Yin-Chi Chan, Ph.D.

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0000-0002-2405-8472 | scholar.google.com/citations?user=NJEB3swAAAAJ

Summary

Data scientist / software engineer with a PhD and 10+ years of research experience in the simulation modelling of stochastic systems, spanning telecommunications and healthcare service delivery.

Former postdoctoral researcher and research software engineer, building simulation models, interactive dashboards, and data-driven tools to support operational decision-making in healthcare systems.

Works mainly in Python, with working experience in TypeScript, Rust, C++, and R – always open to picking up new languages and frameworks.

Currently based in the Toronto area, seeking industry roles in data science, simulation, or backend/data-focused software engineering.

Skills

Languages: Python, R, Rust, TypeScript, C / C++

Frameworks & Libraries: Dash, FastAPI, React

Simulation: SimPy, salabim, Arena, MATLAB / Simulink / Simscape

Tools: Docker, Kubernetes, Git, GitHub Actions, Pytest / Tox

Data: SQL, openpyxl, Pandas, NumPy, R tidyverse

Experience

University of Cambridge, Research Associate — Cambridge, UK
Institute for Manufacturing (IfM) — Jan 2021 – Jan 2026
5 years 1 month

- Supervisor: Prof. Ajith K. Parlikad
- Built discrete-event simulation (DES) models to analyze clinical lab workflows, enabling key performance indicator (KPI) estimation and scenario testing to support operational decision-making by NHS stakeholders, in collaboration with stakeholders at the Cambridge University Hospitals (CUH) NHS Trust.
- Designed DES models to assist operational decision-making at CUH, by predicting hospital bed demand caused by respiratory disease epidemics, including statistical distribution fitting for patient stay durations. Created a Python-based web interface (using Plotly and Dash) allowing non-technical CUH staff to run simulations and explore scenarios independently.

University of the Witwatersrand, Co-lecturer — Johannesburg, South Africa
School of Electrical and Information Engineering — (remote)
July 2021 – Sept 2021
3 months

- Co-lectured the capstone course "Design Project" on engineering design for Electrical and Information Engineering students, invited via prior collaboration with Prof. Anton van Wyk on epidemiological modelling for COVID-19.
- Students choosing the selected topic designed a simple epidemiological model for COVID-19, analyzed possible tipping points leading to an out-of-control local epidemic, and designed an early-warning system to avoid hitting those tipping points.

City University of Hong Kong, Research Associate — Hong Kong
Mar 2020 – Oct 2021
1 year 8 months

Developed stochastic and simulation models and approximation methods for healthcare and telecommunications systems, focusing on capacity planning and optimisation of cellular systems and intensive care networks.

- Supervisor: Dr. Eric W. M. Wong

City University of Hong Kong, Research Fellow — Hong Kong; Oct 2018 – Mar 2020; 1 year 6 months

City University of Hong Kong, Postdoctoral Fellow — Hong Kong; Feb 2017 – Oct 2018; 1 year 9 months

Education

PhD **City University of Hong Kong**, Electrical Engineering — Hong Kong; Feb 2017
- Dissertation: Surrogate-Based Approximation of Blocking Probability in Non-Hierarchical Overflow Loss Systems
- Advisor: Dr. Eric W. M. Wong; Co-supervisor: Prof. Moshe Zukerman

MSc **City University of Hong Kong**, Multimedia Information Technology — Hong Kong; July 2011
- Distinction

BMath **University of Waterloo**, Mathematics — Waterloo, ON, Canada; June 2010
- Distinction

Projects

Respiratory viruses modelling web app
Interactive Python dashboard for modelling respiratory-virus-induced hospital bed demand, developed in collaboration with Cambridge University Hospitals NHS Foundation Trust.
- Built using salabim for discrete-event simulation and Dash/Plotly for the web interface.
- GitHub: github.com/yinchi/virus-sim-dashboard

Data integration for space-aware digital twins of hospital operations
Python code for the Automation in Construction paper of the same name, predicting the effect of building layout and infrastructure status on turnaround time in a clinical laboratory.
- Built using ifcopenshell to process building geometry and salabim for discrete-event simulation; tracks entity decomposition/aggregation, batching/unbatching, and transport across the entire laboratory process.
- Documentation: yinchi.github.io/histopath-bim-des

Ring puzzle with solver and web UI
Clone of a classic ring puzzle with a solver and both terminal-based and web-based interfaces.
- Uses bidirectional depth-first search to precompute an endgame table, with parallelism and Python free-threading for efficient computation.
- Uses GitHub Actions to automatically build and deploy the web interface to GitHub Pages and run unit tests.
- Web UI: yinchi.github.io/ring_puzzle

CodeCrafters projects
Personal implementations of popular software, tested against CodeCrafters' automatic submission system. Site profile: app.codecrafters.io/users/yinchi
- HTTP server (Rust): HTTP/1.1 request handling with concurrency and persistent connections.
- Interpreter (Rust): tokenizer, parser, and interpreter for the Lox programming language.
- LLM client (Python): basic command-line LLM client using the OpenAI Python API.

