

AUSTIN FORUM

ON TECHNOLOGY & SOCIETY

Connect. Collaborate. Contribute.™

Welcome to the
Austin Forum on Technology & Society!

*We bring leaders, thinkers, builders, creators, and learners together to **connect, collaborate, and contribute!***

*Thank you for joining our community
online or in-person!*

Thank you, Capital Factory!



Meg Vrabel
COO



Ehab Gabr
VP Enterprise Innovation

Austin Forum Team!



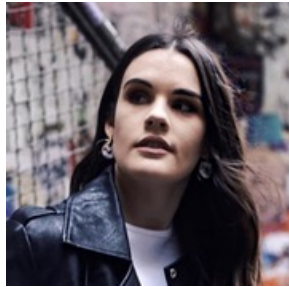
Jay Boisseau
Executive Director



Allison Warner
Logistics



John Lockman
Tech Director



Delanie Majors
Communications Coordinator



Mary Garza
Web/UX Designer

Our Annual Partners Make This Possible!



Please contact us if you want to become an annual partner!

Before we get started, join our slack

Why join the Austin Forum Slack workspace?

- Continue and deepen the conversation after Austin Forum events
- Find new opportunities for collaboration, mentoring, working, and more
- Promote local events and relevant Tech & Society opportunities
- Because this gives *everyone* in our community—online and in-person—the *same* way to ask questions!
- ***We are going to clean up up channels and simplify the space before the next event***

How?

1. Open a web browser
2. Go to: www.austinforum.org/slack
3. Click “Join the Austin Forum Slack Workspace”
4. Enter your email address
5. Check your email to confirm Slack invitation
6. Enter your name and click “Create Account”
7. You’re in! You can use the Slack mobile app now, too.
8. To submit questions during the event, in the channel **#event-questions** (add to your view using + **Add channels**)

We have 4 kinds of programming!

Live onthly events

Presentation + Networking events

- Expert presenter-focused
- In-person and online—hybrid
- Recording and slides posted online

Discussion events

- Participatory for everyone
- In-person *or* online
- Never recorded—speak freely!

Online weekly content

Podcasts – Austin Forum Upload *(new episodes!)*

- Audio only
- Conversation formats
- Hosted in major podcast stores, AF website

Blog – Austin Forum Update *(just rebooted)*

- Web-based (on Medium)
- Weekly(ish) articles
- Multiple formats: “Techsplinations,” interviews, analyses/positions, and series

Austin Forum Upload: New episodes out now!



- Four new episodes in 2023:
 - **ChatGPT**
 - **The Economy & Tech Sector**
 - **SXSW 2023 Preview**
 - **Mis-/Dis-/Malinformation**
 - LastPass, Passwords, Pitfalls & Recommendations (this week)
- The next two episodes will be:
 - “The Last of Us” and Convergence of Gaming and Video
 - Generative AI and Art

Austin Forum Presentation + Networking Events: Experts Share, Inform & Inspire



5:15 Cash bar opens, and free snacks. Mingle in-person w/speakers & attendees, or chat w/online attendees

6:15-7:25 **Main event & presentation**
*Ask questions in **AF Slack #event-questions** channel,
Tweet with **#realityAF @AustinForum***

7:25-7:40 **Q&A with presenters**

7:40-7:45 **Final comments/slides**

8:00 Post-event networking w/speakers, attendees, and free drinks & eats




Q: Do You Understand How Markets Work?

(30 seconds)

1 2 3 4 5 6 7 8 9 10

11 12 13 14 15 16 17 18 19 20

21 22 23 24 25 26 27 28 29 

Questions for speakers?
Submit questions in the
AF Slack channel
#event-questions
for a chance to win a
SXSW 2023 or 2024
badge!

*Must be in-person and present at
~7:45PM to win!*

*Must use your name (first and
last) on questions!*



SXSW 

And now, our featured presentation...

