**Peter Hanping Chen**

GitHub: https://github.com/peterhchen

Phone: (408)858-7657, Gmail: peter.hp.chen@gmail.com

**Areas of Expertise**

* Open Source Chisel/FIRTRL/RISCV
* LangChain/HuggingFace/Gemini/Llama
* Machine Learning: Scikit-learn/PySpark
* Deep Learning: PT (PyTorch), TF (Tensorflow), Keras
* Deep Reinforcement Learning: Deep Q-Learning
* Flask/Fast-API/Django
* HTML-5/CSS3/JavaScript/ReactJS Hook/jQuery/React Native
* MongoDB/MySQL/OracleDB/Postgres

**Professional Experience:**

**AIU (American Innovation University), SAN JOSE, CA (09/2022-Present)**

**Associate Professor/ML Engineer, Boot-camp Program for CS Department**

* Agile Hardware Design by Chisel (Construct Hardware In Scala Embedded Language): Scala/Chisel in Jupyter Notebook/SBT, Mux2/Mu4/Counter/Vending Machine/Memory/Multiplier, Wire, Argument Parameter, Module, FIRRTL (Flexible Intermediate Representation for RTL), Mux, Delay Cycles, Sequential Logic, Counter, FIR Filter, One-Hot Encoder, Multi-Processor Arbiter, Crossbar, Delay Optimization, Generate ASIC/FPGA Verilog, Delay (Critical Path) Minimization, DSE (Design Space Exploration with PAT (Power, Area, Timing), FIRRTL, Formal Verification, Taskflow (Task Creation, Static/Dynamic Task Graph Parallelism), XLS (Accelerated Low-Level/Hardware Verilog Synthesis) for Physical Design/Layout, McPAT-Calib for PAT (Power/Area/Timing) and Power Model by Machine Learning.
* ML (Machine Learning): Regression, Gradient Decent, Logistic Regression, Decision Tree/SVM, Random Forest, K-Fold Test, Naive Bayes Classifier, Tune Hyperparameter/Model, L1/L2 Regularization, KNN, PCA, Bias (Underfit)/Variance (Overfit), Ensemble Learning (Bagging/Aggregation), FastAPI/Flask Server, Deploy on AWS. Implemented Real-Estate Model Prediction:
  + Implemented data preprocessing and feature engineering pipelines using Python Pandas, NumPy, and Scikit-learn libraries. Clean up NaN, remove Outlier with abnormal and mean/std. Dimensionality Reduction for useless Categories.
  + K-Fold Cross-Validation and Grid Search Cross-Validation for Train/Select Linear Regression/Lasso/Decision Tree, Tune hyperparamter. One-Hot-Encoding for text string (categorical location), Pickle Save Model and JSON.
  + Flask API: route request/response with Chrome. Use Postman to verify GET and POST request with parameters and Model Prediction response.
* DRL (Deep Reinforcement Learning): CNN/DQN, Frozen Lake (QL/DQN), Mountain Car (Discrete/Continuous DQN), Pong Game (DQN), Cliff Walking (DQN), Taxi (QL), Cart Pole (QL), Box2D (Bipedal Walker, Car Racing, Lunar Lander), MuJoCo (Multi-Joint Contact)/Stable-Baselines3/Humanoid-v4, MAB (Multi-Armed Bandit), TF-Environment, TF-Agents, TF-Policies, TF-Drivers, TF-Replay Buffer, Ranking, MAB per-arm.
* FS (Full Stack): GCP (Google Cloud Platform), Firebase, AIU Management System
  + ReactJS Hook (useState, useRef, useCallback, useContext, Form Submit), AG-GRID (column grouping, data editing, sorting, filtering), Flask routing/URL parameters processing, Big Data retrieve, restore, and transmit.
  + Student registration, course selection, search, grading, retrieve transcript/modification.
  + Kubernetes Master/Slave server installation/configuration, kubectl, kublet, docker-compose, image creation.
* Cuda/C++ Programming: Cuda programming on Colab/Ubuntu, Grid/Block/Threads, GPU/Memory Architecture, Vector/Matrix Addition/Multiplication, OpenCV, OpenGL.
* LLM (Law ChatBot and AIU ChatBot): Prompt Engineering, LangChain, HuggingFace Host App, Chat Memory, Text Summarization, Agent (Google Real-time Search Platform/LLM Math), Text Chunk Splitting, NLP to SQL Sentence/Word Embedding, Vector Database (ChromaDB), RAG (Retrieval Augmented Generative) with URL/PDF/Excel/SQL, Multi-GPUs Pipeline.
  + Developed and fine-tuned AI models, including ChatGPT, Gemini, Copilot to enhance natural language processing capabilities and improve conversational AI systems
  + Create and refine prompts to effectively guide AI models and generate desired outputs and AI model performance metrics.
  + Developed LLAMA models for a range of NLP applications, including text generation, summarization, and sentiment analysis
* DL (Deep Learning): Colab/Tensorflow, NN Programming, Tensorboard, CPU/GPU benchmark, ANN, One-Hot Encoding, Confusion Matrix, Dropout, Imbalanced, Computer Vision, CNN, Stride/Augmented, TF-Hub/Transfer Learning, Kaggle YOLO (V8) Object Detection/Segmentation.