Movielens Project
Movie recommendation system for partial completion of the HarvardX course "Data Science, Capstone".

- Implements Funk's matrix factorization algorithm, using RcppArmadillo to integrate R with the Armadillo C++ linear algebra library.
- Project report: yinchi.github.io/harvardx-movielens

Continuing Education

Machine Learning Specialization July 2026
Professional Certificate (DeepLearning.AI, in collaboration with Stanford University) covering supervised learning, advanced learning algorithms, and unsupervised/recommender/reinforcement learning.

Mathematics for Machine Learning and Data Science May 2026
Professional Certificate (DeepLearning.AI) covering the mathematical foundations behind machine learning and data science techniques.

Engineering Design and Simulation Apr 2026
Professional Certificate (MathWorks) using Simulink and Simscape to model and simulate physical systems such as a quadcopter and a quarter-car suspension model.

Introduction to Kubernetes Aug 2024
Certificate (LFS158x, The Linux Foundation) on Kubernetes fundamentals and container orchestration.

Data Science Oct 2022
Professional Certificate (HarvardX) covering the full data science workflow, from data wrangling through statistical inference and machine learning, in R.

Epidemics — Origins, Spread, Control and Communication Mar 2021
Professional Certificate (HKUx, University of Hong Kong) on the origins, spread, control, and public communication of infectious disease outbreaks.

Introduction to Quantum Computing Feb 2020
Certificate (MIT xPRO) covering the foundations of quantum computing, including qubits, quantum gates, and quantum algorithms.

Publications

Future directions in space-aware hospital digital twins development and implementation Sept 2025
N. Moretti, A. Mukherjee, **Y.-C. Chan**, M. Nakaoka, A. K. Parlikad
doi.org/10.1049/icp.2025.3672 (Low-Cost Digital Solutions for Industrial Automation 2025)

Data integration for space-aware Digital Twins of hospital operations Aug 2025
N. Moretti, **Y.-C. Chan**, M. Nakaoka, A. Mukherjee, J. Merino, A. K. Parlikad
doi.org/10.1016/j.autcon.2025.106276 (Automation in Construction)

Design, Performance Evaluation and Optimization for Intensive Care Networks Based on Non-Hierarchical Overflow Loss Systems Mar 2025
J. Wu, W. Tian, A. Wang, **Y.-C. Chan**, E. W. M. Wong, K. Chan, G. Joynt
doi.org/10.1109/jbhi.2025.3549142 (IEEE Journal of Biomedical and Health Informatics)

A Process Simulation Model for a Histopathology Laboratory Dec 2024
Y.-C. Chan, A. Mukherjee, N. Moretti, M. Nakaoka, J. Merino, Z. Rosun, C. Carr, D. McFarlane, A. K. Parlikad
doi.org/10.1109/wsc63780.2024.10838731 (2024 Winter Simulation Conference)

Dynamics of a susceptible-infected-recovered model on complex networks with inter-regional migration Aug 2024
R. Niu, **Y.-C. Chan**, E. W. M. Wong, M. A. Wyk, S. Liu
doi.org/10.1103/physreve.110.024304 (Physical Review E)

Integrating teletraffic theory with neural networks for quality-of-service evaluation in mobile networks Feb 2024
Y.-C. Chan, J. Wu, E. W. Wong, C. S. Leung
doi.org/10.1016/j.asoc.2023.111208 (Applied Soft Computing)

A Simulation Model and Dashboard for Predicting Covid-19 Bed Requirements Dec 2023
Y.-C. Chan, K. Dreesbeimdiek, A. K. Parlikad, T. Ridgman, N. J. Matheson, B. Warne, D. Franks
doi.org/10.1109/wsc60868.2023.10407602 (2023 Winter Simulation Conference)

