Zhihua Lai (PhD)

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- **Version** 17-June-2026
- **Source** https://github.com/DoctorLai/doctorlai.github.io/blob/main/full.md
- **A Shorter Version** https://doctorlai.github.io/
- Microsoft Research Profile: https://www.microsoft.com/en-us/research/people/zhihualai/
- Linkedin: https://www.linkedin.com/in/doctorlai/
- Github: https://github.com/doctorlai
- Github Microsoft: https://github.com/doctorlai-msrc

I am currently a Senior Software Engineer in Microsoft Research Cambridge. As an engineer in the Research Organization, I help researchers rapidly prototype ideas from 0 to 1. I've contributed across a broad technical spectrum, from low-level systems programming (eBPF in C) and performance-critical C++ components to app development in C#, Android (Java/Kotlin), robotics (ROS2), & Embedded Rust, e.g. ESP32. **Recently I have been working on the AI tooling for the researchers in MSR.**

During the employment with Amazon, I have contributed to development of several large scale distributed applications in the domain of AWS (Amazon Web Services) e.g. S3 Simple Secure Storage. I have worked from Day 1 at S3 Object Lambda and witnessed the successful launch of it (Mar-18-2021).

During the employment with General Electric, I have added the _while loop, regular expression, http library, jwt APIs and many other features to the Magik compiler (Wiki).

During the employment with Ranplan Wireless, I have designed and implemented the cutting-edge Intelligent Radiowave Propagation Engine that is pushed to its limits by using Win32 inline Assembly in the core. See https://ranplanwireless.com/

In High School (2002), I have won the third prize on NOI programming contest i.e. National Olympiad Informatics.

I am a TOP 3 Witness aka Block Producer of the Steem Blockchain. I am beknown for the contributions (infrastructure, tools, API and services) to the Steem Blockchain. See https://steemyy.com

Microsoft Certified

Code	Domain	Name	Certification Number	Earned-on Date
PL-300	PowerBI	**Power BI Data Analyst Associate**	6C25D7-M05B60	June 17, 2026
PL-900	Power Platforms	Power Platform Fundamentals	69AAEZ-FD6360	June 1, 2026
AZ-500	Security	**Azure Security Engineer Associate**	6318AC-1F9DEE	May 22, 2026
SC-100	Security	**Cybersecurity Architect Expert**	7EE065-8C3CBW	May 8, 2026
SC-300	Security	**Identity and Access Administrator Associate**	580B52-T0A5BD	May 8, 2026
GH-500	Git	**Github Advanced Security**	50295R-7F754	May 8, 2026
AI-901	AI	Azure AI Fundamentals (Beta)	Pending	May 1, 2026
GH-100	Git	**Github Administration**	BF44B3-48M622	April 29, 2026
AZ-400	DevOps	**Azure DevOps Engineer Expert**	692747-12AEA4	April 17, 2026
GH-300	Git	Github Copilot	DCJD08-DF0F44	April 17, 2026
AZ-700	Network	**Azure Network Engineer Associate**	53E66B-4XA079	April 10, 2026
GH-200	Git	Github Action	11F89A-3CC7A3	April 6, 2026
GH-900	Git	Github Foundation	7C1674-5CE607	March 30, 2026

Code	Domain	Name	Certification Number	Earned-on Date
AZ-305	Cloud	**Azure Solutions Architect Expert**	E45B62-19NE7E	March 27, 2026
AZ-104	Cloud	**Azure Administrator Associate**	CBE3B7-4911PC	March 13, 2026
AB-731	AI, Business	AI Transformation Leader	BNBA25-32A1F8	March 13, 2026
AZ-204	Cloud	**Azure Developer Associate**	T6D896-FDCEDF	February 27, 2026
AB-730	AI, Business	AI Business Professional	BA3490-GD0796	February 27, 2026
AI-102	AI	**Azure AI Engineer Associate**	25A6FZ-E1AF43	February 20, 2026
AZ-900	Cloud	Azure Fundamentals	B6FAD6-2S7125	January 16, 2026
SC-900	Security	Security, Compliance, and Identity Fundamentals	B6A851-BECO96	January 13, 2026
AI-900	AI	Azure AI Fundamentals	7Z9DA9-388866	December 19, 2025
DP-900	Data	Azure Data Fundamentals	CD4244-E236BG	December 19, 2025

Google Cloud Certified

Code	Domain	Name	Certification Number	Earned-on Date
PR000309	AI	Generative AI Leader	03429e7450ad4c33926ed613d65793e8	March 27, 2026

Job Experience

Senior Software Engineer at ***Microsoft (Cambridge, UK)*** 2021/07 to Present: Intelligent Network System, Microsoft Research Cambridge

