

Thomas Walker Lynch

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Summary

Innovative and results-driven computer architect with a strong background in AI, neural networks, and high-speed computing. Proven track record of developing cutting-edge technologies and solving complex problems. Extensive experience in startups, consulting, and academic research. Holds multiple US and international patents.

Education

1996 MSEE, The University Of Texas At Austin, Electrical and Computer Engineering. Courses in AI, Neural Networks, Simulation, and Computer Architecture, and computation theory. Master's Thesis is the first to solve a discrete optimization problem related to high speed computing.

1986 BSEE, The University Of Texas At Austin, Electrical and Computer Engineering, minor in Computer Science, passed out of engineering physics requirements then studied electromagnetics and device physics in addition to the core courses.

1981-1983 studied, University of Iowa, Chemical and Electrical Engineering.

1978-1979 Technical Certificate Davenport Technical Institute

Elective courses in Japanese Language, Anthropology, East Asian History. High School AP Physics, AP Chemistry, and elective in psychology.

Affiliations

2009-present Developing novel AI techniques to make litigation more efficient and effective.

2015-2016 Consulting for Serene Devices startup.

2014-2015 Worked on the 'LIQUID' research project at Birkbeck, University of London.

2011-2012 Visiting Fellow University of the West Indies.

1996-2009 Participated in startups, Intellectual Ventures, QuickSilver Technologies, NetEffect, Tempered Hardware and Software, 21st Century Telephone, the latter two being mine.

1986-1996 Design engineer, computer architect, and technical manager at AMD working on microprocessors.

1979-1986 Applied technical school degree and Fortran programming skills on a number of projects at Mast Keystone, Army Corps of Engineers, as a contracted technician at the University of Iowa, Bausch & Lomb Interactive Graphics Division., and IBM.

Projects

Developing *Discussion Architect*. The Reasoning Technology tool.

Developing 'TTCA', a processor architecture that has no architecture limits. See the books section for more information.

Spent a summer vacation spilling into fall reading old journals from visitors and consultants who spent time in Taiwan, to establish better grounding for my book 'Introduction to the Taiwan Question'.

Lustucru – wrote full set of Bash script for building LFS Linux, [on Github](#)

Subu – subuser accounts as light containers, [on Github](#).

TM – an iteration library for Common Lisp, [on Github](#) Part of the study for the book 'Tom's Turing Complete Computer Architecture'.

endian - simple tunnel project morphed into a research paper and method for doing C code without headers both valuable. [on Github](#)

CoViD period project, extended number theory analysis of large integer factorization, and the Riemann Zeta hypothesis. I have a number of unpublished pretty pictures as a result from this and earlier work on the subjects.

only one – continuing work in developing a database without architecture limits, this lead into the TTCA work.

Developed practical distributed trust models. This was before Bitcoin, which employs such a model.

Developed new approaches to digital rights management.

Developed effective approaches for removing heat from microprocessors.

Spent several months studying feminism so as to better understand the events written about in the book "ITIO a Child". I did not use the material in the book, but insight was useful. Note the blog article, "Components of Bullying".

Architected, wrote cycle model, assembler, and test bench of programmable data path microprocessor for stream processing. This predates Nvidia's configurable data path processor.

Planned the first K7 and K5 floating-point unit and nano-code projects, was technical lead and design contributor.

Designed Multirate clock switching and distribution, smart card interface, for the Sonic signal processor.

Micro-architecture and design of computation unit circuits and algorithms, K5 and 29050 microprocessors.

Library characterization and derivation of timing models for CS21s process.

Research project and completed development of a multi-time dimension Spice circuit simulator.

Derived a new approach to training Neural Networks, that included 'concept spaces', the term I used. Built and trained a hardware neural network as a demonstration. (Graduate level AI course and NN course combined classes project).

Spearheaded initiative to bring formal theorem proving and successive design tools into AMD.

Solved the multi-level, model independent, carry skip adder optimization problem. This discrete optimization problem had survived multiple attempts by others since it had been proposed in 1962.

Derived a novel approach to adding numbers that resulted in smaller faster adder circuits. The domino logic approach was then applied at a startup.

Designed from principles a double pumped SRT divider that presages the shift from two phase clocking to single phase clocking.

Replaced barrel shifters with logarithmic networks to halve circuit size to what was being used at AMD.

Derivation and formal proof of correctness for pipeline predetect cases for the 29050 microprocessor, and for the 29050 SRT divider.

Wrote computer program to solve all the control systems homework for UT's control systems course.

Designed and built scanning laser over sample machine for UT Bio-engineering department lab.

