Ethan Buchman

"There is nothing in a caterpillar that tells you it's going to be a butterfly."

- Buckminster Fuller

"There are no passengers on spaceship earth. We are all crew."

- Marshall McLuhan

Education

2013-2016 **Master of Applied Science, Engineering**; University of Guelph (Guelph, Canada)

- Thesis title: Tendermint: Byzantine Fault Tolerance in the Age of Blockchains
- **Thesis available online**.

2010-2013 **Baccalaureate in Science, Honours**; University of Guelph (Guelph, Canada)

- Major: Physical Science, With Distinction
- Thesis title: Mighty Microtubules in Microscopic Mechanics: On The Response of the Microtubule Cytoskeleton to Extreme Deformations of the Cell

2008-2009 **Baccalaureate in Science**; University of Toronto (Toronto, Canada)

- Incomplete - transferred to Guelph

Work Experience

Jan 2020 - Present **CEO**; **Informal Systems** (Toronto, Canada)

- Co-operatively organized R&D firm in blockchains and formal verification, co-leading development of the **Cosmos Network**.

March 2019 - Dec 2019 **Technical Director**; **Interchain Foundation** (Zug, Switzerland)

- Non-profit foundation dedicated to research and development of open, distributed networks, with a focus on the **Cosmos Network**.

Feb 2017 - Present **Vice President of the Foundation Council**; Interchain Foundation (Zug, Switzerland)

Jan 2016 - March 2019 **CTO and Co-Founder**; All in Bits, Inc (Delaware, U.S)

- Builds distributed systems software like **Tendermint** for public blockchains like **Cosmos**

April 2014 - Present — **CEO, Educator, Software Developer**; **CoinCulture CryptoConsulting, Inc** (Guelph, Canada)

- Education, consulting, and software development in open source, blockchain technology and cryptocurrencies.
- See **github** for software and course materials.

Sept 2014 - April 2016 — **Lead Blockchain Developer**; Eris Industries (now **Monax Industries** (London, United Kingdom)

- Built **Burrow**, which is now part of the **Linux Foundation's Hyperledger Project**.

August 2013 — **Research Assistant**; University of California San Francisco (San Francisco, U.S.A)

- With Dr. David Sivak; biophysics; non-equilibrium statistical mechanics; information theory

May 2011 - Sept 2013 (mostly during summers) — **Research Assistant**; University of Guelph (Guelph, Canada)

- With Dr. John Dutcher and Dr. Robert Wickham, simulating pilli-driven bacterial mobility
- With Dr. Alan Willms, simulations and research into a mathematical definition of energy residence times in dissipative dynamical systems
- With Dr. Doug Fudge, fluorescent microscopy based research on microtubule mechanics under stress in MDCK cells
- With Dr. Richard Mosser, western blot and fluorescent microscopy based research on the regulation of heat shock proteins and apoptosis in HeLa cells

Sept 2007 - June 2008 — **Tutor**; Metropolitan Preparatory Academy (Toronto, Canada)

- In-house math and science tutor for all students.

2004 - 2014 — **Tutor**; E for Effort Tutoring Services (Toronto, Canada)

- Ran a personal tutoring business, helping students from Grade 3 to Senior Undergraduates in all maths and sciences.

Teaching Experience

April 2019 — **Intro to Cryptocurrencies and Smart Contracts**: University of Toronto (Toronto, Ontario)

- Part I (6-hrs): Intro to cryptography, Bitcoin, and overview of blockchains
- Taught to MBA students on behalf of the Creative Destruction Lab

August 2018 — **Application Specific Blockchains**: University of Toronto (Toronto, Ontario)

- Detailed overview of Tendermint consensus and the Cosmos-SDK for building decentralized applications
- 2-hour workshop taught to ventures entering the Blockchain-AI stream of the Creative Destruction Lab

November 2017 **Intro to Cryptocurrencies and Smart Contracts**: CoinCulture (Montreal, Quebec),

- Part II (6-hrs): Programming with Bitcoin, Ethereum, and Tendermint

August 2017 **Intro to Cryptocurrencies and Smart Contracts**: CoinCulture (Toronto, Ontario)

