# Deep Pujara

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## SUMMARY

Ph.D. student at Arizona State University with a focus on Signal Processing, Deep Learning, Embedded Machine Learning and Solar. Experienced in hardware and software development, with a track record of IEEE publications, internships in industries and research organizations, awards, and a notable presence in industry meetings and hackathons, seeking a challenging position to showcase my skills.

## EDUCATION

**Doctor of Philosophy in Electrical Engineering** **(Jan 2024 – Present)**
- Arizona State University, Tempe, Arizona, USA (GPA: 3.83/4)
- Specialization: Solar, Signal Processing, and Embedded Machine Learning

**Master of Science in Electrical Engineering** **(Aug 2021 – Dec 2023)**
- Arizona State University, Tempe, Arizona, USA (GPA: 3.82/4)
- Specialization: Solar, Signal Processing, and Machine Learning

**Bachelor of Technology in Electronics and Communication Engineering** **(August 2017 – May 2021)**
- Nirma University, Ahmedabad, Gujarat, India (GPA: 8.11/10)

## WORK EXPERIENCE

**SenSIP Lab, School of ECEE, Arizona State University** **Tempe, AZ, USA**
Graduate Research Associate – Ph.D. Research Jan 2024 - Present
- Designed a **transformer-based embedded machine learning (ML) architecture** for real-time **photovoltaic (PV) fault detection**, optimized for **deployment on resource-constrained embedded devices** using image-based datasets.
- Conducted **topology reconfiguration** research on a 3×3 solar array to **optimize power output** under varying shading conditions.
- Developed a compact embedded ML algorithm utilizing **Pruning**, **Quantization-Aware Training**, and **8-bit Post-Training Quantization** for efficient and accurate topology classification in solar energy systems.

**Recommenders:** *Dr. Andreas Spanias*, *Dr. Cihan Tepedelenlioglu*, *Dr. Devarajan Srinivasan*

**SenSIP Lab, School of ECEE, Arizona State University** **Tempe, AZ, USA**
Graduate Research Associate – Masters Research Sep 2021 - Dec 2023
- Deployed an optimized Embedded ML algorithm on an Arduino Nano BLE 33 using **TensorFlow** and **TensorFlow Lite Micro** Libraries, achieving real-time solar fault detection with 86% test accuracy.
- Designed a **Monitoring Device Hardware** using various **sensors and microcontrollers** to measure important PV parameters such as Voltage, Current, Temperature, and Irradiance with a better transmission rate (1 second), and high data transmission accuracy.

**Recommenders:** *Dr. Andreas Spanias*, *Dr. Cihan Tepedelenlioglu*, *Dr. Devarajan Srinivasan*

**School of ECEE, Arizona State University** **Tempe, AZ, USA**
Graduate Teaching Associate (EEE 598 – Deep Learning, EEE 515 – Computer Vision) August 2025 – Present
- Teaching one weekly lecture and helping students with the assignments; covering topics related to DL topics from **perceptron/backprop** and **MLPs to CNNs**, **RNNs**, **Transformers/ViT**, **GANs/diffusion** using **PyTorch**.
- Mentor students through full ML workflows (**data pipelines/augmentation**, **training & evaluation loops**, **hyperparameter tuning**, **use of shared resources like ASU SOL supercomputer)**.
- Guided students through experiments on the **Intel Gaudi 2 AI Accelerator**, enabling **performance comparison with NVIDIA A100 GPUs**.

**Recommenders:** *Dr. Suren Jayasuriya*

**Skyworks Solution** **Hillsboro, OR, USA**
AI Speech and Signal Processing Intern May 2025 – August 2025
- Built a **cycle-accurate python simulator** for a **systolic array accelerator**, parameterized by matrix/array dimensions and **dataflows** computed per-layer & end-to-end **cycle counts, PE utilization**, **bandwidth utilization**, and auto-recommended **trim strategies to reduce stalls and cycles** for Skyworks' audio ML custom hardware.
- Led **software–hardware co-design** and memory-hierarchy analysis, profiling **SRAM/DRAM** access patterns, **tiling**, and on-chip buffer reuse to **improve throughput/latency** and inform accelerator configuration and performance modelling
- Deployed multiple **audio noise-separation ML models** on Skyworks custom **embedded hardware (SoC/ASIC)** and executed on-device inference, and instrumented power measurement.