Please:

- ✓ **Respect our speakers & audience** by not talking during their presentation, and in your comments & questions
- ✓ **Ask questions** in the AF Slack in the **#event-questions** channel
- ✓ **Share key points** via Twitter w/hashtag **#realityAF** and tag **@AustinForum**
- ✓ **Learn, think, and enjoy!**





How Technology is Innovating (and Improving) Global Financial Markets

March 7, 2023

Scott Richardson
Managing
Partner-Austin
Optiver



Luke Wilson
Head of Global
Research
Infrastructure
Optiver





How technology makes markets work better

Presented by Optiver

Scott Richardson | Managing Partner

Luke Wilson | Head of Global Research Infrastructure





Agenda

- 01 Introduction
- 02 Role of financial markets in society
- 03 Top 5 things to know about markets
- 04 The role of technology in markets
- 05 Why low latency is important
- 06 Q&A



About me

Scott Richardson

- Managing Partner
- 15 years in the trading industry





About me

Luke Wilson

- Head of Global Research Infrastructure
- 20 years in technology industry





Role of financial markets in society

Markets are everywhere





Brief history of financial markets

Technology driving the disruption





The technology of trading





Role of technology in markets

Computers have replaced human traders





The technology of trading

Interacting with today's markets requires more than a license and good instincts.



The need for speed

You didn't think we wouldn't talk about AI, did you?

Big trouble with little data



Big trouble with little data





Big trouble with little data

You can have too much of a good thing!

802.3 Ethernet packet and frame structure

Layer	Preamble	Start frame delimiter	MAC destination	MAC source	802.1Q tag (optional)	Ethertype (Ethernet II) or length (IEEE 802.3)	Payload	Frame check sequence (32-bit CRC)	Interpacket gap (IPG)
	7 octets	1 octet	6 octets	6 octets	(4 octets)	2 octets	46-1500 octets	4 octets	12 octets
Layer 2 Ethernet frame			← 64–1522 octets →						
Layer 1 Ethernet packet & IPG	Maximum size: 1542B ← 72–1530 octets →								← 12 octets →

Source: Wikipedia (https://en.wikipedia.org/wiki/Ethernet_frame)



Big trouble with little data

You can have too much of a good thing!

Optiver collects raw market data from over 70 stock/options/futures exchanges around the world as UDP packets.

**Billions and billions
of packets!**





Big trouble with little data

Drowning in Data



Small things in large quantities are a huge problem!

**1.5KB * 1T =
1.5PB per day!**



Big trouble with little data

We don't want to miss a thing!

What does this mean in practice?