**FUTUREWEI, SANTA CLARA, CA 06/2021–09/02/2022**

**Sr. Staff Software Engineer, IC Lab**

* Design Space Exploration for CPU/GPU (Architecture Configuration optimization) modeling/optimization with MAB (Multi-Armed Bandit) for control variable distribution and PPO (Proximal Policy Optimization) PyTorch, Tensorflow under Kubernetes/docker container.
* CPU/GPU Configuration: Environment: Gem5-Aladdin/McPAT (Power, Area, Timing) Simulation, Gem5 Performance/Power Simulation for NoC, SoC (ARM/AMD/X86/Alpha).
* Completed implement of Feature selection/reduction by sci-kit learn by Bi-Direction/Random Forest.
* Completed PCA (Principal Component Analysis) for Model dimensionality reductions.
* Utilized TensorFlow's data augmentation and transfer learning techniques to improve model generalization and reduce overfitting.
* Completed integrated Machine Learning tool Hypermapper for features (categorical, ordinal, integer, and real) for multi-objective optimization (with maximum performance, and minimum area/power) with Gem5/Aladdin End-to-End SOC Simulation docker image for workloads with accelerated functions.
* Developed the Memory Model for Cache/Load Queue/Store Queue by C/C++ for application program.
* Docker Run, create docker image, container parameters passing, docker volume, Dockerfile, Docker-compose, container orchestra.

**QUALCOMM, SAN DIEGO 04/2013 - 05/2021**

**Sr. Full Stack Developer**

**Camera Performance:**

* Controlled/Validated Medical camera movement with motor for static and shear force for rotation.
* Simulated CMOS Image sensor by SPICE for bandwidth and latency time.
* Developed and deployed deep learning models using TensorFlow for various applications, including image recognition and natural language processing.
* Completed Camera Performance PKI by ReactJS, Flask, Python.
* Completed deployment multiple micro-service apps on Kubernetes with load-balance control on dashboard and real-time execution on Apache Flume, Kafka, Spark based on batch mode modeling.
* Deployed Model by Flask server on AWS: Developed Camera chip performance simulation Model for maximum bandwidth and minimum latency time for ISP (Image Signal Process) with Static Timing analysis.
* Frontend GUI (HTML, CSS, ES6, React, AXIOS/AJAX API): Flask RESTful API, Dashboard, Frequency Sweep, Simulation panel, Hierarchical Chip Browser.
* Backend: Python, JSON/YAML File processing

**QA Verification:**

* Qualcomm Quality Verification Dashboard: Developed customer real-time phone call/text message by Splunk.
* Front end: ReactJS, JQuery, Asynchronous concatenation and parallel, data structure sort by Date/time, State Machine, Chip Quality PKI, and NG-Grid spreadsheet.
* Back end: NodeJS/MongoDB, classified defect and failure.

**TATUNG COMPANY, TAIPEI, TAIWAN 01/2009-04/2013**

**Sr. Project Manager**

* Power surge model prediction
* Integrated Ethernet, EtherCat, PCIE into Power Control system.
* Signal Integrity Power Integrity/Thermal Analysis/EMC Analysis.

