# Chung-Wei (Denis) Wu

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## SKILLS

**Programming Language**: C/C++, Python, GLSL, TCL, MATLAB, Java
**IDE and tools**: Visual Studio, OpenCV, OpenGL, Git, Jira, Linux, Docker, Pytorch, CUDA, CMake, vcpkg, LLVM, JTAG, UART
**Others**: CI/CD, unit testing, web scraping, Embedded system, firmware

## EDUCATION

**University of Washington (UW)**, Seattle, WA                                        Sept. 2023 – Dec. 2024 (Expected)
- *M.S. in Electrical Engineering*                                                                                Overall GPA: 3.85
- Course: The Self Driving Car, Applied Parallel Programming on GPU

**National Tsing Hua University (NTHU)**, Hsinchu, Taiwan                                        Sept. 2019 – July 2021
- *M.S. in Electrical Engineering*                                                                                Overall GPA: 3.57
- Course: Advanced Computer Architecture, Deep Learning, Data Structure, Computational Photography

**National Chiao Tung University (NCTU)**, Hsinchu, Taiwan                                        Sept. 2013 – June 2017
- *B.S. in Electrical and Computer Engineering*                                                                Last 60 GPA: 3.62
- Course: Computer Architecture, Computer Vision, Computer Networks, Operating Systems

## PROFESSIONAL EXPERIENCE

**Visual Concepts** (A subsidiary of 2K Games, the developer behind the NBA 2K and WWE 2K)        June 2024 – Sept. 2024
*Software Engineer Intern*
- Developed an OpenGL / C++ / GLSL framework using strategy design pattern in OOP with CMake and vcpkg to analyze GPU/CPU and memory performance for rendering parameterized human body models in NBA2K25 on PS5
- Reduced GPU memory bandwidth by 30% while maintaining frame rates by implementing various compression algorithms for unit vectors in C++ inside shader code with Sony API and AMD GPU Instruction Set for NBA 2K26 on PS5
- Achieved a 30% reduction in computation costs of executing ray tracing on Nvidia GPU by developing a custom parallelized bounding volume hierarchy (BVH) tree structure construction algorithm in Python, C++, and CUDA

**Novatek Microelectronics Corp.** (Design display ASIC for Samsung, Sony... etc.)        Sept. 2021 – June 2023
*Embedded Software Engineer*
- Developed the embedded Linux kernel space driver in C for the control of the picture engine's display pipeline inside the ARM-based TV system-on-chip (SoC), including the display panel signal timing and display features like image sizing
- Executed pre-silicon functional verification on the Synopsys HAPS FPGA platform utilizing TCL scripts, and conducted post-silicon board bring-up and validation for ARM-based SoCs using C drivers
- Implemented APIs based on client's request to link different layers between the user and the kernel side, attended the display panel bring-up, and customized the driver for advanced display features for the 2022/2023 Android-based TV
- Support clients and FAE teams in debugging issues with anomalous display and erroneous signal timing using lab tools
- Developed and maintained a CI/CD pipeline by authoring TCL unit test scripts to automate the validation of kernel driver codebases within the Git repository, ensuring the integrity of IC functionalities and display features

## SELECTED PROJECTS

**Leveraging AI to Identify the KOL,** UW Capstone project with Genmab                                        Jan. 2024
- GitHub link: https://github.com/ChungWeiWu923/UW_Capstone
- Developed a front-end application with web-based UI and algorithm in Python based on machine learning (ML) to identify key opinion leaders (KOLs) in the pharmaceutical industry
- Implemented a Python-based web scraping script for machine learning algorithm's inputs, including dataset retrieval from online databases such as PubMed and ClinicalTrials.gov, feature extraction, and dataset preprocessing using NetworkX
- Accelerated a score-based ranking process for identifying KOLs by 20x using Graph Neural Networks (GNN) with PyTorch to compute centrality scores
- Developed the back-end system in python with Django REST framework and MySQL database to provide RESTful API for the front-end application
- Packaged source code into Docker containers for streamlined and efficient deployment

**Lidar-based Self Driving Car**, The Self Driving Car Course, UW                                        Nov. 2023
- Developed the embedded software in python on the Nvidia Jetson Nano for sensing, planning, and steering the MuSHR rally car with Lidar
- Implemented particle filter algorithm with probability sensing model on extracting data from Lidar for localization of the car, A* algorithm for planning the shortest path, and PID control algorithm for steering the car along the calculated path
- Achieved a 30% reduction in path completion time by optimizing the code flow and algorithms' parameters
- Won the second place among 13 groups in time trial competition of navigating through waypoints and avoid obstacles

**Image Processing Pipeline with HDR, AWB, and Image Deblurring**, Computational Photography, NTHU        Mar. 2020
- Developed the image processing pipeline with various methods of HDR tone mapping, AWB, and non-blind image deblurring in python, SciPy, and NumPy
- Achieved 60dB in PSNR of HDR image by implementing tone mapping with Gaussian filter and Joint Bilateral filter
- Implemented a custom auto white balance processing work flow to correct the HDR image
- Implemented non-blind image deblurring with Richardson-Lucy (RL), Bilateral RL, and TVL deconvolution algorithm, achieving 55dB and 60dB in PSNR for RL and BRL respectively

**Vision-Based Manipulated Robotic Arm**, Control Lab Course, NCTU                                    June 2016
- Developed a robotic arm system enabling intuitive manipulation through real-time tracking of user arm movements using an XBOX Kinect
- Implemented the PC software in C++ using Microsoft Visual Studio, which included three subsystems: sending data for motor control to Arduino UNO via UART(USB), capturing body movement with XBOX Kinect, and a motion planning algorithm for robotic arm
- Written the motor control software in C on Arduino UNO to drive the movement of robotic arm

## MASTER'S THESIS AT NTHU

"**Improving Conventional Color Doppler Ultrasound with Linear Prediction Extrapolation**"                 Aug. 2021
- Proposed a signal processing algorithm to enhance the performance of clutter filter in medical color Doppler ultrasound imaging system, providing the imaging result with more details of flow dynamics and better signal intensity/flow velocity estimation; implemented the software in MATLAB
- Derived the theory of extrapolating Doppler ultrasound dataset for imaging using frequency-domain linear prediction filtering, a variant of adaptive filtering; constructed signal model for this application
- Achieved 5dB improvement in signal-to-noise ratio (SNR) in a phantom experiment
- Decreased the mean-square-error (MSE) by 8% of flow velocity estimation in an *in vivo* experiment on rat brains