# Youjing Yu

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## Education

**Trinity College, University of Cambridge** *Oct. 2019 – Jun.2023*
ENGINEERING Bachelor of Arts, Master of Engineering

Course in first two years includes Mechanical engineering covering mechanics and vibrations; Structures covering materials and structural mechanics; Mathematical methods covering mathematics and computing; Electrical and Information engineering covering physical principles of electronics, analysis of circuits and devices, linear systems, logic circuits and electromagnetics. Specialised in Information and Computer engineering in the last two years. Courses cover a wide range of topics centring in machine learning and signal processing, including deep learning, probabilistic machine learning, information and coding theory, computational neuroscience, computational statistics, statistical signal analysis and control.

First Year Grades: *Unofficial due to COVID-19*; 85% Overall.
Second Year Grades: *Unofficial due to COVID-19*; 77% Overall; **awarded Senior Scholar.**
Third Year Grades: 78% Overall; **ranked 19/285** (**top 6%**); **awarded Senior Scholar.**
Fourth Year (Masters) Grades: 80% Overall; **ranked 3/285 (top 1%) of general engineering; ranked top of Information and Computer engineering.**

**Hwa Chong Institution, Singapore** *Jan. 2017 - Dec. 2018*
Singapore A level Physics (A), Mathematics (A), Chemistry (A), Economics (A), Modern Physics (Distinction)

**Anderson Secondary School, Singapore** *Jan.2015 – Dec. 2016*
10 Singapore GCEs (All grade A1)

## Awards & Prizes

**Prince of Wales Student Award - July 2023;**
Trinity College Examination Prize - July 2023;
**AT&T Prize for Information and Communications Engineering - June 2023;**
**Cambridge University Trinity College Senior Scholar** - July 2022;
Trinity College Examination Prize - July 2022;
Trinity College Summer Studentship - Mar 2022;
**Cambridge University Trinity College Senior Scholar** - July 2021;
Trinity College Examination Prize - July 2021;
**Cambridge Trust Overseas Scholarship** - Mar 2019;
**Trinity College Overseas Bursary** - Mar 2019;
**Hwa Chong Diploma with Distinction** - 2018;
**Singapore Science and Engineering Fair Silver Award** - March 2018**;**
**Singapore Youth Festival Gold Award** - May 2017;
American Mathematics Competition Distinction - 2017;
Australian Mathematics Competition High Distinction - 2017;
Euclid Mathematics Contest Distinction - 2017;
**Singapore Junior Physics Olympiad Silver Award** - Oct 2016;
**UNSW English Writing Competition High Distinction** - 2016;
UNSW Mathematics Competition High Distinction - 2016;
**OAAS Scholarship Award** - 2016;
**Singapore Youth Festival Gold Award** - 2015;
**Singapore Mathematical Olympiad Silver Award** -2015;

# Experience

**Research Intern under the Department of Engineering** **University of Cambridge**
Student Assistant Researcher Oct.2022-Jun.2023

- Joined the Neural Dynamics and Control (NDC) group directed by Dr Guillaume Hennequin.
- Our task is to implement a webcam-based eye tracker to track the user's eye movements on screen in psychophysical experiments to better understand human thinking when solving challenges.
- Using ideas from human physiology, we implemented an online process that dynamically tracks environment variables such as the user's viewing distance from the screen with one initial simple calibration task.
- Based on WebGazer, we map from the user's eye images in the camera stream (from TensorFlow Facemesh) to eyeball rotation angles using Gaussian Processes regression with a novel proposed kernel.
- Our implementation shows a 22% reduction in error in prediction of gaze location of user compared to the original WebGazer.

**Research Intern under the Department of Computer Science** **University College London**
Student Assistant Researcher Dec.2021-Oct.2022

- Joined the Web Intelligence Research Group and supervised by Dr Aldo Lipani. Check out https://wi.cs.ucl.ac.uk/index.php/people/
- Worked on speech and text-based user confidence and expertise detection and measurement in conversational search systems (CSS) using transformer-based multimodal deep neural networks.
- Prepared a dataset of user queries named UNSURE from Spotify Podcast, with the use of the word-level transcript to segment out questions.
- Crowdsourced using Amazon Mturk service to obtain confidence scores based on the segmented audio files. Performed quality control on collected answers and conducted user agreement analysis.
- Trained a text and audio multimodal regression network using pretrained BERT and HuBERT models to predict human confidence scores. Our model showed a human-level performance in confidence score prediction.
- ***Paper under review at Special Interest Group on Information Retrieval (SIGIR).***