- Part I (6-hrs): Intro to cryptography, Bitcoin, and overview of blockchains
- Part II (6-hrs): Programming with Bitcoin, Ethereum, and Tendermint

March 2017 **A Brief History of Currency and Consensus**; University of Guelph (Guelph, Ontario)

- Guest lecture for Dr. Graham Taylor's senior undergraduate course in computer engineering

Nov 2016 **A Brief History of Currency and Consensus**; University of Guelph (Guelph, Ontario)

- Two guest lectures for Dr. Graham Taylor's senior undergraduate course in computer engineering

Nov 2014 **Cryptography, Consensus, and a new kind of Internet**; University of Guelph (Guelph, Ontario)

- Guest lecture for Dr. Graham Taylor's senior undergraduate course in computer engineering

Sept 2007 - June 2008 **Tutor**; Metropolitan Preparatory Academy (Toronto, Canada)

- In-house math and science tutor for all students.

2004 - 2014 **Tutor**; E for Effort Tutoring Services (Toronto, Canada)

- Ran a personal tutoring business, helping students from Grade 3 to Senior Undergraduates in all maths and sciences.

Publications

- Buchman, Ethan, Zarko Milosevic, and Jae Kwon. "The latest gossip on BFT consensus" (2018). Preprint. https://arxiv.org/abs/1807.04938
- Buchman, Ethan and Jae Kwon. "Cosmos: A network of distributed ledgers." (2016). Whitepaper. https://cosmos.network/cosmos-whitepaper.pdf
- Buchman, Ethan. "Tendermint: Byzantine Fault Tolerance in the Age of Blockchains". Master's thesis (2016). https://atrium.lib.uoguelph.ca/xmlui/handle/10214/9769
- Im, Daniel Jiwoong, Ethan Buchman, and Graham W. Taylor. "Understanding minimum probability flow for RBMs under various kinds of dynamics." arXiv preprint arXiv:1412.6617 (2014).
- Im, Daniel Jiwoong, Ethan Buchman, and Graham W. Taylor. "An Empirical Investigation of Minimum Probability Flow Learning Under Different Connectivity Patterns." Joint European Conference on Machine Learning and Knowledge Discovery in Databases. Springer International Publishing, 2015.
- Buchman, Ethan. "Reflections on metaphor and the nature of mind." Studies by Undergraduate Researchers at Guelph 4.2 (2011): 38-41.

Presentations

April 2019 **Stakeholders and Statemachines**; Rebuild Conference (Toronto, Canada)

- **Conference**

February 2019 **The Latest Gossip on Byzantine Fault Tolerant Replicated State Machines**; The Swiss Blockchain Winter School (Interlaken, Switzerland)

- **Conference**

July 2018 **Brief History of Distributed State**; DappConn (Berlin, Germany)

- **Conference**

July 2018 **The latest gossip on BFT consensus**; Formal Reasoning in Distributed Algorithms (Oxford, U.K.)

- **Conference**

May 2018 **Brief History of Distributed State**; EDCON (Toronto, Canada)

- **Conference**

June 2017 **A Brief History of Distributed State**; Blockchain Government Forum (Ottawa, Canada)

- **Conference**

Jan 2017 **On the Design and Accountability of Byzantine Fault-Tolerant Protocols**; Stanford University (Palo Alto, U.S.A)

- **Blockchain Protocol Analysis and Security Engineering 2017**
- **Conference Presentation**

Oct 2016 **Tendermint: Byzantine Fault Tolerance in the age of Blockchains**; University of Cambridge (Cambridge, U.K)

- **Computer Laboratory Systems Research Group Seminar**

June 2016 **Thesis Defense**; University of Guelph (Guelph, Canada)

- **Master's Thesis Oral Defence**

April 2016 **Tendermint**; Blockchain Workshops (New York City, U.S.A)

- **Conference Presentation**

Feb 2016 **Blockchain Smart Contracts in Any Language with Tendermint TMSP**; SF Bitcoin Devs Meetup (San Francisco, U.S.A)

- **Meetup Presentation**

- Co-presented with Jae Kwon

May 2015 **Presenting Eris Industries**; BlockchainUniversity (Mountain View, U.S.A)

