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| **Yanghonghui Chen**  Tel: +(86) 13396886608 | Email: yanghonghui.21@intl.zju.edu.cn | [Personal Website](https://yonghonghui.github.io/) | | | | | | | | |
| **EDUCATION** | | | | | | | | |
| **University of Illinois Urbana-Champaign** | | Urbana US | | | | | | |
| Bachelor of Science in Electrical Engineering - GPA: 3.88/4.0 | | September 2021 - now | | | | | | |
| **Zhejiang University** | | Haining China | | | | | | |
| Bachelor of Engineering in Electrical Engineering - GPA: 3.95/4.0 | | September 2021 - now | | | | | | |
| **Relevant coursework**: Neural Interface Engineering (A), Neural Circuits and Systems (A+), Embedded DSP Laboratory (A+), Digital Signal Processing (A), IoT and Cognitive Computing (A), Probability with Engineering Applications(A)  **In progress**: Applied Parallel Programming, Machine Learning, Control Systems | | | | | | | | |
| **RESEARCH EXPERIENCES** | |  | | | | | | |
| **Optimized Convolutional Layer Implementation Using CUDA** | | |  | | | | | |
| Course Project (Advisor: Prof. Volodymyr Kindratenko) | | October 2024 - December 2024 | | | | | | |
| ***Keyword****s: CUDA, Parallel programming, GPU acceleration, Convolutional neural networks (CNNs)*   * Designed and implemented the forward pass of convolutional layers for a modified LeNet-5 architecture using CUDA, optimizing performance for deep learning tasks such as image classification and object detection. * Implemented a GPU-based forward convolution with a structured Prolog-Kernel-Epilog approach, ensuring memory management, convolution computation, and output transfer, while matching CPU implementation correctness and optimizing performance using Nsight profiling tools. * Applied advanced GPU programming techniques to optimize the implementation, including streams, GEMM kernels, and kernel fusion, to achieve a target inference time of ≤80ms for 10,000 images from the Fashion MNIST dataset. | | | | | | | | |
| **RRAM-based Heterogeneous Processing for Multimodal Brain-Computer Interfaces** | | |  | | | | | |
| The University of Hong Kong (Advisor: Dr. Zhengwu Liu) | | May 2024 - July 2024 | | | | | | |
| ***Keyword****s: RRAM, Multimodal brain-computer interface, EEG, Compute-in-memory, FDT*   * Simulated representative heterogeneous processing paradigm of P300 signal recognition in Python by using resistive random-access memory (RRAM) with and without fixed parameter disturbance training (FDT). * Contributed to combining the BCIC IV IIa and the P300 RSVP datasets and designing an RRAM-based multimodal recognizer that integrates components of the pre-trained EEGNet, CSP (Common Spatial Pattern), and a modality-fused classifier to create the multimodal settings. * Achieved 2.83% higher accuracy using multimodal BCI with FDT than that without FDT and significantly outperformed the MI-alone and P300-alone results by 8.19% and 13.20%, respectively. | | | | | | | | |
| **Raspberry Pi Based IoT System as a Private Chatbot** | | | | | | | |  |
| Course Project (Advisor: Prof. Deming Chen) | | | | | March 2024 - May 2024 | | | |
| ***Keywords****: IoT System, Raspberry Pi, Machine Learning, Deep Learning*   * Developed an IoT system using Raspberry Pi 4 as a private chatbot with face detection and speaker recognition to guarantee privacy and personal conversations as well as interactions. * Implemented MTCNN with ResNet and dlib-based face recognition, achieving better performance with the latter; trained the system with one hundred face images for live recognition. * Built a custom residual neural network with Keras for speaker recognition, achieving 96% accuracy. * Integrated a server-client architecture using Google Cloud for accelerated processing and implemented speech recognition and TTS for user interaction. | | | | | | | | |
| **Multiplayer Action Game on FPGA: Crazy Arcade** | | | | | | | |  |
| Course Project (Advisor: Prof. Zuofu Cheng) | | | | | | March 2024 - May 2024 | | |
| ***Keywords****: SystemVerilog, FPGAs, System-on-a-chip, MicroBlaze CPU, VGA*   * Used FPGA for real-time operations, integrating MicroBlaze CPU for game logic and keyboard input processing. * Developed various modules in SystemVerilog to manage player movements, bomb mechanics, life counts, and game states, interacting through a system bus. * Incorporated background music by PWM for sound generation, featuring distinct tracks for different game stages. | | | | | | | | |
| **Cheat-Machine for Game 2048** | | | | | | | |  |
| Course Project (Advisor: Prof. Thomas Moon) | | | | March 2024 - May 2024 | | | | |