Wrote wire frame graphics editor.

Porting of early Berkeley chip design tools to Vax 11/750.

Wire wrapped complete Z80 SCSI controller prototype.

Board layout plan for 68020 based minicomputer.

Built prototype of machine for testing disk head wafers. Shopped drawings to vendors to build them in quantity.

Wrote blanket expose calibration standards document.

Built prototype rack mounted equipment for measuring action potentials from pico-probes placed on purkinje cells.

Developed software for the homologous sequence matching of lab measured protein sequences against a database of known protein structures.

Developed graphics software for rendering survey data.

Repaired stage and personal audio equipment, part of startup to sell equipment.

Repaired factory rejects of Mast Keystone's automated presentation equipment.

Science fair project on a hyperbolic space model resulted in an invite to attend the AAAS meeting in San Francisco, and made it to the International Science Fair. Many projects from this era.

Developed a calculus while in junior high school.

Patents

Digital Rights Management

These are methods I developed for preventing the theft of copyrighted material.

Thomas W. Lynch; Protected intra-system interconnect for digital rights management in electrical computers and digital data processing systems; US8302200; Oct 30, 2012.

Thomas W. Lynch; Validation of protected intra-system interconnects for digital rights management in electrical computers and digital data processing systems; US8291501; Oct 16, 2012.

Thomas W. Lynch; Network resource access control methods and systems using transactional artifacts; US8260721; Sep 4, 2012. US9438595; Sep 6, 2016.

Thomas W. Lynch; File accessing and retrieval using soft digital rights management technology; pending US20090126027, WO2009062165A1; May 14, 2009.

Distributed Trust

When I worked on this problem in the early 2000s, leading to these patents being awarded later, I had no idea that this sort of technology would become so commonly used and would become an important component of the Bitcoin protocol. Whether this is a direct contribution or by coincidence, I do not know, but either way, it is kind of cool.

Thomas W. Lynch; Symbiotic computing system and method of operation therefor; US7593989, US6931430, US7562100, US20050165883, US20070124734, US20070179992; Sep 22, 2009.

Thomas W. Lynch; Maintaining coherency in a symbiotic computing system and method of operation thereof; US7562100, US6931430, US7562100, US20050165883, US20070124734, US20070179992; Sep 22, 2009.

Thomas W. Lynch; Maintaining coherency in a symbiotic computing system and method of operation thereof; US6931430, US7562100, US7593989, US20050165883, US20070124734, US20070179992; Aug 16, 2005.

Thomas W. Lynch; Symbiotic host authentication and/or identification, a computer security-related application for a fundamentally new technology for host authentication and user identification; pending US20080229392, WO2008112696A2, WO2008112696A3; Sep 18, 2008.

Thomas W. Lynch; Symbiotic network digital document layering and/or steganography method, article, and apparatus, a computer security-related application for certifying electronic documents; pending US20090260061; Oct 15, 2009.

This one is related to two-factor authentication, i.e., the idea of gaining security by using more than one network.

Thomas W. Lynch; System and method for supporting multimedia communications upon a dynamically configured member network; US6487600; Nov 26, 2002.

High Performance Computer Architecture

These were developed for AMD microprocessors.

Thomas W. Lynch; Piping rounding mode bits with floating point instructions to eliminate serialization; US6233672; May 15, 2001.

Thomas W. Lynch, Ashraf Ahmed; Apparatus and method for tagging floating point operands and results for rapid detection of special floating point numbers; US6009511, DE69801821D1, DE69801821T2, EP0988590A1, EP0988590B1, WO1998057254A1; Jun 11, 1997.

Thomas W. Lynch; Data cache and method using a stack memory for storing stack data separate from cache line storage; US5930820, EP0888587A1, WO1997035257A1; Jul 27, 1999.

Thomas W. Lynch; Rapid pipeline control using a control word and a steering word; US5930492; Jul 27, 1999.

Thomas W. Lynch; Hierarchical microcode implementation of floating point instructions for a microprocessor; US5859998; Jan 12, 1999.

Thomas W. Lynch; Microprocessor configured to detect a group of instructions and to perform a specific function upon detection; US5829031, WO1997031311A2, WO1997031311A3; Jan 12, 1999; 35 citations.

Thomas W. Lynch, Christopher J. Yard; Data cache configured to store data in a use-once manner; US5829028; Oct 27, 1998; 36 citations.

Thomas W. Lynch; Assembly queue for a floating point unit; US5828873; Oct 27, 1998.

