Zhe Wee (Derrick) NG

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Education

University of California, Berkeley
BA in Computer Science *August 2023 - Expected May 2025*

University of California, San Diego
Transferred Credits towards Computer Science Degree *September 2020 - May 2023*

Research Experience

Research Assistant – Diffusive AI Lab
Tsinghua University, Beijing, China *October 2024 - Present*

- Part of the Diffusive AI Lab, guided by Dr. Zheng Zhu, to develop a scalable, diffusion-driven 3D video generation system focused on persistent state tracking and dynamic, text-based scene modifications.
- Implementing state tracking using environmental encoding, action-based updates, and enhanced VAEs with attention layers; leveraging persistent state mechanisms (e.g., LSTM neural networks) trained on sequential data to ensure consistent object placement and temporal coherence across frames.
- Developing a text-prompted scene modification framework, incorporating LLM-driven command parsing and cross-attention transformers for accurate text-to-scene alignment, supported by a dynamic scene graph to enable real-time updates and coherent rendering.

Research Assistant – Berkeley Engineering Design Scholars Program & Co-Design Lab
Jacobs Institute for Design Innovation & Department of ME, UC Berkeley *June 2024 - Present*

- Leading NLP-based research on sustainable design, started during the Berkeley Engineering Design Scholars Program, and continuing under the Co-Design Lab with Dr. Kosa Goucher-Lambert.
- Developed automated web scraping tools using DrissionPage and BeautifulSoup to extract Amazon product and review data.
- Applied NLP techniques in Python, including aspect-based sentiment analysis with LLMs like BERT, VADER, and OpenAI's API, as well as LDA and NMF topic modeling. Evaluated model performance through correlation matrices to uncover insights on sustainability perceptions from certifications and customer feedback, informing sustainable design strategies.

Independent Research – Predictive Maintenance Modelling *April 2024 - Present*

- Conducting research on predictive maintenance to enhance equipment reliability in industrial settings.
- Developed LSTM neural networks to forecast equipment failures using time-series data. Achieved improved predictive accuracy and reduced downtime compared to traditional maintenance approaches by evaluating model performance with metrics like MSE and precision-recall analysis.
- Authored a manuscript titled "*Enhanced Equipment Reliability Through Predictive Maintenance Modeling: A Machine Learning Approach*", currently under peer review.

Awards

Multimodal Single-Cell Integration Kaggle Competition (Silver Award)

September 2022 - December 2022

- Collaborated in a team of 5 to develop predictive models analyzing covariation among DNA, RNA, and protein measurements in single cells.
- Utilized Python and R for model development, employing XGBoost, Random Forest, and Neural Networks.
- Achieved 24th place among over 2,000 teams on Kaggle, earning a Silver Award for model accuracy on the test dataset.

International Genetically Engineered Machine Competition (Silver Award)

July 2019 - September 2019

- Led a team of 5 in designing and implementing a BioBrick part using CRISPR-Cas9 to target HPV, identifying proteins associated with NFX1-123 overexpression, a gene linked to cervical cancer risk.
- Utilized laboratory techniques such as PCR, plasmid construction, cell transfection, and mass spectrometry-based proteomics (IP MS, FASP) to create and validate a functional prototype of the BioBrick part, confirming protein expression variations in HPV-infected HeLa cells.
- Ranked in the top 20 globally among over 100 teams at iGEM, earning a Silver Award for developing a prototype to detect biomarkers for early HPV-related cervical cancer diagnosis and prevention.

Work Experience

Web Development Engineer (Internship)

AoSheng Global Inc., El Monte, CA, U.S.A *September 2023 - December 2023*

- Developed adaptive websites using HTML, CSS, and JavaScript for cross-platform compatibility, employing performance optimization algorithms to improve responsiveness.
- Designed intuitive UI/UX tailored to the education consulting industry, increasing client engagement through user-friendly interfaces.
- Contributed to strategic development meetings, offering insights on emerging web technologies to shape the company's digital strategy.

Data Analyst (Internship)

Hironpal Holdings, Singapore *March 2022 - August 2022*

- Analyzed sales and inventory data in the ERP system using SQL, developing automated tools for inventory turnover and stock alerts to streamline management.
- Built revenue forecasting models in Python with linear regression and KNN algorithms, analyzing historical sales data, customer patterns, and market trends.
- Conducted A/B testing via Google Optimize to evaluate marketing strategies, yielding insights into customer behavior that informed targeted and effective campaign adjustments.
- Collaborated with the marketing team to utilize data-driven insights for product selection and market positioning, optimizing advertising strategies and increasing campaign ROI.

Test Engineer (Internship)

Serica Semiconductor Technology, Beijing, China *November 2021 - January 2022*

- Conducted ModelSim simulations to verify PLL circuit functionality and stability, analyzing frequency and phase noise characteristics to ensure compliance with technical specifications.
- Developed and executed C test scripts using the OpenSSL library to validate RSA encryption and decryption functions, ensuring accuracy.
- Identified PCB hot spots with thermal imaging tools and optimized thermal pad placement through ANSYS Icepak simulations, improving heat dissipation efficiency.
- Measured PCIe signal integrity using an oscilloscope and mitigated distortions and crosstalk by refining trace routing and impedance matching, achieving stable signal transmission.

Venture Capital Analyst (Internship)

JinDing Capital, Shanghai, China *May 2020 - December 2020*

- Analyzed technology sector trends by consulting industry experts and reviewing market data, identifying investment opportunities in DPU, CPU, semiconductors, and software management services.
- Evaluated tech firms' business potential using qualitative methods (process analysis, development methodologies, management practices) and quantitative techniques (financial modeling, valuation methods) to guide strategic investment decisions.
- Assessed products such as machine vision systems and magnetoencephalography devices by analyzing their development stages and technical specifications, delivering detailed reports and presentations to senior management.

Skills

- **Programming Languages:** Python, Java, C, R, MATLAB, JavaScript, HTML, CSS, LaTex
- **Programming Techniques:** Data structures, algorithm design and evaluation, software engineering principles
- **Artificial Intelligence:** Foundational AI principles, machine learning methodologies, diffusion-based models, attention mechanisms (VAE), temporal sequence modeling (LSTM)
- **Natural Language Processing:** Aspect-based sentiment analysis (BERT, VADER), topic modeling (LDA, NMF), and OpenAI API integration
- **Data Analysis:** SQL data management, predictive modeling (Linear Regression, KNN, XGBoost, Random Forest, Neural Networks), correlation matrix evaluation
- **Web Technologies:** Web scraping (DrissionPage, Selenium, BeautifulSoup, pandas), UI/UX design, performance optimization, adaptive web development
- **Database Systems:** Full-stack database system design and evaluation, database services including protection and integrity control
- **Computer Architecture:** Digital logic design, ModelSim for simulations, ANSYS Icepak for thermal analysis, oscilloscopes for signal integrity measurement, OpenSSL for encryption/decryption validation
- **Cryptography:** Theoretic foundations of cryptography, encryption/decryption methods, secure communication protocols
- **Project Management:** Coordinating research projects, evaluating technology trends, strategic planning and decision-making
- **Communication:** Effective communication, conflict resolution, bilingual (English and Mandarin Chinese)