**School of ECEE, Arizona State University** **Tempe, AZ, USA**
Graduate Teaching Associate (EEE 407 – Digital Signal Processing) Jan 2023 – May 2025
- Provided support to students in understanding the concepts of **Fast Fourier Transform, Filters, Sampling, and related topics.**
- Conducted 2-3 interactive live teaching sessions every semester and provided problem-solving support to students, facilitating a practical understanding of the DSP concepts and their real-life applications.

**Recommenders:** *Dr. Andreas Spanias*, *Dr. Antonia Papandreou-Suppappola*

**Skyworks Solution** **Austin, TX, USA**
Broadcast Application Engineering Intern May 2023 – Aug 2023
- Engineered an advanced USB to SPI bridge (REV 2.0) using **ORCAD**, incorporating 4 chip select and reset lines. Optimized **MISO**, **MOSI**, and **SCK** pins, ensuring seamless replacement for Rev 1.0 with improved functionality.
- Built driver code in **C++** enabling efficient **USB-SPI communication**, facilitating smooth data transfer with maintained compatibility and enhanced performance compared to REV 1.0.

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## ACADEMIC PROJECTS

**DeepAI: AI Portfolio Assistant** June 2025 – July 2025

- Developed and integrated a conversational AI assistant using the **OpenAI Assistants API (GPT-4o)** to provide real-time answers about my skills and experience.
- Engineered **a secure CI/CD pipeline** with GitHub Actions to automate deployment, ensuring API keys were never exposed in the public repository.
- Enabled **Retrieval-Augmented Generation (RAG)** by providing the model with a knowledge base of my resume and project data for accurate, context-aware responses.

**EdgeVoice: Real-Time Wake Word Detection on Embedded Systems** July 2024 – Sep 2024

- Collected and curated a **custom speech dataset** using recorded audio samples and publicly available data, preprocessing it with **Audacity** for noise reduction and normalization.
- Engineered a **Convolutional Neural Network (CNN)** architecture optimized for low-power devices, utilizing **MFCC feature extraction** (13 coefficients, 256 FFT length) to recognize speech with **78.63% test accuracy**.
- Implemented the model on **Arduino Nano 33 BLE Sense** with **TensorFlow Lite for Microcontrollers**, enabling **efficient real-time voice command processing** for edge AI applications.