- **Full Stack**: Linux (BASH), C, C++, eBPF, 4G/5G, O-RAN, Azure (AKS/K8S, Azure Functions, Service Bus, CI/Pipeline ...), Python, Go, C#, NodeJS, Rust, Android, WASM etc.
- **Open Source**:
  - github.com/microsoft/jbpf - My Pull Requests & Issues
  - github.com/microsoft/jrt-controller - My Pull Requests & Issues
  - github.com/microsoft/jbpf-protobuf - My Pull Requests & Issues
  - github.com/microsoft/exekias - My Pull Requests & Issues
  - github.com/microsoft/jrtc-apps - My Pull Requests & Issues
- **Publications**:
  - Open-AI RAN'25: Distributed AI Platform for the 6G RAN
  - Microsoft Technical Report: Taking 5G RAN Analytics and Control to a New Level, December 2022
  - ACM MobiCom'23: Taking 5G RAN Analytics and Control to a New Level
  - ACM MobiCom'23: (*Best Demo Award Runner-Up*), Programmable RAN Platform for Flexible Real-Time Control and Telemetry
  - ACM MobiCom'23: Accelerating Open RAN Research Through an Enterprise-scale 5G Testbed

Software Development Engineer at ***Amazon AWS (Cambridge, UK)*** 2020/01 to 2021/07: SDE (L5) = **Someone Does Everything** = Full Stack Software Engineer + On-Call Duties

- Technology: Java/RxJava, Python, Ruby, Javascript (Node, Vue.Js), AWS S3, EC2, CloudFormation, API Gateway, Lambda, DynamoDB, CloudWatch, Step Function, CDK/LPT...

Highlights of contributions:

- Working on S3 Object Lambda from Day 1! https://aws.amazon.com/s3/features/object-lambda/
- Built the internal tooling to track the performance of S3 - the largest distribute storage product in the world. Automated categorization of issues and performance bottlenecks in a very large distributed system help engineers identify and address the problem.

Staff Software Engineer at ***General Electric (Cambridge, UK)*** 2018/12 to 2020/01: It has been a tremendous success for me as I have learned a lot, improved myself and become confident in the GE Smallworld technology stacks. I have merged 165+ PRs and completed

92+ stories (25 Pull Requests Merged in First 3 Months), and have contributed quite a few to the smallworld products (Smallworld GIS Software core and other components)

- Technology: BASH, C/C++, Javascript (NodeJS), Java and Magik; REST API, OAuth2 (UAA), Docker, Kubernetes Clusters.

Highlights of contributions:

- I added the while loop to the Magik programming language.
- I added the regular expression to the Magik programming language.
- I designed and implemented the HTTP library.
- I designed and implemented the JWT (Json Web Token) library - used in UAA Authentication.
- I implemented the Magik Random Interop Library that improves the performance and fix the multithreading race condition problems.
- I added the Magik URL validation library in the core.
- I contributed to the development of the outbound/inbound framework.
- I contributed to MUnit testing framework.

Principal Algorithm Engineer at ***Ranplan Wireless (Cambridgeshire, UK)*** 2010/09 to 2018/11: I am one of the lead developers for this product (C#7, .NET4.7): https://ranplanwireless.com/products/ and I design, develop and maintain the core library (Radio Propagation engine). It is a 500K LOC code base that consists of Visual Studio C++ 2017, Delphi 10.2 Tokyo with some Inline Assembly and some VBS/JS.

Key result areas included:

- To supportthe development of Ranplan in-house ray tracing model
- To lead cutting-edge channel modelling algorithms and techniques
- To train and share all knowledge of algorithm in radio propagation channel modelling
- To provide level 3 support and customer consulting project services
- To contribute to Ranplan Patents

Highlights:

- Core developer of the flagship product: The Author of Ranplan Radiowave Propagation Model (one of my babies): My overall job purpose was to provide and implement my algorithm research expertise in developing Ranplan Radio Propagation Model (RPM) which is one of Ranplan's key intellectual property.
- Lead a Propagation Team e.g. Rewrite RPM in C++.
- OpenCL GPU Implementation of Vector Ray Launching Propagation Algorithms.
- Prototyping the Geo-localization algorithm using KNN and other machine learning algorithms.
- Develop the 32/64-bit cutting-edge wireless radiowave propagation engine (plugins, scripts) using C++, Delphi and Inline Assembly.
- Research, bug-fixes and development for an indoor wireless planning tool using C#.
- Develop and maintain web-based licensing software using PHP + MySQL + Javascript.
- Develop Hundreds of Unit Tests and Integration Tests in C# and VBScript.
- Develop More than 1500 APIs using Delphi (Win32/64 COM Library).
- Develop Tools of Statistics and Code Quality on Jenkins Continuous Server Powershell.
- Develop Smart/Intelligent algorithms to convert clutter GIS data to vector building data.
- Develop various GIS conversion/cropping tools using C# ie. GeoConverter.

