Lufter C.W. **Liu**

e64069094@gs.ncku.edu.tw | lufter.github.io | Lufter

Research Interests

Quantum Information, Quantum Computing, Computer Simulating Physics.

Education

National Cheng Kung University (NCKU) *Tainan, Taiwan*

B.S. in Civil Engineering *06/2020*

- Overall GPA: 3.55/4.3, Physics Major: 4.16/4.3
- Courses: Physcis (QM I&II, EM I&II, SS), Engineering, Material Science, Computational Science

Research Experience

***Research Assistant* , Physics Dept. Matterwave Lab,** Prof. Pei Chen Kuan *Tainan, Taiwan*

Multiple Way Quantum Walk (MWQW) *08/2019 - PRESENT*

- Disscussed phenomenon when implementing MWQW in optical systems using analitical and numerical methods.
- Deployed a computer program that simulate and visualized MWQW, which engance our working efficiency.
- Improved the defects in previous asympotic analysis methods when implementing Schrödinger's approach to MWQW.
- Presented the recursive relations in MWQW and its exit probability p_∞ from an automation perspective.

Sensitive Measurements Through Matter Waves.

- Research on implementing double-diffraction Bloch oscillation to cancel the phase purterbation when performing sensitive measurements.

***Research Assistant*, Civil Engineering Dept. AI Material Lab,** Prof. Yun Che Wang *Tainan, Taiwan*

Machine learning in material design. *02/2019 - 06/2020*

- Applied various generative adversarial networks (GANs) to generate high fedility material samples.
- Proposed a method using VGG networks that can predict mechanical properties from microstructure images with 95% accuracy.
- Investigated an integrated model that optimizes the geometry generated by GANs.

Constructing auxetic materials unsing computational molecular dynamics.

- Applied prunning protocal to generate auxetic networks based on "Auxetic metamaterials from disordered networks".
- Proposed a prunning protocal that ran on 96 cloud-based CPUs, incresed the computatioinal efficiency by 40 times.
- Implemented a stochastic protocal to produce large scale homogenous microstructure datasets by two-point corelation function.

Publication

1. **Chun Wei Liu**, Pei Chen Kuan, *Symmetric Quantum Walk With Phase Transition Feature*, Physics Prview Meow, 2020 (In preperation)
2. Yun-Che Wang, **Chun Wei Liu** , Pei-Chen Cheng , Jyun-Ping Wang, Tsai-Wen Ko, *Design of Chiral Metamaterials via Deep Neural Networks*, 44th National Conference on Theoretical and Applied Mechanics (CTAM2020)

Honors & Awards

2020 **Chairman Special Award (entering final round),** IBMq Qiskit Hackthon Taiwan

2018 **5th Place (out of 250 students),** Asia Pacific Mechanics Contest for College Students

2016 **Dean's list ,** GPA in top 5% of the department

Presentation

***Design of Viscoelastic Auxetic Materials Through Machine Deep Learning* |Link** *Taipei, Taiwan*

Asian Pacific Congresson Computational Mechanics (APCOM2019) *12/2019*

- Disscussed the use of VGG networks as an alternative of finite element method when labeling mechanical properties of small scale 2D microstructure geometries.

Selected Projects

Predicting Handwriting Recognition With Parametrized Quantum Circuit

For IBMq Qiskit Hackthon Taiwan 2020 *09/2020*

- Implemented 4qubit-Ry gate circuits in predicting MNIST dataset with learning curve converge after 10 iteration.
- Analized the potential in predicting molecular ground state energies with Quantum LSTM Meta-Learner and VQE.

Writting a Request For Proposal (RFP) For a Pedestrian Overland Bridge

For CE4093 (Special Projects) *06/2020*

- Designed and analized a pedestrian overland bridge with ASCE Codes and Standards and special requirements.
- Won **3rd place** (out of 8 groups) in the competitive bidding event by achieving a minimum cost and working days.

Finite State Machine Chatbot

For CSIE4007 (Theory of Computation) *12/2019*

- Designed a chatbot applicaiton using finite state machine.

Extracurricular Activity

American Language Program, School of Professional Studies, Columbia University *New York City, NY*

Student *07/2018 - 08/2018*

- Passed the intensive C1 english program and visited some advanced academic facilities to prepare for my graduate stuties.

NCKU CE Student Association *Tainan, Taiwan*

Academic Director *06/2017 - 06/2018*

- Organized several construction site-visiting through contacting mojor consulting corporations for 200 students accumulated.

Skills

Languages: Python, C/C++, MATLAB
Libraries/Tools: Qiskits, Tensorflow, PyTorch
Other Technologies: GNU/Linux, Raspberry Pi, GCP, Git, LAMMPS, LaTeX