Thomas W. Lynch; Computer system configured to translate a computer program into a second computer program prior to executing the computer program; US5819067, EP0882261A1, WO1997031309A1; Oct 6, 1998.

John G. Bartkowiak, Thomas W. Lynch; Processor having a bus interconnect which is dynamically reconfigurable in response to an instruction field; US5771362, WO1997044728A1; Jun 23, 1998.

Andrew Mills, Mark A. Ireton, Thomas W. Lynch; Microprocessor configured to detect a DSP call instruction and to direct a DSP to execute a routine corresponding to the DSP call instruction; US5721945, WO1997042569A1; Jun 23, 1998.

High Performance Computing Circuits

These were also for AMD microprocessors.

Thomas W. Lynch; Ripple carry shifter in a floating point arithmetic unit of a microprocessor; US5901076; May 4, 1999.

Thomas W. Lynch; Interface for coupling a floating point unit to a reorder buffer; US5887185; Mar 23, 1999.

Thomas W. Lynch, Steven D. McIntyre; High speed mixed radix adders; EP19910301348, DE69131218D1, EP0450752A2, EP0450752A3; May 12, 1999.

Thomas W. Lynch, Steven D. McIntyre; High speed mixed radix adder; US5285406; Feb 8, 1994.

Thomas W. Lynch, Steven D. McIntyre; Radix 4 carry lookahead tree and redundant cell therefor; US5095458, DE69132129D1, DE69132129T2, EP0450755A2, EP0450755A3, EP0450755B1; Mar 10, 1992.

Thomas W. Lynch, Steven D. McIntyre; Radix 4 carry lookahead trees; EP0450755, DE69132129D1, DE69132129T2, EP0450755A2, EP0450755A3, US5095458; Apr 26, 2000.

Smeeta Gupta, Robert M. Perlman, Thomas W. Lynch, Brian D. McMinn; Normalizing pipelined floating point processing unit; US5267186; Nov 30, 1993.

Salim A. Shah, Thomas W. Lynch; Special carry save adder for high speed iterative division; US5206828; Apr 27, 1993.

Thomas W. Lynch, Salim A. Shah; High speed digital divider; EP19910301347, DE69130621T2, EP0450751A2, EP0450751A3; Dec 16, 1998; DE69130621D1.

Thomas W. Lynch, Stephen D. McIntyre, Ken Tseng, Salim A. Shah, Tony Hurson; High speed divider with square root capability; US5128891, EP19910301355, DE69131187D1, DE69131187T2, EP0450754A2, EP0450754A3; Apr 27, 1993.

Smeeta Gupta, Robert M. Perlman, Thomas W. Lynch, Brian D. McMinn; Normalizing pipelined floating point processing unit; US5058048;

Dense HPC Chip Packaging

I normally work in computer architecture, so I was a bit surprised when asked for concepts for removing heat from microprocessors. I studied thermodynamics and revisited that textbook. It is a significant problem, and the investigation yielded some fruitful results.

Thomas W. Lynch; Double bonded heat dissipation; US8018722, US7706144, US20090154106, US20100226097, WO2009079512A2, WO2009079512A3; Sep 13, 2011.

Thomas W. Lynch; Heat dissipation system and related method; US7706144, US8018722, US20090154106, US20100226097, WO2009079512A2, WO2009079512A3; Apr 27, 2010.

Thomas W. Lynch; Reticulated heat dissipation with coolant; pending US20090165996, WO2009085291A1; Jul 2, 2009.

Thomas W. Lynch; Reticulated heat dissipation, a clever method for removing heat from servers and other applications; pending US20090154111, WO2009079516A1; Jun 18, 2009.

Books

The ReasoningTechnologyJS Library Core

Author: Thomas W. Lynch

Publication Date: to be published in 2024

Description: This book explains the theory behind, and workings of, the ReasoningTechnologyJS library core.

Introduction to the Taiwan Question

Author: Thomas W. Lynch

Publication Date: 2023-05-03

ISBN: 979-8393462536

Description: An informative exploration of the historical, political, and cultural aspects surrounding the Taiwan Question, offering valuable insights and analysis.

Tom's Turing Complete Architecture

Author: Thomas W. Lynch

Publication Date: 2017-02-12

ISBN: 979-8392389087

Description: This book provides an in-depth theoretical derivation of a processor design with no architectural bounds.

It Takes a Frontier Mentality

Author: Thomas W. Lynch

Publication Date: 2016-07-22

ISBN: 978-1520591070

Description: High tech startup fundamentals.

Mystique Passage

Author: Thomas W. Lynch

Publication Date: 2008-05-29

ISBN: 978-1435719323

Description: A sailing adventure story.

