Ryan Tsai

Machine Learning and AI Engineer

tsai.ryanw@gmail.com GitHub LinkedIn

Machine Learning and AI Portfolio Projects

- **Histopathology Image Classification**: Achieved a testing AUC of 94.2% with ResNet-18 and 94.8% with ViT-Base, outperforming the research paper's AUC of 92.7% with ResNet-18 by employing image augmentation, class balancing, and other generalization techniques.

Skills

- Programming languages: Python, MATLAB
- Machine learning frameworks: PyTorch, Scikit-learn, TorchMetrics
- Data analysis and visualization: SciPy, NumPy, Matplotlib
- Tools: Git, Conda, Jupyter

Work Experience

Staff Modem Systems Engineer @ Qualcomm — May 2022 – Dec 2023

- **Led the design and commercialization of a novel APT PA calibration algorithm on the next-gen modem chipset, achieving a ~20% reduction in power consumption at lower operating powers and a ~10% decrease in calibration time.** Facilitated software and system algorithm debugging by automating data parsing and plotting in Python.
- **Led the development and commercialization of a new software feature to adjust FBRx capture timing based on Tx group delay on the next-gen modem chipset, eliminating capture-related bugs by 100%.** Automated the generation of software lookup tables by writing Python scripts to parse Excel and text files for delay values, and calculating and storing the lookup values in spreadsheets or Python functions.

Senior Staff Digital Front End Systems Engineer @ Zeku — May 2020 – May 2022

- **Designed a hardware-efficient Rx notch filter in Matlab to suppress CW spurs and recover degraded SNR, a critical component for achieving competitive product performance.** Employed an iterative process similar to ML model training, tuning hyperparameters such as pole settings, bitwidths, and acquisition length to optimize SNR across sampling rates, subcarrier spacings, and spur powers.
- **Designed hardware-efficient rational upsampling and downsampling filter chains in Matlab, essential components of the digital front end.** Employed an iterative process similar to ML model training, tuning filter models, filter lengths, resampling ratios, inband flatness specifications, out-of-band rejection specifications, and bitwidths to meet EVM, image suppression, and anti-aliasing requirements across sampling rate lineups.
- **Led the integration of Tx fixed-point digital front end and RF models into a unified end-to-end simulation in Matlab. Delivered simulation results across bandwidths and sampling rates to show compliance with internal and 3GPP requirements.** Optimized WOLA hyperparameters to achieve acceptable performance across sampling rates and subcarrier spacings. Wrote Matlab functions to calculate EVM and out-of-band emissions to evaluate end-to-end performance.

Senior RF Systems Engineer @ Qualcomm — Nov 2017 – May 2020

- **Led the commercialization of a novel TxIIP2 calibration algorithm, essential for meeting Rx sensitivity specifications on the next-gen RF transceiver. Reduced calibration time by 50% by grouping similar signal paths.** Facilitated software and hardware debugging by automating calibration data parsing, plotting, and exporting to Excel using Python.
- **Independently developed a custom Python library to analyze baseband harmonic emissions, significantly reducing budgeting time and increasing test coverage compared to manual spreadsheets.** Automated the parsing of transceiver specifications, 3GPP requirements, and CA band combinations, incorporating PSD simulation to enhance link budget accuracy. Exported link budgets to Excel for easy identification of failing cases.
- **Delivered comprehensive transmitter specifications for next-gen 4G and 5G RF transceivers, enabling the RFIC team to design and tune the transceiver to meet internal and 3GPP requirements.** Conducted link budget analyses for each new and updated specification, collaborating with RFIC and PA systems teams to relax specifications while maintaining acceptable performance.
- **Resolved all customer software and hardware issues on the next-gen 4G RF transceiver, including TxIIP2 failures, transient spurs, emissions failures, BLER, and desense.**

Senior RF Hardware Engineer @ Qualcomm **Apr 2013 – Nov 2017**

Education

Machine Learning Engineering Bootcamp @ WeCloudData **Jun 2024 – Dec 2024**

M.S. in Electrical Engineering @ UCLA **Sep 2011 – Mar 2013**

B.S. in Electrical Engineering and Computer Sciences @ UC Berkeley **Aug 2007 – May 2011**