Christine Wu

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EDUCATION

University of Washington-Seattle -- Master of Science in Electrical Engineering   Anticipated Graduation: May 2024

University of Illinois at Urbana-Champaign -- Bachelor of Science in Computer Engineering   Graduated: *May 2021*
- Thesis title: "Overcoming optical scattering in photoacoustic imaging with intensity-recovering deep learning model"
  Advisor: Yun-Sheng Chen (Department of ECE and BioE)
- UIUC ***Dean's List*** and recipient of the ***John Deere Foundation WECE Scholarship*** for high academic standing

REASEARCH INTERESTS

My research interest is to interweave fundamental concepts of Machine Learning with interdisciplinary knowledge, design intelligent algorithms and systems, and develop scalable optimization tools. Through improvements in computation, I wish to apply them in healthcare and medicine to create portable and accessible products that can assist working medical professionals.

SKILLS & COURSEWORK

Programming
  Python, Java, C++, C, SystemVerilog, JavaScript

Technology & Applications
- Web Development -- Django, FastAPI, MySQL, MongoDB, CSS, HTML
- Cloud Services -- AWS – EC2, Google Cloud Platform – Compute Engine
- Machine Learning -- NumPy, Scikit-learn, SciPy, TensorFlow, Keras, PyTorch, Pandas, Matplotlib, OpenCV, MATLAB
- Digital Systems -- FPGA, Quartus II, ModelSim-Altera

Coursework
- Data Structures, Algorithms & Models of Computation
- Mobile Computing & Localization, Data Visualization
- Analog Signal Processing, Digital Signal Processing, Image Processing
- Applied Machine Learning, Artificial Intelligence, Probability-Statistic
- Computer Systems & Architecture, Digital Systems, Microprocessor
- Biosensors, Neural Circuits and Systems, Database Systems

WORK EXPERIENCE

Housing Residential Technology Services, *Urbana, IL*   January 2018 – May 2021
Computer Consultant Coordinator | Linux, MS Windows, macOS
- Establish credibility by communicating complex problems professionally and productively to the IT Technical Associate
- Supervise 32 Peer Computer Consultants to troubleshoot residents' technology issues on both MACS and MS/Windows
- Orchestrate a yearly 3-day training to walkthrough common issues and respective solutions to maintain a group of well-equipped staff for an efficient academic environment at housing computer labs

PROJECTS

MACHINE LEARNING & IMAGE PROCESSING

Research Assistant at UIUC-YSChen Lab | MATLAB, Python, PyTorch, CUDA   November 2019 – January 2022
- Collaborate with Google Researcher on Google Cloud Platform to design the dataflow and convolutional layers to perform the image-to-image translation between ultrasound and photoacoustic images, overcoming short penetration depth of light waves
- Integrated cGAN with laser information input layer and incorporated a SSIM loss function and a pre-trained laser intensity estimator CNN to create a robust PowerNet that generates uniform intensity photoacoustic images with limited optical scattering
- Design and construct an automated workflow to pre-process, train, validate, and post evaluate medical data, including active snake contour method to remove skin layer and CW-SSIM to post-evaluate images

Research Assistant at NCKU-Media SoC Lab | MATLAB, Keras, Python, C   May 2020 – January 2022
- Assist Professor Lee in designing the workflow and C code of a portable melanoma skin cancer detector that classifies melasma dendritic level through mobile devices
- Consult effectively with dermatopathologists from Kaohsiung Medical University to obtain important pathological information to formulate a contour snaking algorithm that identifies cytoplasm boundary of dead skin cells for cytoplasm segmentation

Research Assistant *at **NCKU-Media SoC Lab** | MATLAB, TensorFlow, Python, C*   May 2022 – August 2022
- Modified ResNet50 with dilated convolution in TensorFlow to classify food images into 24 ingredient categories, and use the predictions to estimate nutritional intake for the dietary tracking mobile application, *CogniAI*
- Automate mask labeling for food image database through image segmentation based on low-level color & texture features in C

COMPUTER SYSTEMS & ARCHITECTURE
Linux Operating System | *x86 Assembly, C*
- Develop an operating system based on simplified interfaces through reading Linux Kernel Specifications in protected mode
- Set up the basics: interrupt and global descriptor tables, paging, real-time clock, device interrupt and exceptions handling
- Devise the functionality and integrations of system call, multiple terminals, and basic scheduling to handle at most 10 system calls; provide support for six tasks from program images in the file system
- Generate adequate test cases for each component to isolate design and coding bugs

Life or Death Vaccination Game | *x86 Assembly, Kernel*
- Implement a text-mode game for players to guess randomly generated DNA sequences to vaccinate and prevent live cells from being decreased by aggressive virus
- Use double buffering to efficiently update game boards data for each generation
- Set up levels of protection by copying data to and from users's memory and manipulated the data in Kernel to prevent user messing with game execution stack through I/O inputs
- Incorporate Linux real-time clock driver (RTC) that generated interrupts through a tasklet function, thereby updating game board data and game status to display continuously at a settable frequency

DIGITAL SYSTEMS
Advanced Encryption Standard (AES) | *SystemVerilog, FPGA, C, NOIS-II*
- Implement a software encryptor, an embedded NOIS-II processor, to encrypt input data using provided cipher key and communicate with the IP core to decrypt the AES encrypted message in hardware FPGA with SystemVerilog
- Devise a state machine to control how the slave port of the Avalon Memory Map reads and writes when the Avalon master, NOIS-II, send signals to call upon the operations
- Establish USB interface connection between NIOS-II and MAX3421E USB chip with SPI protocols, so users can define the input key and the message to encrypt

DATABASE SYSTEMS
Dozen-Duty Web Application | *AWS, HTML, Python, Django, SQL, MongoDB*
- Utilize Django to create web application that manages a "household" by 1) assign and manage chores equally, 2) suggest grocery items based on buying frequency and diet healthiness, and 3) keep track of money debts between group members
- Designed the front-end usability and visualizations with HTML and CSS, and deploy the Django application on AWS by setting up virtual environment and configuring Apache
Implement triggers to insert, update, delete tables automatically, and query the database with raw SQL and NoSQL commands

CONFERENCE & SYMPOSIUM PRESENTATIONS
Oral Symposium Presentations
> **Wu, C. S.**, Chen, Y. (2021, May). *Overcoming optical scattering in photoacoustic imaging with intensity-recovering deep learning model.* UIUC Undergraduate Research Symposium, Urbana, IL.

Oral Conference Presentations
> Huang, K. C., **Wu, C. S.**, Zhao, Y., Chen, Y. (2022, Jan). *Photoacoustic deep tissue imaging enhanced by ultrasound-guided deep convolution neural networks.* Session 13: Machine Learning: Developments and Applications, SPIE Conference: Photons Plus Ultrasound: Imaging and Sensing 2022, San Francisco, CA.

VOLUNTEER & LEADERSHIP EXPERIENCE
Women in Electrical Computer Engineering | *Urbana, IL*
Member of Tech Committee   ***January 2018 – May 2019***
- Plan workshops for soldering, Arduino, and GitHub to expand tools for fellow WECE members
- Maintain fluency in multiple tools such as Vim, Raspberry Pi, Arduino, and Git when preparing for workshops

Guatemala Engineering Service | *Antigua, Guatemala*   ***December 2017 – January 2018***
- Engineer and construct housing for a local family, setting up the water system and electricity for bathroom and kitchen
- Analyze cultural differences, while becoming more open-minded when approaching issues and solving problems

REFERENCES

Brian T. Cunningham, Professor and MNTL Director
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Department of Bioengineering
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