

Chou-Wei Kiang

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Education

National Taiwan University (NTU), Taipei, Taiwan

Sept. 2018 – June 2022

B.S. in **Electrical Engineering (EE)** | GPA: **4.24/4.3**, ranked **top 4% (7/196)**

- Selected courses (**straight A+**): Solid State Electronics, Modern Physics, Integrated Circuit Design, Optoelectronic Electromagnetics, RF Microwave Wireless Systems, Fourier Transform and Fourier Optics, Thermodynamics

Peer-Reviewed Journal Articles

- [1] **C.-W. Kiang** and J.-F. Kiang, "Imaging on underwater moving targets with multistatic synthetic aperture sonar," *IEEE Transactions on Geoscience and Remote Sensing*, vol. 60, Nov. 2022, Art. no. 4211218, [pdf] [IEEE Xplore].
- [2] **C.-W. Kiang** and J.-F. Kiang, "Imaging and motion parameter estimation of flying helicopter with duo airborne SARs in X-Band," *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, vol. 15, pp. 9623-9638, Nov. 2022, [pdf] [IEEE Xplore].

Journal Manuscript Under Review

- [3] **C.-W. Kiang** and J.-F. Kiang, "Quantum Sensing of Geomagnetic Fluctuations and Noise Spectroscopy with Hybrid Short Ramsey-Haar Wavelet Method and NV Ensembles," *IEEE Transactions on Quantum Engineering*, under review, [pdf].

Research Interests

Quantum engineering (solid-state systems for quantum computing and quantum sensing, superconducting microwave circuits), quantum information processing (sensing, communications), quantum optics, and sensing technologies.

Research Experiences

Quantum Electronics Laboratory | Research Assistant

Mar. 2023 – present

Advisor: Prof. Jiun-Yun Li

Department of EE, NTU

- Hall measurement and characterization of GeSn/Ge spintronic devices
 - analyze electrical and magneto-transport properties of undoped and modulation-doped GeSn/Ge heterostructures through SdH oscillations and quantum Hall plateaus
 - investigate strain and Sn effect on Rashba spin-orbit coupling by analyzing WL/WAL patterns and SdH oscillations
- Differential conductance measurement and characterization of GeSn/Ge, Ge/GeSi quantum point contact (QPC) devices
 - investigate nonlinear transport and magnetic depopulation effects through conductance measurement
- Set up apparatus and write Matlab codes to control lock-in amplifiers and voltage source for remote measurements

Group of Electromagnetic Applications | Research Assistant

June 2020 – Aug. 2023

Advisor: Prof. Jean-Fu Kiang

Department of EE, NTU

- Simulations of **quantum sensing** using nitrogen-vacancy (NV) center ensembles [3]
 - model and simulate dynamics of qubit sensors based on NV center ensembles with Lorentzian spin-bath noise
 - implement inverse Haar wavelet transform for quantum sensing with short Ramsey and spin-echo MW sequences
 - reconstruct a sub-nT arbitrary waveform in kHz band with sensitivity of 0.63 pT/ $\sqrt{\text{Hz}}$, along with the noise spectrum
- Synthetic aperture sonar (SAS) (**remote sensing & signal processing**) [1]
 - propose multistatic SAS configuration to estimate velocity vector of moving submarine within 3% of error
 - design a modified range Doppler algorithm to acquire SAS image from echoed signals by integrating range frequency reversal transform, modified second-order Wigner-Ville distribution transform and Radon transform
- Synthetic aperture radar (SAR) (**remote sensing & microwave radar imaging**) [2]
 - propose a two-stage template matching method to separate backscattered signals from fuselage and fast-spinning rotors
 - propose a duo airborne SAR and phase matching transform to estimate target velocity within 0.03% of error
- Modeling and simulation of optical radiation force (**optics & electromagnetics**) (Report:[pdf])
 - integrate Fourier transform for decomposing an incident Gaussian beam, Lorenz-Mie theory for computing scattered fields, and Maxwell stress tensor for computing the radiation force exerted on a spherical particle
 - compute with numerical methods the electric field and radiation force density distributions on a spherical surface, as well as the net time-average radiation force exerted with different Gaussian-beam waists

Honors & Awards

2023 DoD NDSEG Fellowship Awardee (declined) – Selected among over 3,080 applicants

Fall 2023

NTUEE graduation ceremony representative – Top 10 in the class of 2022

2018–2022

Dalongdong Baoan Temple Scholarship (5 times) – Merit-based undergraduate scholarship

2018–2022

NTU Presidential Award – Academic excellence award

Fall 2018

Skills

mK cryogenic system operations: TeslatronPT + KelvinoxJT insert, ProteoxMX (Oxford Instruments)

Transport and conductance measurement: B1500A semiconductor device analyzer (I-V measurement), SR830, SR865A lock-in amplifiers, Basel low-noise/high-resolution DAC, superconducting magnet operations

Classical simulation of quantum systems using Matlab and Python

Modeling and simulations of electromagnetic, optics, and microwave systems with Matlab and Python

Programming: proficient in Matlab, Python (QuTiP, Tensorflow), C/C++; **familiar with** Verilog

Other skills: proficient in \LaTeX , Visio; **familiar with** Linux, Solidworks, Meshlab

Languages: English (**TOEFL: 106/120**), Mandarin Chinese

Selected Course Projects

Autofocus Methods for Synthetic Aperture Radar (SAR) Imaging Spring 2022

Term paper for Fourier Transform and Fourier Optics, [pdf](#)

- investigate and derive phase gradient autofocus (PGA) and minimum entropy autofocus (MEA) algorithms
- implement PGA and MEA with Matlab on blurred point targets and blurred image acquired from real SAR data

DWT and DTCWT for Image Processing Fall 2021

Term paper for Time-Frequency Analysis and Wavelet Transform

- thoroughly compare discrete wavelet transform (DWT) and dual-tree complex wavelet transform (DTCWT) in terms of
- implement image denoising and image compression with DWT and DTCWT under different wavelet designs

Digital Integrated Circuit (IC) Design of an Image Processing Filter Spring 2021

Term project for Integrated Circuit Design

- design IC circuit with Verilog to perform pixelwise census transform and median filter on an input image
- implement pipeline design to improve area-time (AT) performance
- simulate the design flow, including register transfer level (RTL) design, synthesis, and auto-place and route (APR)

Simulation of Double-Stub Impedance Matching in Transmission Line Spring 2020

Simulation project for Electromagnetics II, [demo](#)

- derive double-stub impedance matching theory with 9 phasors and 9 boundary conditions
- simulate voltage and current variation with time on the main transmission line and both stubs with Matlab

Leadership Experiences

Feb. 2016 – Jan. 2017 Vice-Chairman of Student Association, Taipei Municipal Chien-Kuo Senior High School