Timing Liu

Address: Fitzwilliam College, Cambridge, CB3 0DG, UK • Email: timingliu@outlook.com • Website: https://timingliu.org

Education

UNIVERSITY OF CAMBRIDGE	United Kingdom
Bachelor of Medicine, Bachelor of Surgery (MB BChir – equivalent to MD in the US)	2025
Bachelor of Arts (Engineering)	2022
DATACAMP	United Kingdom
Professional Data Scientist Certification (Completed)	2023
NATIONAL JUNIOR COLLEGE (FULL SCHOLARSHIP)	Singapore
Advanced Level	2018

Selected Scientific

* indicates equal contribution; # indicates corresponding authorship

Computational and molecular biology:

Liu T, Wang FS, …, Chong SS, 2021. Simultaneous Screening of the FRAXA and FRAXE Loci for Rapid Detection of FMR1 CGG and/or AFF2 CCG Repeat Expansions by Triplet-Primed PCR. The Journal of Molecular Diagnostics 23, 941–951. https://doi.org/10.1016/j.jmoldx.2021.04.015

Liu T, …, Chong SS 2022. CHRAB – a tool for identification and visualization of chromosomal abnormalities in preimplantation embryos using next-generation sequencing data (presented at ESHG 2022)

Tan V*, **Liu T***, Arifin Z*, …, Chong SS. 2022. Third-generation single-molecule sequencing for preimplantation genetic testing of aneuploidy and segmental imbalances (under review, presented at ASPIRE Asia Pacific Initiative on Reproduction 2022 and ESGH 2022)

Liu T and Chong SS. Peer Review Report For: The FRAXA and FRAXE allele repeat size of boys from the Avon Longitudinal Study of Parents and Children (ALSPAC) Wellcome Open Res 2020, 4:116 (https://doi.org/10.21956/wellcomeopenres.17209.r37691)

Deep learning in ophthalmology:

Zhou Y, …, **Liu T**, … Keane P, 2022, A foundation model for diverse and generalisable disease detection from retinal images (under review)

Wagner S, …, **Liu T,** …, Keane P, 2023, Multimodal retinal oculomics in schizophrenia: findings from the AlzEye study (in press, JAMA Psychiatry)

Moraes G, Struyven R, **Liu T**, …, Keane P, Quantifying changes in retinal morphology on optical coherence tomography in eyes receiving treatment for neovascular age-related macular degeneration (to be submitted)

ARVO 2022:

Liu T, …, Keane P, 2022. Association between retinal fractal dimension and schizophrenia

ARVO 2023:

Liu T, Wagner S, …, Keane P, 2023, Retinal biomarkers for systemic diseases: an oculome-wide association study in 164,784 individuals

Luke C, **Liu T**, …, Keane P, 2023, Association between retinal microvascular morphology and thyroid dysfunction: a retrospective analysis in 93,814 individuals

Murray O, **Liu T**, …, Keane P, 2023, Associations between COPD and retinal vessel density, fractal dimension, and tortuosity density

Raja L, **Liu T**, …, Keane P, 2023, Associations of Retinal Vascular Morphology and Inflammatory Bowel Disease: A cross-sectional analysis.

Wang Y, **Liu T**, …, Keane P, 2023, Age prediction from retinal fundus images and segmented vessel images using deep learning.

Zhou Y, …, **Liu T**, … Keane P, 2023, Predicting major adverse cardiovascular events with colour fundus photograph in the AlzEye Study

Deep learning in other clinical specialties:

Liu T*# Lee C*, Floto A#, van der Schaar M, Understanding the longitudinal progression of cystic fibrosis using deep learning. (to be submitted)

Berrevoets J*, **Liu T***, …, van der Schaar M*, Gimson A*, Donor-organ allocation using causal deep learning. (to be submitted)

Genetic epidemiology:

Liu T*, Paterson G*, …, Martin H, Finer S, Estimating the prevalence and misclassification of diabetes in a population-based cohort of British Pakistanis and Bangladeshis using polygenic risk scores (to be submitted)

(One more first-author paper to be submitted)

Medical statistics:

