Haozhe Tian

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Education

- **Imperial College London** *Oct 2023 - Oct 2027*
  PhD, Dyson School of Design Engineering London, UK
  - Scholarship from UKRI and Dyson School of Design Engineering

- **Imperial College London** *Oct 2021 - Oct 2022*
  MSc, Department of Electrical and Electronic Engineering London, UK
  - Grade: Distinction | The Ivor Tupper Prize For Excellence in Signal Processing, Broadcast, and Video Technology (1 in the cohort)

- **Beihang University** *Sep 2017 - Jun 2021*
  BEng, School of Automation Science and Electrical Engineering Beijing, China
  - GPA: 3.84/4 | China National Scholarship (0.2%) | three-times on the outstanding student list (5%) | Outstanding Graduate (10%)

Work

- **Research Assistant [🌐]** *Jan 2023 - Aug 2023*
  Hong Kong Polytechnic University Hong Kong SAR, China
  - Developed a graph poisoning method that systematically injects a small number of malicious nodes that significantly enhance graph link inference attack performance.
  - Presented finding at IEEE Big Data 2023

- **Teaching Assistant** *Jun 2024 - ongoing*
  Imperial College London London, UK
  - Taught *Optimisation*, *Statistics*, and *Machine Learning* to MEng and MSc students.
  - Developed tutorial sheets to reinforce core concepts, delivered 3-hour weekly tutorials and provided individual guidance during office hours.

Publications

[1] Haozhe Tian, et al. (2024). **Reinforcement Learning with Adaptive Regularization for Safe Control of Critical Systems**. In *Advances in Neural Information Processing Systems (NeurIPS)*.

[2] Haozhe Tian, et al. (2023). **CGP: Centroid-guided Graph Poisoning for Link Inference Attacks in Graph Neural Networks**. In *IEEE International Conference on Big Data (BigData)*.

[3] Haozhe Tian, et al. (2023). **Hearables: Heart Rate Variability from Ear Electrocardiogram and Ear Photoplethysmogram (Ear-ECG and Ear-PPG)**. In *45th Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC) (**oral presentation**)*.

[4] Bei Zhang, Haozhe Tian, et al. (2021). **Instrumentation of surface plasmon microscopy: complete scheme of signal extractions**. In *IEEE Transactions on Instrumentation and Measurement*.

Skills

- **English:** GRE General (330+4.0) | TOEFL iBT (115)
- **Programming Languages:** Python | MATLAB | julia | C/C++ | Verilog HDL
- **Frameworks:** Numpy | PyTorch | Scikit-learn | OpenCV | pandas | Matplotlib
- **Others:** LaTeX | html | CSS | git

PROJECTS

- **Reinforcement Learning for Safety-Critical Applications** *Oct 2023 - ongoing*
  Topics: Reinforcement Learning (RL), Model Predictive Control (MPC), Convex Optimization
  - Awarded the I-X Moonshot Seed Fund (awarded to 6 projects annually at Imperial College London).
  - Developed and open-sourced three safety-critical control environments (two for blood glucose control and one for chemical reactors) [].
  - Proposed a "focus" module that integrates MPC for achieving safety in RL training.
  - Analytically quantified worst-case policy safety and proved policy convergence.
  - Validated the algorithm in simulated environments using real-patient parameters.
- **Link Inference Attacks in Graph Neural Networks** *Jan 2023 - Aug 2023*
  Topic: Graph Neural Network (GNN)
  - Formalized a novel graph link inference attack scenario involving malicious nodes.
  - Designed a link inference attack method leveraging malicious nodes to extract sensitive links.
  - Achieved > 0.9 inference F1-score with just 1% malicious nodes in classic graph datasets.
- **Analysis of Noisy Ear ECG and PPG Signals** *Jan 2022 - Aug 2022*
  Topics: Matched Filter, Hilbert Transform, Machine Learning
  - Contributed to the development of a wearable ear sensor for bio-signal measurements (ECG and PPG).
  - Created a method for heartbeat detection using a Matched Filter with auto-generated templates.
  - Applied signal processing techniques to extract features from real-world signals, enabling physical state classification using machine learning.
- **Epileptic Seizure Detection Using Graph Neural Networks** *Jan 2021 - Jun 2021*
  Topics: Graph Neural Network (GNN), Signal Processing
  - Conducted spectral analysis and statistical tests to identify key EEG frequency bands.
  - Developed graph-based representations of EEG channels using spatial and spectral coherence.
  - Compared performance of fully connected neural networks, shallow GNNs, and deep GNNs using multiple metrics.
- **Surface Plasmon Microscopy Based on Object Detection Networks** *May 2020 - Apr 2021*
  Topics: Object Detection, Signal Processing, Optics
  - Built an optical system for acquiring surface plasmon (SP) profiles.
  - Trained a Faster R-CNN network for localizing SP profiles and classifying polarization states.
  - Introduced self-correlation for location rectification and gray-scale statistical methods for aperture radius measurement.