**It means storing
18 million bytes
every second of
the day!**





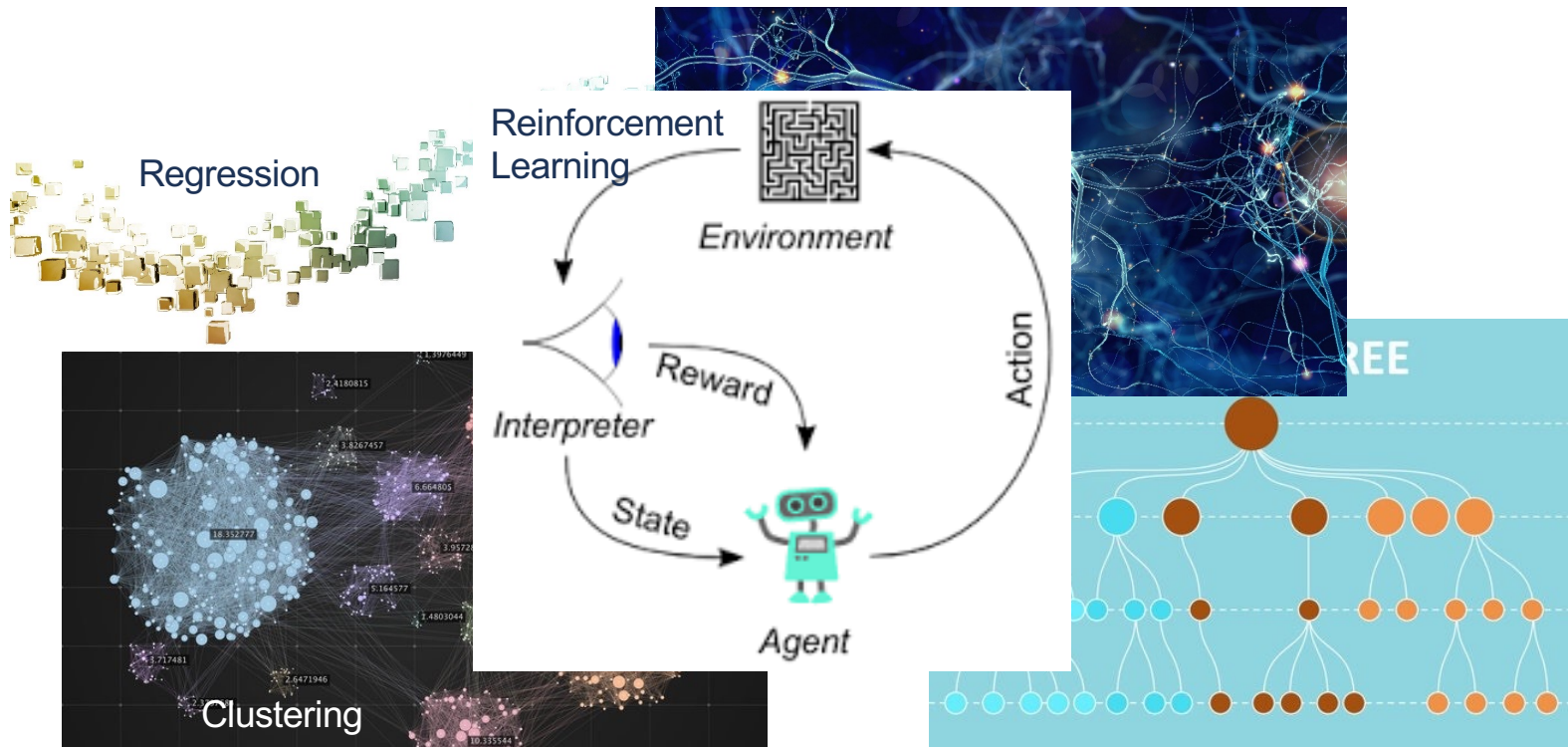
You didn't think we wouldn't
talk about AI, did you?





My computer is smarter than your trader

Algorithmic trading on electronic markets uses every ML trick in the book!





My computer is smarter than your trader

What are we teaching algorithmic traders to do?





My computer is smarter than your trader

So many samples!