Loh B, Jiang L, **Liu T**, Kong-Vega N, Ganesan G, Tan KB, How TS, Koh J. Charlson Comorbidity Index is a Strong Predictor of 10-Year Mortality in Surgically Treated Hip Fracture Patients (under review)

Taribagil P, **Liu T**, …, Bhattacharya V Role of 'Dual Surgeon' Operating In Improving Patient Outcomes and Surgeon Wellbeing for Complex, Elective cases: A Cross-Sectional Study (under review)

(Three more papers under review)

Selected Awards

Project Prize for my *top-ranked* project on *reinforcement learning***,** Cambridge University Engineering Department,   2022
Engineers' Progress Prize for completing the course in 1/3 of the time and ranked top 30%, Fitzwilliam College,   2022
Fitzwilliam Chinese Scholarship, Fitzwilliam College,   2022-2025
Summer Studentship, Evelyn Trust,   2022
Travel grant and selected for **press release**, Association for Research in Vision and Ophthalmology (ARVO)**,**   2022
NHS Clinical Entrepreneur, National Health Service (NHS),   2021
Excelet Research Award, Fitzwilliam College,   2020
Summer Research Grant, British Genetics Society,   2020
Winner, Massachusetts Institute of Technology COVID-19 Challenge,   2020
First Runner-up, Poster Presentation at National University Health System Paediatrics Week,   2019
Valedictorian, Science Research Programme, National University of Singapore,   2018
Best Paper Award as the first author, International Researchers Club Conference on Science, Engineering and Technology,   2018
Gold, Singapore Science and Engineering Fair,   2018
First Runner-up, Poster Challenge, Nanyang Technological University,   2017
Best Poster Award, West Zone Centre of Excellence Science Students Symposium,   2017
Silver, Nanyang Research Programme Symposium,   2017
Academic Award (overall top student for academic performance), National Junior College,   2016 and 2015
Champion, Astronomy Competition Advanced Section, Nanyang Polytechnic,   2016

Selected Experience

MOORFIELDS EYE HOSPITAL   United Kingdom
Data Scientist   August 2021– Present
- Worked with multidisciplinary teams in ophthalmology to combine genetic data with Electronic Health Record data and Imaging data for improved ophthalmic and systematic disease diagnosis using multimodal machine learning

CAMBRIDGE CENTRE FOR AI IN MEDICINE   United Kingdom
Data Scientist   August 2021– Present
- Worked with multidisciplinary teams at Mihaela van der Schaar's lab on optimizing organ transplant and dynamic risk prediction with tabular and time series data

MEDTECH FOUNDATION   United Kingdom
National Program Director   August 2020 – August 2022
- Worked with national committee members to build a resource platform and community for MedTech Foundation members and everyone interested in medical technology
- Worked with local branch leaders to develop training programs in medical technologies for professionals, undergraduate and postgraduate students
- Doubled the previous network of 7 branches to 14 branches over 5000 members within the first year in office

WELLCOME SANGER INSTITUTE   United Kingdom
Computational Biologist   June 2020 – October 2022
- Worked on association testing between genomic and metabolic data in a highly consanguineous population with full funding from the British Genetics Society
- Identified gene mutations in the 5' UTR region of two genes that could lead to increased diagnosis in the Deciphering Developmental Disorders project
- Estimated the prevalence of Type 1 and Type 2 diabetes in British South Asian cohort of 44k individuals using genetic risk score and characterized the genetic and clinical features of a potentially misdiagnosed group of ~1k individuals.
- Acquired proficiency in high-performance computing, pipeline analysis, machine-learning, and kernel machine methods
- Discovered novel associations that can be useful for future drug targets and improving healthcare equality

CAMBRIDGE CLINICAL TRIAL UNIT   United Kingdom
Full Stack Mobile Application Developer   Mar 2020 – June 2020
- Developed Xamarin Form mobile applications on iOS and Android for three clinical trials on COVID-19
- Engaged with ongoing trial report and analysis