ITIO a Child

Author: Thomas W. Lynch

Publication Date: 2008-05-14

ISBN: 978-1435718265

Description: An in depth look at corruption in a local government.

Binary Adders

UT Austin

May 1996

Authors: Thomas W. Lynch

[Link to Thesis at UTexas Austin](#)

Everything you ever wanted to know about adding two numbers together, circuits and logic, and more. Also shows the solution the multi-level, any device model, carry skip adder optimization problem.

Articles

Andrea Cali, Tommaso Di Noia, Thomas W. Lynch, Azzurra Ragone. "Processing SPARQL Queries on Deep Web Sources." In *Proceedings of the 26th Italian Symposium on Advanced Database Systems (SEBD 2018)*, 2018. [URL](#).

Cali, Andrea, Lynch, Thomas W., Martinenghi, Davide, Torlone, Riccardo. "Processing Keyword Queries Under Access Limitations." In *Lecture Notes in Computer Science*, Springer International Publishing, 2015, pp. 30-35. DOI: [10.1007/978-3-319-27932-9_3](#).

Cali, Andrea, Thomas W. Lynch, Davide Martinenghi, Riccardo Torlone. "Processing Keyword Queries Under Access Limitations." In *Open Access Semantic Keyword-Based Search on Structured Data Sources*, Volume 9398, 2015, pp. 30-35. [Github](#)

Lynch, Thomas W. "Entrepreneurship in the Caribbean." In *Business Journal, Caribbean PR Agency*, October 2011. Thoughts on doing high-tech startups in the Caribbean.

Moore, J.S., Lynch, T.W., Kaufmann, M. "A Mechanically Checked Proof of the AMD5/sub K/86/sup TM/ Floating-Point Division Program." In *IEEE Transactions on Computers*, vol. 47, no. 9, 1998, pp. 913-926. DOI: [10.1109/12.713311](#).

Lynch, T.W., Schulte, M.J. "Software for High Radix On-Line Arithmetic." *Reliable Computing*, 1996, pp. 133-138. Also published in Russian as: Программное обеспечение для компьютерной арифметики оперативного доступа с большим основанием системы счисления.

- Lynch, Thomas W.** "A High Radix On-Line Arithmetic for Credible and Accurate Computing." In *Real Numbers and Computers Conference Proceedings*, July 1995.
- Lynch, T., Ahmed, A., Schulte, M., Callaway, T., Tisdale, R.** "The K5 Transcendental Functions." In *Proceedings of the 12th Symposium on Computer Arithmetic*, IEEE Comput. Soc. Press, 1995. DOI: [10.1109/arith.1995.465368](https://doi.org/10.1109/arith.1995.465368).
- Lynch, T.W.** "The Energy Content Of Knowledge." In *Workshop on Physics and Computation*, IEEE, 1992. DOI: [10.1109/phycmp.1992.615499](https://doi.org/10.1109/phycmp.1992.615499). Also in *Post Proceedings of the Physics of Computation Workshop*, Dallas, Texas, IEEE Computer Society Press, 1992.
- Lynch, T., Swartzlander, E.E.** "A Spanning Tree Carry Lookahead Adder." In *IEEE Transactions on Computers*, vol. 41, no. 8, 1992, pp. 931-939. DOI: [10.1109/12.156535](https://doi.org/10.1109/12.156535).
- Lynch, Thomas W.** "A Formalization of Computer Arithmetic." In *Proceedings of the Third International IMACS-GAMM Symposium on Computer Arithmetic and Scientific Computation (SCAN-91), Oldenburg, Germany, Oct. 1-4 1991*, Elsevier, 1992. A formal logic description of numeric computing and some proofs regarding exception handling.
- Lynch, T., Swartzlander, E.** "The Redundant Cell Adder." In *[1991] Proceedings 10th IEEE Symposium on Computer Arithmetic*, IEEE Comput. Soc. Press, 1991. DOI: [10.1109/arith.1991.145553](https://doi.org/10.1109/arith.1991.145553).
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Preprints