Each UDP packet is a potential data point for training ML models

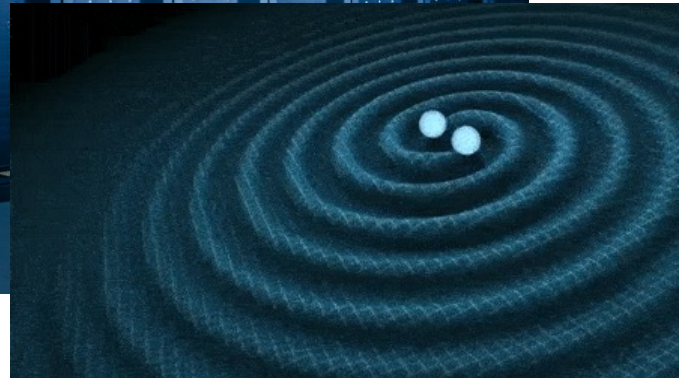
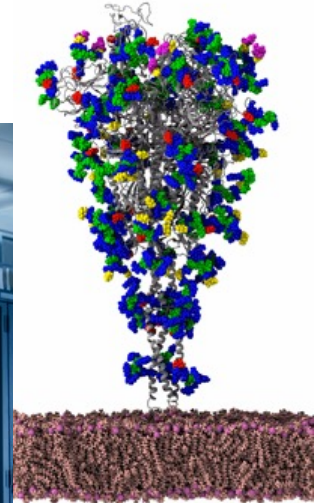
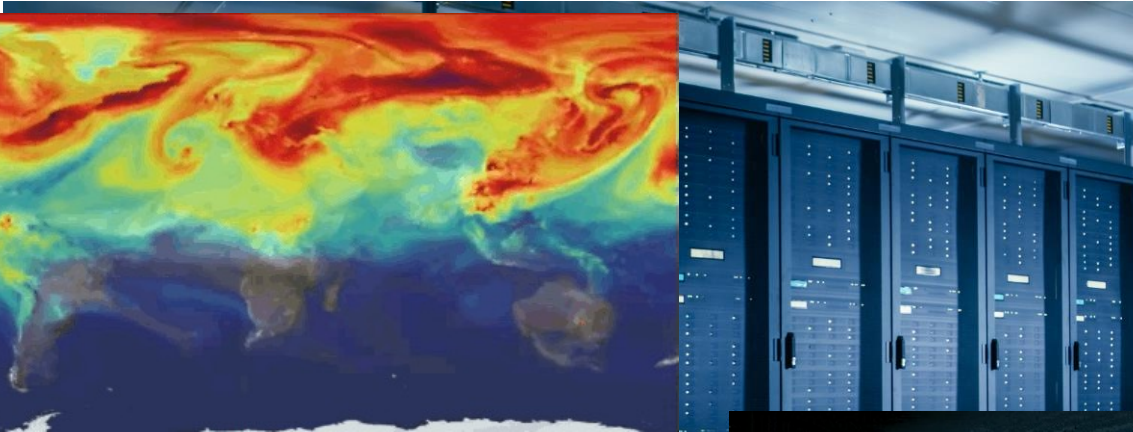
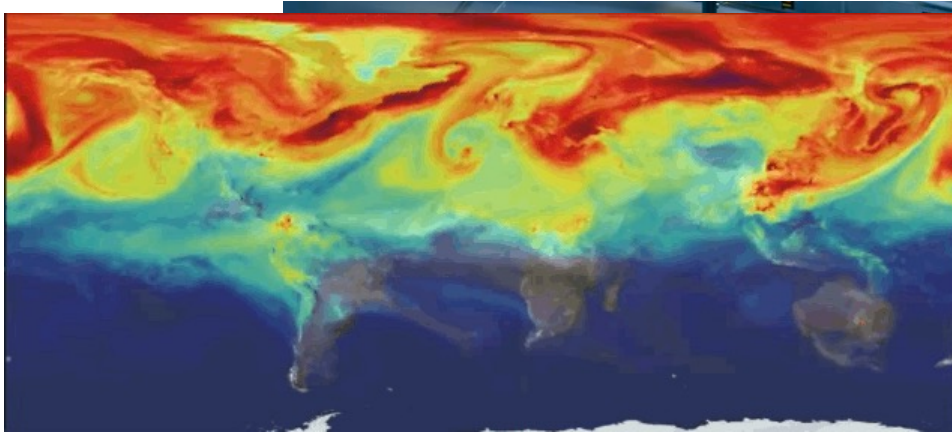
Imagine training an ML model on 1 trillion data points per day...

3 months of training data is 60 trillion data points!



My computer is smarter than your trader

Lots of little data needs LOTS of big compute!





The need for speed





The need for speed

Blink and you'll miss it



Time for lightning to strike:

- 30 microseconds

Time to make a trading decision:

- ~300 nanoseconds!

100x faster than lightning!