NATIONAL UNIVERSITY OF SINGAPORE Singapore
Computational Biologist and Genetic Diagnostic Developer May 2017 – June 2020
- Undertook three projects on preimplantation testing for chromosomal and monogenic disorders with Oxford Nanopore and Illumina sequencing and provided remote bioinformatics support
- Designed R package for aneuploidy detection at the precise of 5 megabases and deployed it via R shiny web app
- As a high-school graduate, I mentored undergraduate final-year students and prepared high school students for Singapore Science and Engineering Fair 2019 where they were awarded Gold
- Developed a molecular diagnostic assay for Fragile XE Syndrome and transformed the assay into a duplex assay that also diagnoses Fragile X Syndrome
- Investigated the local allele frequency of repeats at the Fragile XE Site and the site's association with cognitive disorders

CLINICIANWIKI.COM United Kingdom
Founder, Full Stack Web Developer May 2020 – May 2021
- Led a team to build a non-profit website (https://ClinicianWiki.com) as a platform to make medical knowledge-sharing more collaborative, open, and accurate
- Built website with customized MediaWiki, Azure DevOps, and cloud computing resources
- Developed and executed business, marketing, and human resources strategies

Selected Extracurricular Courses

WESLEYAN UNIVERSITY	Social Psychology
UNIVERSITY OF PENNSYLVANIA	Entrepreneurship
	Epidemics - the Dynamics of Infectious Diseases
CANCER RESEARCH UK	Image Analysis with Fiji
HARVARD UNIVERSITY	Data Analysis for Genomics, Statistical Genetics
JOHNS HOPKINS UNIVERSITY	Genomic Data Science
UNIVERSITY OF CALIFORNIA SAN DIEGO	Bioinformatics
UNIVERSITY OF CAMBRIDGE	

Introduction to Machine Learning, Data Science in Python, Image Processing with MATLAB, Research Data Management, Introduction to Metagenomics, Introduction to Biological Networks, Experimental Design, DNA Methylation Analysis, Ensembl REST API and Genome Browser, Snakemake, JMP Software Tools, Open Targets, InterMine

EMBL EBI	Network Analysis
	Introduction to the Ensembl Genome Browser
MASSACHUSETTS INSTITUTE OF TECHNOLOGY	Molecular Biology
JOHNS HOPKINS UNIVERSITY	Mastering Software Development in R
UNIVERSITY OF MICHIGAN	Web Applications for Everybody
SINGAPORE MANAGEMENT UNIVERSITY	Problem Solving with Programming Language Ruby
STANFORD UNIVERSITY	Machine Learning
	Writing in the Science
DUKE UNIVERSITY	Population Genetics
MAX PLANK INSTITUTE	Statistical Rethinking
DATACAMP	PyTorch, Linear mixed effect modelling

Computational Skills

Advanced: R, Python, SQL, C#, MATLAB, Shell, *Xamarin, Flutter,* machine learning, deep learning
Intermediate: Ruby, PHP, JavaScript, Arduino, Azure, *XAML, HTML, CSS*, time series, signal processing

Open-source Projects:

Lead developer: CHRAB
Contributor: targets, KING

Other Awards

Fitzwilliam Chinese Undergraduate Bursary Fund, Fitzwilliam College,	2021, 2020
Chris Xie Undergraduate Bursary Fund, Fitzwilliam College,	2020
Louis Wang Undergraduate Bursary Fund, Fitzwilliam College,	2020
Bell, Abbott, and Barnes Fund, University of Cambridge,	2020
Distinction, Chemistry, Physics, Mathematics, Economics and Project Work in SEAB-GCE Advanced Level,	2018
Merit, Pharmaceutical Chemistry, General Paper in SEAB-GCE Advanced Level,	2018
Merit, Anatomy Challenge, Nanyang Technological University,	2018
Second Runner-up, Circuit-Chem Chemistry Practical Challenge, National University of Singapore,	2017
Distinction, Higher Chinese in SEAB-GCE O Level Certificate,	2016
Silver, Singapore Junior Chemistry Olympiad,	2016
Champion, Mandarin Speaking Award, Young Men's Christian Association,	2015