Low-cost digitalisation opportunities in healthcare: a histopathology department case study Sept 2023
N. Moretti, A. Mukherjee, **Y.-C. Chan**, G. Yilmaz, J. Merino, M. Sasidharan, Z. Rosun, C. Carr, D. McFarlane, A. K. Parlikad
doi.org/10.1049/icp.2023.1735 (Low-Cost Digital Solutions for Industrial Automation 2023)

Healthcare process and variable mapping for identifying digitalisation opportunities and building a hospital digital twin July 2023
A. Mukherjee, N. Moretti, **Y.-C. Chan**, G. Yilmaz, M. Sasidharan, J. Merino, Z. Rosun, C. Carr, D. McFarlane, A. K. Parlikad
doi.org/10.35490/ec3.2023.270 (Proceedings of the 2023 European Conference on Computing in Construction and the 40th International CIB W78 Conference)

A Century-Long Challenge in Teletraffic Theory: Blocking Probability Evaluation for Overflow Loss Systems With Mutual Overflow June 2023
E. W. M. Wong, **Y.-C. Chan**
doi.org/10.1109/access.2023.3283803 (IEEE Access)

Modeling the Impact of Vaccination on COVID-19 and Its Delta and Omicron Variants July 2022
J. Wang, **Y.-C. Chan**, R. Niu, E. W. M. Wong, M. A. Wyk
doi.org/10.3390/v14071482 (Viruses)

A stochastic SEIHR model for COVID-19 data fluctuations Oct 2021
R. Niu, **Y.-C. Chan**, E. W. M. Wong, M. A. Wyk, G. Chen
doi.org/10.1007/s11071-021-06631-9 (Nonlinear Dynamics)

Evaluating Non-Hierarchical Overflow Loss Systems Using Teletraffic Theory and Neural Networks May 2021
Y.-C. Chan, E. W. M. Wong, C. S. Leung
doi.org/10.1109/lcomm.2021.3052683 (IEEE Communications Letters)

Power Consumption and GoS Tradeoff in Cellular Mobile Networks With Base Station Sleeping and Related Performance Studies Dec 2020
J. Wu, E. W. M. Wong, **Y.-C. Chan**, M. Zukerman
doi.org/10.1109/tgcn.2020.3000277 (IEEE Transactions on Green Communications and Networking)

Modeling the COVID-19 Pandemic Using an SEIHR Model With Human Migration Oct 2020
R. Niu, E. W. M. Wong, **Y.-C. Chan**, M. A. Van Wyk, G. Chen
doi.org/10.1109/access.2020.3032584 (IEEE Access)

Performance Evaluation of 5G mmWave Networks with Physical-Layer and Capacity-Limited Blocking May 2020
J. Wu, M. Wang, **Y.-C. Chan**, E. W. M. Wong, T. Kim
doi.org/10.1109/hpsr48589.2020.9098993 (2020 IEEE 21st International Conference on High Performance Switching and Routing)

Overflow models for the admission of intensive care patients Dec 2018
Y.-C. Chan, E. W. M. Wong, G. Joynt, P. Lai, M. Zukerman
doi.org/10.1007/s10729-017-9412-8 (Health Care Management Science)

Blocking Probability Evaluation for Non-Hierarchical Overflow Loss Systems May 2018
Y.-C. Chan, E. W. M. Wong
doi.org/10.1109/tcomm.2017.2784450 (IEEE Transactions on Communications)

Energy Efficiency-QoS Tradeoff in Cellular Networks with Base-Station Sleeping Dec 2017
J. Wu, E. W. M. Wong, **Y.-C. Chan**, M. Zukerman
doi.org/10.1109/glocom.2017.8254042 (2017 IEEE Global Communications Conference)

Surrogate models for performance evaluation of multi-skill multi-layer overflow loss systems Oct 2016
Y.-C. Chan, J. Guo, E. W. Wong, M. Zukerman
doi.org/10.1016/j.peva.2016.06.007 (Performance Evaluation)

Performance analysis for overflow loss systems of processor-sharing queues Apr 2015
Y.-C. Chan, J. Guo, E. W. M. Wong, M. Zukerman
doi.org/10.1109/infocom.2015.7218518 (2015 IEEE Conference on Computer Communications)

Patents

Base station sleep mode based on power consumption and/or quality of service Feb 2020
US Patent 10,568,047 B2. Assignee: City University of Hong Kong.
- Inventors: W. M. E. Wong, J. T. Wu, **Y. C. Chan**, M. Zukerman
- patents.google.com/patent/US10568047B2