**Research Intern under the Department of Engineering** **University of Cambridge**
Team Leader Jul.2021-Oct 2021

- Successfully developed a web-based interface for Natural Language Processing (NLP) text corpora that enables gender biases to be revealed visually and interactively.
- A Flask-based web framework was created where the user can upload their corpora through inputting plain text, URL or txt files. Two NLP algorithms will run, namely the Bias Score Calculation algorithm and the Sentence Parsing algorithm, both based on word embeddings. The user is able to view the Bias scores associated with each token and specific sentence structures. Interactive pivot tables, bar graphs, word clouds, PCA and TSNE graphs are provided for the user to explore and extract information.
- The user is also able to input a natural language query, where the query is parsed and the answer is given in the form of a data frame and a bar graph. A debias feature is also available if the user wishes to discard the more extreme sentences and retrieve a less biased file.
- Self-taught web-development skills such as JavaScript, CSS and HTML; self-taught NLP algorithms and parsing techniques.
- GitHub Repo: https://github.com/YoujingYu99/visualising_data_bias
- ***Paper under review at Digital Scholarship in the Humanities.***

**MAGIC Research Group under the Department of Engineering** **University of Cambridge**

Research Intern Mar.2021- Apr.2021

- Joined a research group named the Managing Air for Inner Greater Cities (MAGIC) where the broad aim is to develop cities with no air pollution and no heat-island effect. The subgroup directed by Professor Adam Boies targets identifying modes of pollution resulting from different car models.
- My job was to identify car plate numbers and hence car models from video footage and hence determine the pollution output from each car model and the pollution that enters the surrounding buildings. I wrote a machine-learning algorithm for detecting UK car plate numbers from videos using computer vision packages such as OpenCV and Pytesseract. Data cleaning was performed using maximum likelihood inference.

**Spacept project at Hackbridge** **University of Cambridge**

Team member Oct.2020-Dec 2020

- The goal of the project is to identify and predict building damage and forest fires from satellite images. We built an ML-Enhanced Computer Vision Change Detector System for Satellite Images Analysis. We wrote a Convolutional Neural Network (CNN) for differential image detection for satellite building, forest fire and oil spill images.
- Team leader of the unsupervised learning team.
- Exploring various techniques (shallow and deep ML, supervised, semi-supervised and unsupervised models) to determine changes of interest in satellite images.

**Citadel Europe Regional Datathon** **Online Event**

Team member Oct.2020

- Participated in a one-week datathon challenge.
- Solved a social and economic problem with the implementation of Machine Learning. We tested strategies, namely Random Forest and Long Short-Term Memory neural networks to predict which tracts will gentrify in the upcoming ten years from historical data.
- Performed economic analysis on the given and predicted set of data to derive the population characteristics of gentrified tracts.

**Research Group under the Department of Electrical and Electronic Engineering** **University of Hong Kong**

Student Assistant researcher *Jul.2020-Sep.2020*

- Did a ten-week internship programme on deep-learning generated holography.
- Our goal is to generated holography images from camera images using deep learning techniques. We used TensorFlow to build various neural networks such as convolutional neural networks (CNN), ResNet, Wide ResNet, DenseNet and SqueezeNet. We performed image to image translations with Generative Adversarial Network (GAN) structures on hologram images.

**Research Group under the Department of Engineering** **Cambridge**

Research Intern Mar.2020

- Joined a Carbon Nanotube (CNT) characterisation research under Dr. Boies, where I tested and recorded the thermal responses of CNT.
- Passed atomised DNT particles through CNT filters to test and record transmission efficiency.
- Learned basic machine and software manipulation of FLIR camera, neutraliser, electrostatic classifier, condensation particle counter and pressure gauge among other techniques.

**3D printing society** **Cambridge**

Society Member Jan.2020 - June 2022

- Joined a team working on Cambridge University Engineering Department Library Project, where we design tools, toys and decorative items to put in the library.
- Used SolidWorks to design and print Luban Ball, a traditional 8-piece Chinese puzzle; Luban Lock, an 8-piece puzzle; a rotational interactive toy and many more.
- Participated in a metal 3D printing workshop at the Institute for Manufacturing to learn basics of metal printing techniques.

