

SILPA BABU

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OBJECTIVE

Ph.D. candidate in Electrical and Computer Engineering at Iowa State University with over one year of industry experience. Seeking an opportunity to apply my expertise in deep learning, inverse problems, MRI reconstruction, and signal processing.

RESEARCH INTERESTS

Deep Learning, Magnetic Resonance Imaging (MRI) Reconstruction, Image Reconstruction, Inverse Problems, Signal Processing.

SKILLS

- **Programming Languages:** Python, MATLAB.
- **Deep Learning Frameworks:** Pytorch, Tensorflow.

EDUCATION

- **Iowa State University, Ames, Iowa** *Currently Pursuing*
Ph.D. in Electrical and Computer Engineering
- **Vellore Institute of Technology, Vellore, India**
Master of Technology in Communication Engineering
- **Kannur University, Kannur, India**
Bachelor of Technology in Electronics and Communication Engineering

RELEVANT GRADUATE LEVEL COURSES AT IOWA STATE UNIVERSITY

Data Analytics in EE, Deep Learning, Machine learning, Digital Signal Processing, High Dimensional Probability, Theory Probability and Statistics, Linear Algebra, Convex Optimization.

EXPERIENCE

- **Graduate Research Assistant, Ames, Iowa** *Jan 2021 - Present*
Dept. of Electrical and Computer Engineering
Research Advisor: Dr. Namrata Vaswani, Anderlik Professor, Dept. of Electrical and Computer Engineering, Iowa State University.
 - Developed a 3-level hierarchical algorithm that is fast and memory-efficient for MRI reconstruction using undersampled k-space measurements.
 - Automated the code to ensure it works effectively across various MRI applications (brain, cardiac, and speech), sampling schemes (such as spiral, radial, Cartesian, and pseudo-radial), and sampling rates, without any parameter tuning.
 - Designed a near-real-time MRI reconstruction algorithm that outperforms keyhole imaging and view-sharing techniques in image quality.
 - Conducted a comparative study between the proposed algorithms and deep learning methods to evaluate reconstruction time and image quality.
- **Graduate Teaching Assistant, Ames, Iowa** *Jan 2021 - Dec 2022*
Dept. of Electrical and Computer Engineering | Signals and Systems, Probabilistic Methods for Electrical Engineers
Instructors: Dr. Namrata Vaswani, Dr. Andrew K. Bolstad
 - Mentored students in implementing MATLAB experiments for the Signals and Systems course.
 - Developed solution manuals for Probabilistic Methods for Electrical Engineers course.
- **Graduate Engineer | Intern, Bangalore, India** *Aug 2017 - Jan 2019*
Aptiv Technical Center
 - Reduced CAN busload for efficient communication between radars.
 - Configured Bootloader for BMW SRR5 radar systems.

PUBLICATIONS

C=CONFERENCE, J=JOURNAL

- [J.1] S. Babu, S. G. Lingala, and N. Vaswani, "Few Shot Alternating GD and Minimization for Generalizable Real-Time MRI", *under review, IEEE Transactions on Medical Imaging*, 2025.
- [J.2] S. Babu, S. G. Lingala and N. Vaswani, "Fast Low Rank Column-Wise Compressive Sensing for Accelerated Dynamic MRI", *IEEE Transactions on Computational Imaging*, 2023, vol.9, pp. 409-424, doi: 10.1109/TCI.2023.3263810.
- [C.1] S. Babu, W. Alam, R. Z. Rusho, S. Goud Lingala and N. Vaswani, "Generalizable Real-time Accelerated Dynamic MRI", 2025 *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, Hyderabad, India, 2025, pp. 1-5, doi: 10.1109/ICASSP49660.2025.10888799.
- [C.2] S. Babu, S. Aviyente and N. Vaswani, "Tensor Low Rank Column-Wise Compressive Sensing for Dynamic Imaging", *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2023, pp. 1-5, doi: 10.1109/ICASSP49357.2023.10097054.
- [C.3] S. Babu and N. Vaswani, "A Fast Algorithm for Low Rank + Sparse column-wise Compressive Sensing", 59th *Annual Allerton Conference on Communication, Control, and Computing (Allerton)*, 2023, pp. 1-6, doi: 10.1109/Allerton58177.2023.10313478.
- [C.4] S. Babu, S. S. Nayer, S. G. Lingala and N. Vaswani, "Fast Low Rank Column-Wise Compressive Sensing For Accelerated Dynamic MRI", *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2022, pp. 1346-1350, doi: 10.1109/ICASSP43922.2022.9747549.
- [C.5] S. Babu and N. Vaswani, "AltGDmin for Accelerated L+S Dynamic MRI", 2024 58th *Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, USA, 2024, pp. 265-269, doi: 10.1109/IEEECONF60004.2024.10942852.

CERTIFICATION

• Deep Learning Specialization

Coursera (Instructor: Andrew Ng, DeepLearning.AI)

Feb 2024

- Completed the following five courses: Neural Networks and Deep Learning, Improving Deep Neural Networks: Hyperparameter Tuning, Regularization, and Optimization, Structuring Machine Learning Projects, Convolutional Neural Networks, Sequence Models
- Gained expertise in building neural network architectures (CNNs, RNNs, LSTMs, Transformers) and implementing deep learning strategies like Dropout and BatchNorm.
- Applied deep learning to real-world challenges such as speech recognition, chatbots, music synthesis, and machine translation using Python and TensorFlow.
- Verified certificate: <https://coursera.org/share/aec75bdf496dd4800d3e4ef1f07bb651>.

DEEP LEARNING-BASED COURSE PROJECTS

• Impact Study of Undersampled MRI Reconstruction on Brain Tumor Detection | Python, PyTorch

- Conducted an initial study analyzing the effect of undersampled k-space reconstruction on brain tumor detection performance.

• Plant Disease Classification from Images | Python, TensorFlow

- Designed and trained Convolutional Neural Networks (CNNs) for disease classification tasks using images. Improved classification accuracy through data augmentation and hyperparameter tuning.

AWARDS

- Mrs. Sundarabai Thulasiraman Endowment Award for outstanding performance in the academic year 2017-2018.
- Merit Scholarship for the best academic performance in the academic years 2016-2017 and 2017-2018.
- Gold Medal for scoring the highest marks among 50 students during my Master's degree.

VOLUNTEER EXPERIENCE

• Outreach and Publicity Officer

Graduate Student Organization (GO-ECPE)

Iowa State University

Jan 2024 - May 2024

- Organized two events to foster social interaction between faculty and students.
- Designed promotional flyers for these events.

• Tutor

CyMath

Iowa State University

Aug 2023 - Feb 2024

- Conducted weekly one-on-one math tutoring sessions for 3rd and 4th graders.