## PUBLICATIONS

1. **D. Pujara**, D. Srinivasan, C. Tepedelenlioglu, and A. Spanias, "Real-Time Photovoltaic Array Topology Optimization Using Embedded Machine Learning," **to be submitted** to *IEEE Access*, 2025.
2. S. Katoch, **D. Pujara**, D. F. Ramirez, P. K. Turaga, C. Tepedelenlioglu, D. Srinivasan, and A. S. Spanias, "Global Horizontal Irradiance Forecasting for Photovoltaic Systems," **submitted** to *ICPS*, 2026.
3. 3. T. K. Patel, N. A. Babar, **D. Pujara**, G. Uehara, J. Larson, and A. Spanias, "Training Students for Research with Quantum AI Simulation Tools," in Proc. IEEE Int. Conf. Acoustics, Speech and Signal Processing (ICASSP), 2026, **to be presented.**
4. J. Larson, **D. Pujara**, D. Ramirez, L. Miller, T. Patel, N. Babar, A. Spanias, "WIP: Building a Research Experience for Undergraduates in Quantum Machine Learning" *2024 Frontiers in Education (FIE)*, Washington DC, USA.
5. D. Ramirez, **D. Pujara**, C. Tepedelenlioglu, D. Srinivasan and A. Spanias, "Infrared Computer Vision for Utility-Scale Photovoltaic Array Inspection," *2024 15th International Conference on Information, Intelligence, Systems & Applications (IISA)*, Volos, Greece, 2024. *(Paper recently presented at the conference)*
6. **D. Pujara**, D. Ramirez, C. Tepedelenlioglu, D. Srinivasan and A. Spanias, "Real-time PV Fault Detection using Embedded Machine Learning," 2024 IEEE 7th International Conference on Industrial Cyber-Physical Systems (ICPS), St. Louis, MO, USA, 2024, pp. 1-5.
7. W. Chao, A. Sharma, G. Uehara, L. Miller, **D. Pujara**, W. Barnard, J. Larson, and A. Spanias. "Introducing Quantum Computing in a Sophomore Signals and Systems Course." *2023 IEEE Frontiers in Education Conference (FIE)*, pp. 1-5. IEEE, 2023.
8. **D. Pujara**, D. Ramirez, C. Tepedelenlioglu, D. Srinivasan and A. Spanias, "Design of a New Photovoltaic Intelligent Monitoring and Control Device," *2023 14th International Conference on Information, Intelligence, Systems & Applications (IISA)*, Volos, Greece, 2023, pp. 1-4.
9. S. Rao, **D. Pujara**, A. Spanias, C. Tepedelenlioglu and D. Srinivasan, "Real-time Solar Array Data Acquisition and Fault Detection using Neural Networks," *2023 IEEE 6th International Conference on Industrial Cyber-Physical Systems (ICPS)*, Wuhan, China, 2023, pp. 1-5.
10. **D. Pujara**, P. Patel and S. Gajjar, "Geo Tracking of Waste, Triggering Alerts and Mapping Areas with High Waste Index," *2020 IEEE 17th India Council International Conference (INDICON)*, New Delhi, India, 2020, pp. 1-5.
11. **D. Pujara**, P. Kukreja and S. Gajjar, "Design and Development of E-Sense: IoT based Environment Monitoring System," *2020 IEEE Students Conference on Engineering & Systems (SCES)*, Prayagraj, India, 2020, pp. 1-5.

## INVITED PRESENTATIONS

- **D. Pujara**, "How Humans Taught Machines to Think: A Journey of AI", Adani University, Gujarat, USA, 2026.
- **D. Pujara**, "Generative Pre-trained Transformers - A Combination of a Few Individual Innovations", Nirma University, Gujarat, USA, 2025.
- **D. Pujara**, D. Ramirez, C. Tepedelenlioglu, D. Srinivasan and A. Spanias, "Real-time PV Fault Detection using Embedded Machine Learning," *2024 SenSIP Industry Consortium*, Arizona State University, Arizona, USA, 2024.
- **D. Pujara**, D. Ramirez, C. Tepedelenlioglu, D. Srinivasan and A. Spanias, "Design of a New Photovoltaic Intelligent Monitoring and Control Device," *2023-2024 Arizona Student Energy Conference*, Arizona, USA, 2023.
- **D. Pujara**, C. Tepedelenlioglu, D. Srinivasan and A. Spanias, "Design and Implementation of a Photovoltaic Monitoring Device," *2022-2023 SenSIP Industry Consortium*, Arizona State University, Arizona, USA, 2022-2023.

## SKILLS AND EXPERTISE

- **Programming:** Python, MATLAB, C++
- **Packages:** Scikit-Learn, TensorFlow, TensorFlow Lite, PyTorch, NumPy, Matplotlib, Pandas
- **Software:** Microsoft Office, Visual Studio Code, Arduino IDE, Raspberry Pie, LaTeX, Jira, Confluence, Simulink, Git
- **Sensors Used**: Arduino UNO, Arduino BLE 33 Sense, ESP 32 (Wi-Fi), XBee S2C, MCP2210 (USB to SPI Bridge)
- **Relevant Coursework:** Digital Signal Processing, Communication System, Deep Learning, Embedded ML (Edge Computing), Hardware-software Co-design for ML, Speech Processing, Artificial Neural Computation, Python Programming, Random Signal Theory