. Nath</i> <i>Research: Modelling of 2D/3D heterostructure based photodetector for deep UV applications.</i>
June'17 – Aug'17	<b>Summer Research Intern</b> , Polymer Processing Laboratory, Centre for Nano Science and Engineering Indian Institute of Science, Bangalore <i>Advisor: Prof. S.A. Shivashankar</i> <i>Research: Characterization and application of Cu<sub>2</sub>S nanoparticles using microwave irradiation.</i>

Aug'16 – June'17	<b>Research Assistant</b> , Department of Medical Electronics, M.S. Ramaiah Institute of Technology, Bangalore <i>Advisors: Prof. Sriraam. N and Dr. A.S. Hegde (Director - Neurosurgeon, M.S. Ramaiah Memorial Hospital, Bangalore)</i> <i>Research: Processing of Electroencephalogram data for the real-time detection of epileptic seizures with a long-term goal to study Alzheimer's disease.</i>
June'16 – Aug'16	<b>Summer Research Intern</b> Polymer Processing Laboratory, Centre for Nano Science and Engineering Indian Institute of Science, Bangalore <i>Advisor: Prof. S.A. Shivashankar</i> <i>Research: Synthesis and Characterization of CuAlO<sub>2</sub> nanoparticles using microwave irradiation.</i>

## RELEVANT COURSES

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Jun'20 – Aug'20	<b>Online course on "Quantum Mechanics and Quantum Computation" (edX course)</b> Instructor: Prof. Umesh Vazirani University of California, Berkeley.
Jun'20 – Aug'20	<b>MA 511 "Linear Algebra with Applications"</b> Instructor: Prof. Ying Chen Purdue University.
Jan'20 – May'20	<b>PHYS 526 "Quantum Computing"</b> Instructor: Prof. Yuli Lyanda-Geller Purdue University.
Jul'19 – Sep'19	<b>Online course on "Quantum Machine Learning" (edX course)</b> Instructor: Prof. Peter Wittek University of Toronto. <i>As part of the course, I worked on Qiskit and implemented the following:</i> <ul style="list-style-type: none"> <li>• Gate-Model Quantum Computing</li> <li>• Quantum Annealing for Optimization</li> <li>• Variational Circuits</li> <li>• Ensemble Learning &amp; Discrete Optimization</li> <li>• Discrete Optimization in Unsupervised Learning</li> <li>• Quantum-Enhanced Kernel Methods</li> <li>• Quantum Phase Estimation</li> <li>• Quantum Matrix Inversion</li> </ul>
Aug'16 – Sep'16	<b>Online course on "Magnetic materials and devices" (edX course)</b> Instructor: Prof. Caroline Ross, MIT Department of Materials Science and Engineering.

## AWARDS

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- Meissner Fellowship, Purdue University.
- Award for Academic Achievement by BEML Limited, 2014.
- Samskruthi Award by Janmabhoomi Samskruthika Nagarikara Vedike, Bangalore, 2012.
- State Bank of India Scholarship.

## **PUBLICATIONS**

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- Wang, K. C., Grassi, R., Chu, Y., **Sureshbabu, S. H.**, Geng, J., Sarangapani, P., ... & Kubis, T. "Introduction of Multi-particle B<sup>+</sup> Tracer Probes--Bridging the Gap between Drift Diffusion and Quantum Transport". Journal of Applied Physics **128**, 014302 (2020).

## **RESEARCH PROJECTS**

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### **Purdue University, West Lafayette, Indiana, USA (December 2019 – Present)**

School of Electrical and Computer Engineering and Department of Chemistry

*Ph.D. Student*

*Advisors: Prof. Sabre Kais & Prof. Zubin Jacob*

- Implemented a Restricted Boltzmann Machine (RBM) based algorithm to obtain the electronic structure of H<sub>2</sub>, LiH, and N<sub>2</sub> using Qiskit's qasm simulator.
- Implemented the above algorithm for H<sub>2</sub> molecular system for 8 qubits using IBM's "ibmq\_16\_melbourne" device and also utilized the "Measurement Error Mitigation" in order to obtain better converged results.
- Currently working on implementing this algorithm to study the many-body effects of periodic materials on a quantum computer.

### **Purdue University, West Lafayette, Indiana, USA (May 2019 – August 2019)**

Birck Nanotechnology Center

*Ph.D. Student*

*Advisor: Prof. Joerg Appenzeller*

- Fabricated Field Effect Transistors (FETs) using 2D materials for logic and hardware security applications.
- Modeled the device in Python and analyzed the effect of gating in the Schottky barrier FETs.

### **Purdue University, West Lafayette, Indiana, USA (August 2018 – May 2019)**

School of Electrical and Computer Engineering

*Ph.D. Student*

*Advisor: Prof. Gerhard Klimeck & Prof. Tillmann Kubis*

- Semiclassical and Quantum Transport modeling of nano-electronic devices.
- Investigated different architectures for Tunneling Field Effect Transistors (TFETs).
- Implemented NEGF based quantum transport model in Python for III-V devices.

### **Indian Institute of Science, Bangalore, India (November 2017 – April 2018)**

Centre for Nano Science and Engineering (CeNSE)

*Visiting Research Student*

*Advisor: Prof. Digbijoy N. Nath*

- Modeled MoS<sub>2</sub>/GaN heterostructure based vertical photodetector pertaining to deep UV applications using the Silvaco TCAD package.
- Worked closely with experimentalists to obtain a detailed analysis of the transport of carriers in the device.

### **Indian Institute of Science, Bangalore, India (June 2017 – August 2017)**

Polymer Processing laboratory, CeNSE

*Summer Research Intern*

*Advisor: Prof. SA Shivashankar*

- Synthesized Cu<sub>2</sub>S nanomaterial using a bio-compatible precursor by the microwave method.
- Characterized the self-assembled nanomaterial using XRD, SEM, UV, and NMR spectroscopy.

**M.S. Ramaiah Institute of Technology, Bangalore, India** (August 2016 – June 2017)

Department of Medical Electronics, MSRIT

*Research Assistant*

*Advisor: Prof. N Sriraam*

- Developed a real-time epileptic seizure detection biomarker.
- Removed artifacts in the data, processed the EEG signals and utilized a neural network classifier to classify the seizures.

**Indian Institute of Science, Bangalore, India** (June 2016 – August 2016)

Polymer Processing laboratory, CeNSE

*Summer Research Intern*

*Advisor: Prof. SA Shivashankar*

- Synthesized transparent p-type delafossite  $\text{CuAlO}_2$  using a domestic microwave.
- Characterized this material using XRD, SEM, UV, and NMR spectroscopy.

**OTHERS**

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- Participated in the Qiskit Global Summer School and received the **Certificate of Quantum Excellence**.
- Attended the “*Quantum Machine Learning and Data Analytics Workshop*” at Purdue University.
- Volunteer at TEDx(MSRIT).
- Certified LabVIEW Associate Developer.