Marie Curie Experienced Researcher at ***University of Sheffield, UK*** 2013 to 2015: Development of tools for the design of wireless and energy efficient buildings; in charge of high frequency ray tracing tools. WIFEEB Grant ID: 286333

Awards (Selected)

- 2002: ACM - National Olympic Informatics (NOI), Third Prize by China Computer Federation & NOIP Orgranisation Committee
- 2001: ACM - Fujian Olympic Informatics (FOI), Third Prize by Fujian Education Federation & Fujian Science Orgranisation

Patents (Selected)

- PCT/GB2015/053224, Zhihua Lai etc., Method for Predicting Outdoor Three-Dimensional Space Signal Field Strength By Extended Cost-231-Walfisch-Ikegami Propagation Model, US Patent Application No. 15/522,728, Claimed Filing Date: 27 October 2015.
- PCT/GB2015/053223, Zhihua Lai etc., Method for Predicting Indoor Three-Dimensional Space Signal Field Strength Using An Outdoor-To-Indoor Propagation Model, US Patent Application No. 15/522,735, Claimed Filing Date: 27 October 2015.

Education and Awards

2006-2010 (Three and Half Years) **PhD, Computer Science and Wireless**; University of Bedfordshire (UK)

Thesis title: The Development of an Intelligent Ray Launching Algorithm for Wireless Network Planning

- *2009*: Marie Curie Fellowship for Transfer of Knowledge by University of Applied Sciences of Western Switzerland

2004-2006 **BSc, Computer Science (First Class, Score 15.51 out of 16)**; University of Luton (UK)

Thesis title: Chinese Chess

- *2004*: National Computer Rank Programming Contest, Top 30 by National Education Examinations & China Education

Open Source Projects

I am a builder and a problem-solver.

- steem-load-balancer: I also deployed load balancing to AWS, Microsoft Azure and CloudFlare.
- llm-telegram-bot: Simple LLM Telegram Bot.
- SimilarString: Flask App to Compute Similarity of Two Strings.
- awesome-steem
- yaml-json-converter
- base64-converter
- rot47-converter
- markdown-html-converter
- prime-factorization
- hex-viewer
- steem-proxy-cloudflare
- sokoban-web
- Steem Blockchain Tools and APIs: https://steemyy.com

DAO (Decentralized Autonomous Organization) Proposals

I've managed to compile/build the STEEM blockchain (C++) on Modern OS.

- Proposal: Fixing Steemd Build Dependencies in the Latest OS #98
- Votes: Proposal: Merging dev changes to main (DAO 98)

Pull Requests:

- #3707: Enable Basic Tests and Use 4 Theads to Build
- #3706: Add Basic Github CI to Build All Dockerfiles
- #3705: Fixes and Refactor the Docker files
- #3704: Fix test_block_log
- #3703: Compile steemd on Debian 13 (Trinx)
- #3702: Make Steem Great Again: Support AzureLinux3!
- #3701: Make steemd compiled at Ubuntu24.04
- #3700: Add Ubuntu 22.04 Support for steemd