**DewTouch** **Singapore**

Intern *Jun.2018*

- DewTouch is a software company that develops Fleet Management Systems and food Catering Management Systems. As an intern, I analysed car sales data from excel, presenting results in graphical forms.
- Designed website layout and icons.
- Participated in business negotiations.

**Research Group under the Department of Building** **National University of Singapore**

Assistant researcher; Student team leader *Mar.2017-Jan.2018*

- The goal of the project is to produce nano encapsulated organic particles for coating. The coating should ideally be self-cleaning (dust-resistant) and thermally insulating. Our Cadmium Orthostannate nanoparticles with 3-(mercaptopropyl)trimethoxysilane suspended in organic solution were shown to have effective thermal insulation abilities, which can save massive amounts of energy if painted on windows.
- Familiarised with the use of common laboratory equipment, including centrifuge, scanning electron microscope and transmission electron microscopy.
- *Paper accepted in International Researchers Club Conference (retracked due to IP issues)*.
- **Silver Award** at Singapore Science and Engineering Fair.
- Participated in ASTAR Talent Search.

## Extra-curricular Activities

**Trinity College Badminton Club** **Trinity College, University of Cambridge**

President Oct.2022 – Jun.2023

- President of the Trinity College Badminton Club .
- Overseeing Women's Team, Men's First, Second and Third Team.
- Organised trials and assigned members for each team.
- Organised coaching, league matches, cuppers matches, field bulk bookings and social events.
- Organised stash designs and orders.

**Trinity College Badminton Club** **Trinity College, University of Cambridge**

Captain Oct.2021 – Jun.2022

- Organised trainings and devised a plan to focus on different skills each week.
- Organised inter-collegiate matches, booked badminton courts and kept logs of scores.

**Trinity College Engineers Society** **Trinity College, University of Cambridge**

Events Officer Oct.2020 – April.2021

- Events officer who is responsible for organising events for engineers at Trinity College.
- Organised Pizza Night where engineers across all years come for Pizzas. Minimal socialising was allowed due to COVID situation. All planned in-person events after this, unfortunately, were cancelled due to COVID situation.
- Online social event with Girton College Engineers Society where participants met up and played games online.

**Hwa Chong Girls' Tennis Team** **Singapore**
Member Jan.2017 – Dec.2018

- Represented Hwa Chong Junior College in inter-collegiate tennis matches.
- **First Runner-Up** in 2017.
- Second Runner-Up in 2018.

**Hwa Chong Junior College Chinese Orchestra** **Singapore**
Member Jan.2017 – Jun.2017

- Represented Hwa Chong Junior College Chinese Orchestra.
- **Gold Award** at Singapore Youth Festival.

**Son-rise Singapore** **Singapore**
Member Jan.2017 – Dec.2018

- Responsible for interacting and playing with an autistic child for four hours a week.
- Taught the child basic words and phrases.
- This experience taught me the value of empathy and the importance of always respecting and helping people living on the margins of society, which I am highly grateful for. I have also developed a positive mindset and a passion for serving.

**Anderson Secondary School Choir** **Singapore**
Member Jan.2015 – Dec.2016

- Represented Anderson Secondary School Choir.
- **Gold Award** at Singapore Youth Festival.

**Ground-up Initiative** **Singapore**
Member Jan.2015 – Dec.2016

- Ground-up Initiative is a non-profit community that aims to develop urban sustainability through hands-on education on farming, craftwork and painting. Participated in carpentry, brick-making, seed-sowing, plant-watering and a variety of agricultural activities.
- This experience taught me appreciating nature and the importance of conservation. It also helped me gain some hands-on skills with the use of basic tools.

## Additional Skills

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| **IT** | Proficient in the use of Microsoft Office;<br>Basic command of SolidWorks;<br>Able to program in Python, MATLAB, JavaScript, SQL, C++. |
| **Driving** | Full clean driving licence (China) |
| **Languages** | Fluent Chinese; Advanced German |

## Personal Website: https://youjingyu99.github.io/

## Referees

Professor Per Ola Kristensson
Director of Studies
Department of Engineering

Dr Guillaume Hennequin
Lecturer
Pembroke College, Cambridge