- **Part 1**
- **Part 2**

Sept 2014 **Introducing Ethereum: A General-Purpose, Decentralized, Secure Compute Platform**; International Workshop on Technical Computing for Machine Learning and Mathematical Engineering (Leuven, Belgium)

- **Conference**

Sept 2014 **What is Bitcoin? A Platform for Sustainable Economies**; Transition Guelph (Guelph, Canada)

- **Meetup Presentation**

Podcasts

April 2019 **Want to Connect Blockchains? Cosmos Has Tools for Coders**; Unchained Podcast

- **Podcast**

April 2019 **Launching the Internet of Blockchains**; Epicenter Podcast

- **Podcast**

July 2018 **Testnets**; Zero Knowledge Podcast

- **Podcast**

March 2018 **Consensus Systems**; Software Engineering Daily

- **Podcast**

Feb 2017 **Tendermint and the Internet of Blockchains**; Digital Banking Leadership Council

- **Online Conference**

June 2016 **Consensus, Security, and the Blockchain Programming Interface**; Blockchain With The Best

- **Online Conference**

Jan 2016 **Tendermint - Private Modularized Blockchains**; Epicenter Podcast

- **Podcast**
- Co-presented with Jae Kwon and Dustin Byington

Awards

2016 **Most Innovative**; Blockchain Summit's Demo Day (Shanghai, China)

- Jae Kwon pitched the concept behind the Cosmos Network at an event co-hosted with the Ethereum Foundation's Devcon II.

2014 **Second Place**; In-Crypto-We-Trust Hackathon (Toronto, Canada)

- Built a prototype decentralized publishing system on Ethereum called CryptoSwartz
- Co-won with Vlad Zamfir

2013 **Governor General's Academic Medal, Silver**; University of Guelph (Guelph, Canada)

- Highest marks in my cohort

2011-2013 **Various scholarships**; University of Guelph (Guelph, Canada)

2008-2009 **Various scholarships**; University of Toronto (Toronto, Canada)

2007 **Governor General's Academic Medal, Bronze**; Metropolitan Preparatory Academy (Toronto, Canada)

- Highest marks in my cohort

Technical Experience

Cryptocurrencies Extensive understanding of cryptocurrency design and implementation. Including

- Public key cryptography. Implemented elliptic curve digital signing algorithm **from scratch**.
- Bitcoin. Implemented **vanity address generator** and **transaction construction** from scratch.
- Ethereum. Made contributions to the **Go**, **Python**, and **Javascript** implementations of the protocol. Contributed to the **Serpent** language implementation. Implemented the virtual machine from scratch in **Burrow**. Maintain various tools and guides, including the **evm-tools** for understanding the Ethereum Virtual Machine, the **eth-sign** tool to form and sign raw transactions, and the **understanding the ethereum trie** repository for understanding the Ethereum database structure.

Consensus Algorithms Extensive understanding of consensus algorithm design and implementation. Specifically

- Lead developer of the **Tendermint Byzantine Fault Tolerance consensus software**.

Machine Learning Extensive understanding of neural network design and implementation, in particular Deep Learning, Restricted Boltzmann Machines, and Dynamic Time Warping.

Open Source Active open source developer. Mostly to **ebuchman**, **CoinCulture**, **Monax Industries**, **Tendermint**, **Cosmos**, and **Ethereum**.

Programming Languages

Go: Active user since mid 2014 for distributed consensus systems and transactional state machines.

Python: Active use 2012-2014 with emphasis on machine learning using the Theano framework.

C: Active use 2011-2013 for school work and some biology focused simulations.

Working knowledge of **Javascript**, **Bash**, **Solidity**, **Docker**, **MacOS**, **Linux**, **Nginx**

Have worked with **CUDA**, **SQL**, **PHP**, **MatLab**

Other Skills, Hobbies, Experiences

- Human Languages:
  - English (native speaker)
  - Hebrew (basic conversational)
- Gardening
- Guitar and Drums
- Public Speaking
- Ran for Member of Parliament in **2015 with the Canadian Libertarian Party in the Eglinton-Lawrence riding**