- #3699: Refactor and Cleanup: Ubuntu20.04 and Remove Ubuntu18.04

Selected Publications

- Distributed AI Platform for the 6G RAN, In 2nd ACM Workshop on Open and AI RAN (OpenRan '25), November 4–8, 2025, Hong Kong, China. ACM, New York, NY, USA. https://doi.org/10.48550/arXiv.2410.03747
- Accelerating Open RAN Research Through an Enterprise-scale 5G Testbed, In The 29th Annual International Conference on Mobile Computing and Networking (ACM MobiCom'23), October 2-6, 2023, Madrid, Spain. ACM, New York, NY, USA. https://doi.org/10.1145/3570361.3615745
- Programmable RAN Platform for Flexible Real-Time Control and Telemetry, In The 29th Annual International Conference on Mobile Computing and Networking (ACM MobiCom'23), October 2-6, 2023, Madrid, Spain. ACM, New York, NY, USA. https://doi.org/10.1145/3570361.3614065 - **Best Demo Award Runner-Up**
- Taking 5G RAN Analytics and Control to a New Level, In The 29th Annual International Conference on Mobile Computing and Networking (ACM MobiCom'23), October 2-6, 2023, Madrid, Spain. ACM, New York, NY, USA, 16 pages. https://doi.org/10.1145/3570361.3592493
Taking 5G RAN Analytics and Control to a New Level, Technical Report	December 2022
- Chapter 2 - Radio Propagation Modelling, in Book "Heterogeneous Cellular Networks: Theory, Simulation and Deployment", Cambridge University Press, 2012.
- Chapter 5 - Outdoor-Indoor Channel, in Book "LTE-Advanced and Next Generation Wireless Networks: Channel Modelling and Propagation", John Wiley & Sons, November, 2012.
- Intelligent Ray Launching Algorithm for Indoor Scenarios, Radioengineering, Towards EUCAP 2012: Emerging Materials, Methods, and Technologies in Antenna & Propagation, Volume 20, Number 2, 2011, ISSN: 1210-2512, p.p.:398-408.
- The Development of a Parallel Ray Launching Algorithm for Wireless Network Planning, International Journal of Distributed Systems and Technologies, IGI, DOI: 10.4018/jdst.2011040101, Volume 2, Issue 2, 2011.
- Indoor Massive MIMO Channel Modelling Using Ray-Launching Simulation, International Journal of Antennas and Propagation, Volume 2014 (2014), Article ID 279380.
- Joint Ray Launching Method for Outdoor to Indoor Propagation Prediction Based on Interpolation, The Ninth European Conference on Antennas and Propagation, EUCAP, IEEE, Lisbon, Portugal, April 12-17, 2015.
- Joint Ray Launching Method for Indoor to Outdoor Propagation Prediction Based on Ray Aggregation, The Ninth European Conference on Antennas and Propagation, EUCAP, IEEE, Lisbon, Portugal, April 12-17, 2015.
- Implementation and Validation of a New Combined Model for Outdoor to Indoor Radio Coverage Predictions, Hindawi Publishing Corporation EURASIP Journal on Wireless Communications and Networking, 2010: 215352.
- Modelling the mmWave Channel Based on Intelligent Ray Launching Model, The Ninth European Conference on Antennas and Propagation, EUCAP, IEEE, Lisbon, Portugal, April 12-17, 2015.
- Implementation and Validation of a 2.5D Intelligent Ray Launching Algorithm for Large Urban Scenarios, The Sixth European Conference on Antennas and Propagation, EUCAP, IEEE, Prague, Czech Republic, March 26-30, 2012,ISBN: 978-1-4577-0919-7.
- Antenna Height Compensation for an Indoor to Outdoor Channel model based on a 2D Finite Difference Model, 29th Progress In Electromagnetics Research Symposium, Marrakesh, Morocco, March 20-23, 2011.
- A New Deterministic Hybrid Model for Indoor-to-Outdoor Radio Coverage Prediction, The Fifth European Conference on Antennas and Propagation, EUCAP, IEEE, Rome, Italy, April 11-15, 2011, ISBN: 978-88-8202-074-3, p.p.:3771-3774.

Worth mentioning

- Ranked Top 30 iPinyou Global RTB Bidding Algorithm Contest (season two offline, 2013)
- My propagation model 'IRLA' has been cited in the book "Femtocells - Technologies and Deployment", John Wiley & Sons, ISBN: 978-0-470-74298-3.
- I run a delegated service on steem blockchain \@justyy where Steemians delegate their Steem Power to me and my bots send out the Steem Dollars (tokens) at a rate of 8% to 10%. Also my bots are up running 24/7 to vote the quality posts of the delegatees.
- I am currently the top 3 witness on the STEEM Blockchain. A witness is a block producer.
- I am currently the 3-rd most delegated account on the STEEM Blockchain e.g. 300+ delegations according to https://steemyy.com/top-delegations-by-count/
- I run \@dailychina where the algorithms select top 10 quality posts and reward them daily (very popular and postive feedbacks received).

- I develop \@fairlottery (Blockchain Lottery) and \@witnesstools (Steem Blockchain Gambling).
- I write discord/telegram bots that distribute test coins (TRX, USDT, USDC, USDD) on Tron Blockchain (Shasta and Nile Test Net).
- I develop and run Simple Token Swap Tools on Multiple blockchains as a POC:
  - Tron/USDT/USDD/TRX to STEEM
  - Steem to SUI
  - Steem to Ethereum
  - Steem to Solana
  - Steem to Bitshares
  - Steem to TRON
  - Steem to USDT
- I develop and run Account Registration Services on Steem Blockchain: Register a Free Account on Steem Blockchain.
- I develop the Steem Blockchain Explorer.
- I run a Steem Power Token Rent (Lease Services).

Miscellaneous

- 2019-11 to 2019-12: I taught the course *Microbit Programming* at weekends in Chesterton Community Colleage (organised by Chinese Family Together and Hacklab Cambridge) to kids (8 yrs+).
- I teach my sons programming (and math) videos (700 days+): https://zhihua-lai.com/teaching/
- Keep learning:
  - My Microsoft Learn Profile zhihualai
  - StackOverflow
  - Credly
  - Github: C++ Coding Exercise
  - I develop the ExamGPT
- Clean UK Driving License (13 yr+)