**FARADAY TECHNOLOGY, HSINCHU, TAIWAN 01/2004-04/2009**

**Sr. Project Manager**

* SPICE Analog IP to Verilog digital system (liberty library) Finite Element Simulation and characterization: power, slew rate, timing, driving strength.
* Autotomized IP Mixed Signal Verification Flow/Flow by SPICE simulator, IPC by Socket Programming, and distributed computing (VNC, GRID, LSF) by Python PyQt/Qt GUI/C++/STL, GNU Debugger.
* Oversaw the selection and procurement of micro-controller components, ensuring compatibility and reliability.
* Run-time controls the inventory/bonus of distributed EDA license with public/private cryptography.
* QA tools: IBM ClearCase (Global File Management), Coverity/ Purify Code Coverage / Quantify Performance, HSpice/FineSim, PSpice and Mentor Graphics

**NATIONAL SEMICONDUCTOR, SUNNYVALE, CA 07/1995–12/2003**

**CAD Manager**

* Developed NSC Mixed signal design toolkit for Mixed signal technologies integration and Testing.
* Solved Antenna effect in Chip Manufacturing.

**LSI Logic, Milpitas, CA, 07/1987–07/1995**

**CAD Engineer**

* Developed LSI Tool kit for design compiler/Placement and Routing algorithm for datapath design.
* Developed/Released front-end/backend tools and technologies for Verilog/SPICE circuit simulation.
* RF analog signal measurement and testing system.

**BMSR (Biomedical Simulation Resource), USC, Los Angeles, CA 05/1985-07/1987**

**Research Assistant**

* C++ Programmer/Research Assistant
* Interfaced EEG machine.
* Developed Wiener, Volterra functional kernels for neural network model for brain wave simulation and diagnosis.

**Education**

* EMBA (44 units), NCTU (National Chiao-Tong University), Hsinchu, Taiwan (5/2011-8/2013), Phi-Tau-Phi award
  + Thesis: Business Planning and Forecasting in High-Speed EtherCAT and High-Power IGBT Motor Control
* PhDEE (60 units), UNEM (University of Empresarial), Costa Rica, CA (1/2006-12/2010)
  + AI Course/Dissertation: “Antenna Effect Solution using Dynamic Diode Insertion during Cell Placement and Post-Layout”
* PhDEE Certificate (62 units), ITU (International Technological University), Santa Clara, CA (1/1995-12/2003)
  + Published Paper: “Beat the Competition: A knowledge-Based Design Process Address the Antenna Effect and Cell Placement,” IEEE Device and Circuit (Volume 20, May-June, 2004). 6 citations, <https://ieeexplore.ieee.org/document/1304538>
  + Published Paper: “Fixing antenna problem by dynamic diode dropping and jumper insertion,” IEEE/ISQED (2000), 33 citations, <https://www.semanticscholar.org/paper/Fixing-antenna-problem-by-dynamic-diode-dropping-Chen-Malkani/ce75dc8d162d8e709ab0b58816563098d9234b0e>
* MSEE (Artificial Intelligence), USC (University of Southern California), Los Angeles, CA (1986-1987)
  + AI Project, “Medical Auto-Diagnosis Expertise System,” (1986)
* MSBME (Biomedical Engineering), USC, Los Angeles, CA (1995-1986)
  + Research Project/Report: “Brain Kernel Modeling by Voltera-Wiener Kernel Convolution,” (1986)
  + Published 1 journal paper in Data modeling.
* MSCS, NCU (National Central University), Taiwan (1979-1981)
  + Thesis: “Crude Oil Component-Temperature Data Modeling and Steam-Stripper Tower Simulation,” (1981)
  + Published 2 Journal papers in data model and process simulation.

**Awards & Distinctions**

* Well-known Antenna Effect patent and solution sold to Synopsys, Inc. in 1997.
* Analog Characterization patents (15+) sold to Faraday Technology, Inc. in 2006.
* Synopsys Best Papers Awards (10+), 2000-2009
* Phi-Tau-Phi Academic Award, for best NCTU/EMBA
* Published Papers (20+), Institute of Electrical and Electronics Engineers and Industrial Conferences
* US Patents (30+), Algorithms/Mathematical Modeling for device and power characterization (<https://patents.justia.com/inventor/peter-h-chen>)