Other Research Experience

CANCER SCIENCE INSTITUTE OF SINGAPORE Singapore
Invited Reviewer Oct 2020 – Present
- Invited to write a systematic review for liquid biopsy

SYNTHETIC BIOLOGY SOCIETY, UNIVERSITY OF CAMBRIDGE United Kingdom
Member Oct 2019 – Present
- Attended research workshops to learn how to better integrate biological and computational interfaces

NATIONAL HEART CENTRE SINGAPORE Singapore
Student Research Team Leader April 2017 – November 2017
- Led a group of five students to conduct a literature review on the technological development in the treatment of aortic stenosis

SINGAPORE GENERAL HOSPITAL Singapore
Research Associate November 2016 – December 2016
- Collected and analyzed data for a Singapore Health Services funded project to develop a risk score for predicting in-hospital mortality after hip fracture in the elderly patients
- Built pipeline for disease data extraction

NANYANG TECHNOLOGICAL UNIVERSITY AND NATIONAL JUNIOR COLLEGE Singapore
Student Research Team Leader January 2015 – April 2017
- Led groups students to investigate the parameters that affect the filtration efficiency of membrane bioreactor and efficiency of heavy metal adsorption using agricultural side products (watermelon peels processed with powdered activated carbon)

Other MedTech/Programming Experience

MANSFIELD ADVISORS United Kingdom
Junior Analyst Dec 2020 – Present
- Commercial due diligence on major veterinary chains (in China, Spain, German, Britain)
- Commercial due diligence on private hospital groups (in Britain)
- UK government vaccination strategy analysis and recommendations
- Applied text mining, web-scraping, and modeling skills
- Acquired a strong foundation in corporate finance and market analysis of the pharmaceutical and healthcare service industries
- Sharpened skills in project planning, client meeting, and result presentation

ARETE MEDTECH United Kingdom
Software Engineer June 2020 – August 2020
- Worked with UX/UI designer and hardware engineers to design an app for COPD and Asthma monitoring with Xamarin and Flutter on iOS and Android
- Return offer for continuing development with a stronger focus on data analysis from December 2020 onwards

COVMD.ORG United Kingdom
Co-Founder and Front-End Developer April 2020 – June 2020
- Led a team to build a non-profit multilingual website (https://covmd.org) as a platform for doctors to provide COVID-19 educational resources and mentorship to doctors in other countries

- Built website on WordPress with various libraries and google analytics tools
- Developed and executed business, marketing, and human resources strategies
- Transitioned project to https://ClinicianWiki.com

STOP THE SPREAD United Kingdom
Front-end Web Developer Mar 2020 – May 2020
- Developed website (https://stopthespread.info) to disseminate accurate information and provide support to the public during the COVID-19 epidemic

MEDTECH FOUNDATION United Kingdom
Deputy Team Leader and Software Engineer at the Innovation Program October 2019 – Apr 2020
- Coordinated a team of engineers, biological scientists, and medical students to develop innovative neurosurgical tools to minimize brain tissue damage

Clinical Experience

ADDENBROOKE'S HOSPITAL, LISTER HOSPITAL United Kingdom
Medical Student September 2022 – Present

ADDENBROOKE'S HOSPITAL United Kingdom
Medical Student September 2020
- Took history from patients remotely as a part of Preparing for Patients course

NUFFIELD MEDICAL CENTRE United Kingdom
Medical Student November 2019 – February 2020
- Took history from patients in the clinic and conducted home visits as a part of the Preparing for Patients course

LIANYUNGANG TRADITIONAL CHINESE MEDICINE HOSPITAL China
Attachment Student in Cardiology December 2016 – January 2017
- Attended ward rounds, outpatient clinics and observed interventional cardiology, dental and Traditional Chinese Medicine acupuncture procedures

SINGAPORE GENERAL HOSPITAL Singapore
Research Associate November 2016 – December 2016
- Attended ward rounds, outpatient clinic sessions, bedside teaching, and observed at cadaveric dissection classes with the medical students
- Attended teaching sessions with the physio and occupational therapist