| ***Keywords****: Embedded DSP, Real-time Signal Processing, Image Processing, Android Studio*   * Developed an app in Android Studio to analyze a live game of 2048, recognizing board digits using image processing. * Employed efficient template matching for multi-digit recognition, using grayscale conversion, Canny edge detection, and perspective transformation to preprocess images. Used python packages to evaluate the workflow of the application. * Built an AI engine with an Expecti-max Search algorithm to recommend the optimal move, focusing on corner placement strategies. * Achieved high accuracy in digit recognition (100% when properly aligned) and consistent AI performance, reaching 1024 tile in 75% of simulations. | | | | | | | | |
| **Simulating Neuron Circuit Design** | | | | | | | |  |
| Course Project (Advisor: Prof. Jont Allen) | | | | | | December 2023 | | |
| ***Keywords****: Neuron Simulation, Hodgkin-Huxley Model, Circuit Simulation*   * Designed an electronic circuit based on the Hodgkin-Huxley model to simulate neuron action potentials. * Conducted electrical pulse stimulation to observe and analyze neuronal signaling pathways. * Optimized circuit performance by adjusting component parameters to achieve clear action potential observations. | | | | | | | | |
| **Hook&Hair Structure 3D-Printing based on Path Control and 4D Printing Experiment Exploration** | | | | | | | |  |
| Zhejiang University (Advisor: Prof. Guanyun Wang) | | June 2023 - August 2023 | | | | | | |
| ***Keywords****: 3D printing, Grasshopper, Rhino, FDM, Path-planning, 4D printing*   * Developed 3D printing techniques for complex hook and hair structures using Rhino and Grasshopper for path planning, generating G-codes for customized printing paths instead of traditional FDM (Fused Deposition Modeling) methods. * Accomplished applications including hooked ball-mitten toys and hairy objects, requiring precise path control to avoid defects and achieve intricate designs. * Conducted experiments in 4D printing, modeling deformable planar objects in Fusion360 that transform into stereoscopic shapes when heated. | | | | | | | | |
| **Over-the-Air-Computation Based Federated Learning Model Establishment & Simulation** | | | | | | |  | |
| Zhejiang University (Advisor: Prof. Howard Yang) | | April 2022 - April 2023 | | | | | | |
| ***Keywords****: Edge Computing, Federated Learning, OFDM, Over-the-air Computing, Simulink, Machine Learning, Neural Networks*   * Explored an innovative approach to utilizing private data from distributed databases to train shared models, ensuring user privacy while making use of the data. * Set up an over-the-air-computation-based communication model in Simulink which could transmit and receive massive data gradients between federated users effectively. * Combined Machine Learning models like Linear Regression and Deep Learning models like neural networks in MATLAB codes with communication models in Simulink to implement effective edge-computing models. * Improved the model to adapt to the Large-scale applications by exploiting and modifying existing OFDM Communication Systems. | | | | | | | | |
| **HONORS** | |  | | | | | | |
| Dean’s List (Top 20%) | *UIUC* | | | | Fall 2023 | | | |
| Scholarship from Zhejiang University (Top 8%) | *Zhejiang University* | | | | 2021-2022, 2022-2023 and 2023-2024 Academic Years | | | |
| Academic Excellence Award | *Zhejiang University* | | | | 2021-2022, 2022-2023 and 2023-2024 Academic Years | | | |
| Outstanding Performance in Social Work Award | *Zhejiang University* | | | | 2021-2022 Academic Year | | | |
| Recognition for Outstanding Performance, 2022 Undergraduate Summer Research Program | *Zhejiang University* | | | | Summer 2022 | | | |
| Recognition for Academic Poster Exhibition, 2022 Undergraduate Summer Research Program | *Zhejiang University* | | | | Summer 2022 | | | |
| **SKILLS** | |  | | | | | | |
| Programming Languages: Python, C/C++, MATLAB, System Verilog, CUDA, LC-3 assembly  Softwares: Visual Studio Code, Jupyter Notebook, MATLAB, Rhino, Android Studio  Hardwares: 3D Printing, PCB design | | | | | | | | |
| **EXTRA-CURRICULAR ACTIVITIES** | |  | | | | | | |
| **Drone Club** *Zhejiang University* | | September 2021 - now | | | | | | |
| * Collaborated with a diverse team to design and develop an autonomous drone. * Led the mechanical group, honing skills in manufacturing drone components using carbon fiber. | | | | | | | | |
| **Illinois Space Society** *University of Illinois at Urbana-Champaign* | | September 2023 - May 2024 | | | | | | |
| * Built my own L1 rocket from designing the rocket structure in Open Rocket, modeling and 3D printing the nosecone & fin sets, installing all the parts, and evaluating the functionality to the final launch. | | | | | | | | |