- Lynch, Thomas Walker.** "Some Computer Programming Terms Related to Functions." ResearchGate, 2019. [URL](https://www.researchgate.net/publication/332811705). DOI: 10.13140/RG.2.2.17056.33281.
- Lynch, Thomas Walker.** "Adventures in JavaScriptLand." ResearchGate, 2019. [URL](https://www.researchgate.net/publication/332811705).
- Lynch, Thomas Walker.** "Numerical Analysis of Computer Approximations." Detailed description of computing error terms for floating-point computations. ResearchGate, 2018. [URL](https://www.researchgate.net/publication/332811705). DOI: 10.13140/RG.2.2.10906.49601.
- Lynch, Thomas Walker.** "The White Knight is Talking Backwards - A Bayesian Hot Gas Crystallization Model for QM." ResearchGate, 2017. [URL](https://www.researchgate.net/publication/332811705). DOI: 10.13140/RG.2.2.26428.49281.
- Lynch, Thomas Walker.** "Towards a Better Understanding of CAR, CDR, CADR and the Others." arXiv preprint arXiv:1507.05956, 2015. [URL](https://arxiv.org/abs/1507.05956).
- Lynch, Thomas Walker.** "Coincidence and Premonition." ResearchGate, 2012. [URL](https://www.researchgate.net/publication/332811705). DOI: 10.13140/rg.2.2.24316.54407.
- Lynch, Thomas Walker.** "More Jabber about the Collatz Conjecture and a Closed Form for Detecting Cycles on Special Subsequences [Assertion: Collatz cycles]." arXiv preprint arXiv:1108.4056, 2011. [URL](https://arxiv.org/abs/1108.4056).
- Lynch, Thomas Walker.** "Architecturally Opaque Instruction Set to Computer Science Object Binding." 2006.
- Lynch, Thomas Walker.** "Ubiquitous Expansion of Particles Would Be Observed as an Attractive Force." ResearchGate, 1997. [URL](https://www.researchgate.net/publication/332811705). DOI: 10.13140/RG.2.2.21799.96166.

Notable Blog Posts

Lynch, Thomas Walker. "Apotheosis Not Singularity." 2010. [URL](#).

Lynch, Thomas Walker. "Components of Bullying." Enumerates social techniques used by bullies. 2010. [URL](#).

Lynch, Thomas Walker. "Global Warming and the Carnot Cycle." 2009. [URL](#). Points out that as the planet warms, Carnot engines become disproportionately less efficient.

Lynch, Thomas Walker. "Kryptonite, a Better Alternative to Gold For a Monetary Standard." 2003. [URL](#). This post discusses the meaning of money and explains the validity of using numeric quantities as money. Turned out to be prescient.

Lynch, Thomas Walker. "Macro Sharing in Genetics Causing Evolution." 1998. Points out that genetic mutation alone does not necessarily explain evolution. Hypothesizes the existence of a hierarchy, libraries if you will, and the sharing of libraries (coherent genetic sequences) across species in times of severe duress.

Invited Public Talks

This Might Be Why *Given to the "Skeptics of Taichung," 2015.* Perhaps why the Advice of Ancient Sages hasn't brought lasting peace.

Culture for Innovation *Presented at the National Taiwan University, 2013.* Discussed the culture of environments with high amounts of innovation. Presented in the large hall to a full audience.

Thoughts on Due Diligence *Presented to VCs in Victoria and Taipei, 2013.* Discussed high tech startup business plan evaluation.

Evolution of the Terminal Client *Demonstration lecture given at National Taiwan University, 2013.* Showed how the computer interface has changed from the time stacking jobs on card readers to the present day of windows and browsers, suggests a trend.

Charles Babbage's God *Given to the University of the Virgin Islands Computer Science Department, 2008.* Discusses Charles Babbage's theory of the 'Divine Legislature' as inspiration for the invention of the computer.

Entrepreneurship for Math and Science Students *Given at the University of Cave Hill in Barbados, 2011.* Invited lecture series on how to put together a startup. Had a variety of students from various departments.

Current Projects

Reasoning Technology Code Development AI to make litigation more efficient and effective. *Needs further support.*

Tom's Turing Complete Computing Processor Architecture Implementation of new microprocessor architecture and accompanying secure computer language. *Looking for sponsor.*

Wireless Power Technology *Seeking funding for prototype development.*

Novel Superior Media Compression Algorithm *Looking for code development support.*

Better Approach to Presenting Knowledge on the Internet *Seeking coding support.*

Generalized Discrete Solver Development *Seeking support for novel development.*

New Digital Coin and Algorithm *Needs a software development team.*

Different Way to Do Social Media *In need of a development team.*

Faster Adder Configuration *Looking for a buyer for an even faster adder configuration than my redundant cell adder.*

Linux Version There is a lot I would like to do with Linux and system design to improve security. I've run some studies (Such at the Lustucru project), and I have some IP that has run its twenty plus year course that possibly could be applied. I am thinking of "X" Linux, where "X" is the sponsor for the work, perhaps a company or a university.