Volunteering Experience

TAN TOCK SENG HOSPITAL Singapore
Volunteer January 2017 – March 2019
- Visited hospitalized patients biweekly and engaging them with cognitive activities that reduce their risk of delirium
- Coordinated between volunteers to encourage attendance and guiding new volunteers to interact with the elderly
- Organized a String Orchestra performance to bring joy to patients before Christmas
- Learned to speak dialects to communicate with elderly patients

NATIONAL JUNIOR COLLEGE Singapore
First-Aid Instructor January 2017 – Dec 2018
- Conducted Cardiopulmonary Resuscitation & Automated External Defibrillators courses to students and community members

NATIONAL YOUTH ENVIROLYMPICS CHALLENGE Singapore
Logistics Committee Member March 2016 – August 2016
- Organized an environmental forum with the Minister of Environment and Water Resources as the guest of honor
- Organized collections for electronic wastes from the neighborhood to prepare for an En-mazing race with participants from various schools in Singapore

I ART SG Singapore

Publicity Committee Member November 2015 – November 2016
- Publicized blind artists' art exhibitions in Singapore, Hong Kong, and Malaysia

SAGE COUNSELLING CENTRE Singapore
Head of Helpdesk November 2015 – November 2015
- Took charge of answering clients who are caregivers for the elderly

Leadership Experience

YOUTH HEALTH AMBASSADOR, NATIONAL JUNIOR COLLEGE Singapore
Head of Committee Mar 2017 – Mar 2018
- Decorated the school library with updated information on mental health and motivational quotes
- Organized events to distribute de-stress balls to students taking examinations

SINGAPORE INTERNATIONAL SCIENCE CHALLENGE Singapore
Head of Poster Challenge June 2017 – July 2017
- Organized poster exhibition and quizzing for overseas high school students
- Initiated activities that encourage participants to understand more about Singapore culture
- Performed as a String Orchestra member at the opening ceremony

MATHEMATICS SOCIETY, NATIONAL JUNIOR COLLEGE Singapore
Vice President July 2016 – July 2017
Member January 2015 – December 2018
- Conceived and implemented an outreach event that incorporates mathematical questions into Minecraft, a sandbox game, to the new cohort of College members
- Designed questions and acted as an emcee for the Singapore Mathematical Challenge, a mathematical modeling competition organized for all secondary schools across Singapore
- Conducted and coordinated the weekly training sessions in the Society

Music Experience

FITZWILLIAM COLLEGE CHOIR United Kingdom
First Tenor October 2019
- Sang at evening services at College Chapel

ASIAN CULTURAL SYMPHONY ORCHESTRA Singapore
Assistant Sectional Leader, Viola Jan 2017 – Mar 2017
Violist June 2016 – September 2019
- Organized and performed at various concerts to promote Asian music through classical instruments

STRING ORCHESTRA, NATIONAL JUNIOR COLLEGE Singapore
Head of Welfare July 2016 – July 2017
Quartermaster July 2015 – July 2016
Assistant Sectional Leader, Viola July 2016 – July 2018
Violist May 2016 – December 2018
First Violinist January 2015 – June 2017
- Organized a group trip to Hong Kong for cultural and musical exchange
- Initiated an instrument loaning system that significantly improved the transparency and efficiency of instrument loaning
- Initiated a room management system to provide a conducive environment to members
- Organized Talent-time, an intra-college event that provided a platform for students to showcase their talent
- Organized various activities and outings to promote bonding between orchestra members
- Trained and guided junior members of the Viola section
- Learned to play the viola in one month when the orchestra needs violists

Other Extracurricular Courses

MCMASTER UNIVERSITY & UNIVERSITY OF CALIFORNIA SAN DIEGO Learning how to Learn
YALE UNIVERSITY Introduction to Classical Music

Editorial Positions
Review Editor, Frontiers in Digital Health

Peer Reviewer
Wellcome Open Research, BMC Genetics, Frontiers in Digital Health, Ophthalmology Science

Professional Appointments
Member, Association for Research in Vision and Ophthalmology (ARVO)
Associate Member, American College of Physicians

Language Skills
Native proficiency: English, Mandarin Chinese   **Professional working proficiency:** Cantonese

References
Referees' contact details will be provided upon request.