The need for speed

Making decisions with incomplete information





The need for speed

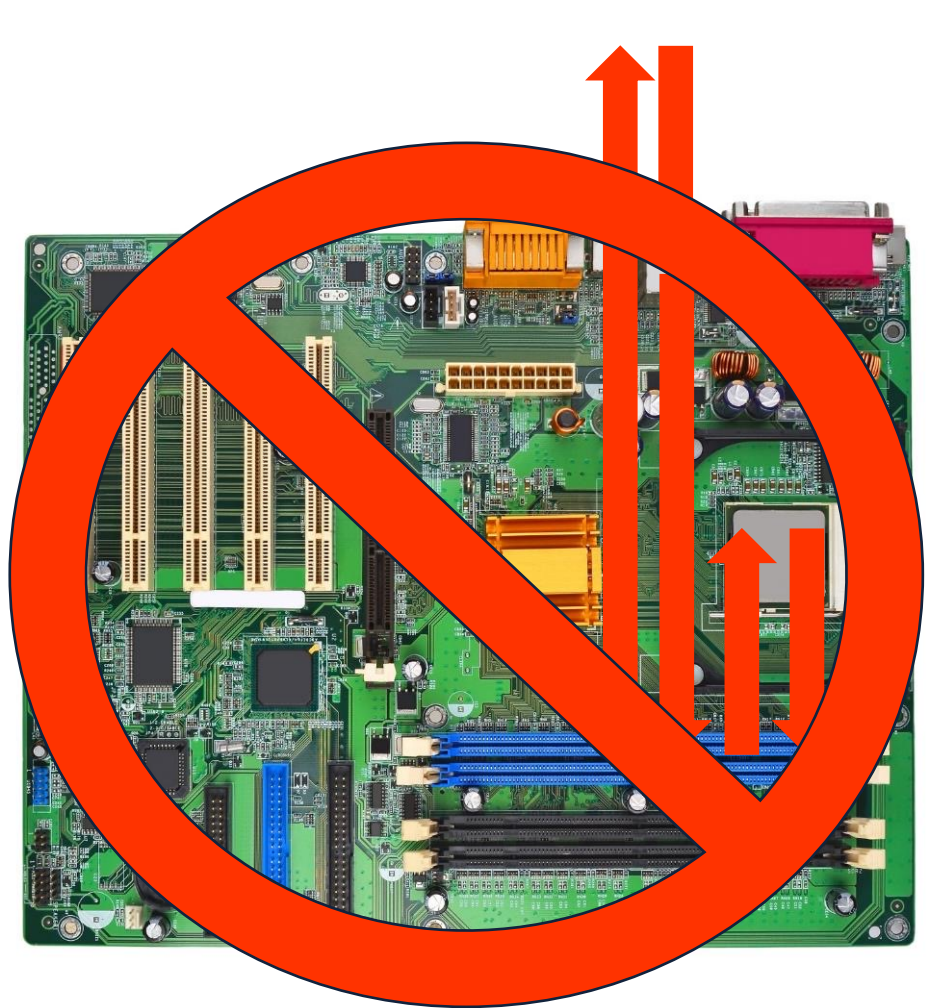
Software is too slow



The need for speed

Computers are too slow

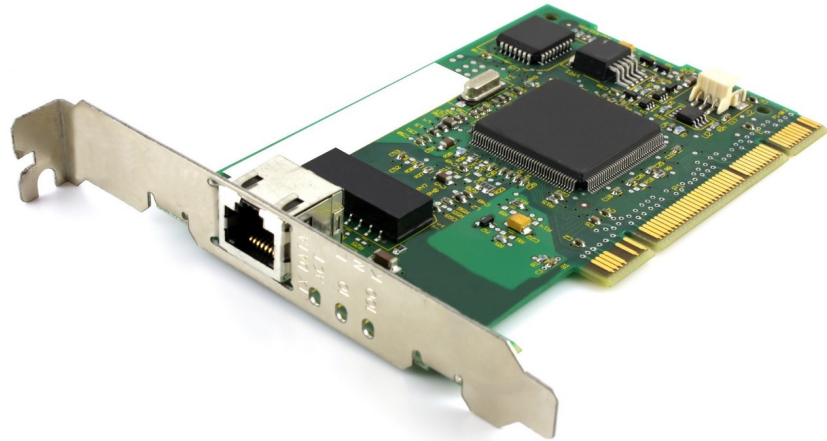
Total time: ~10 microseconds





The need for speed

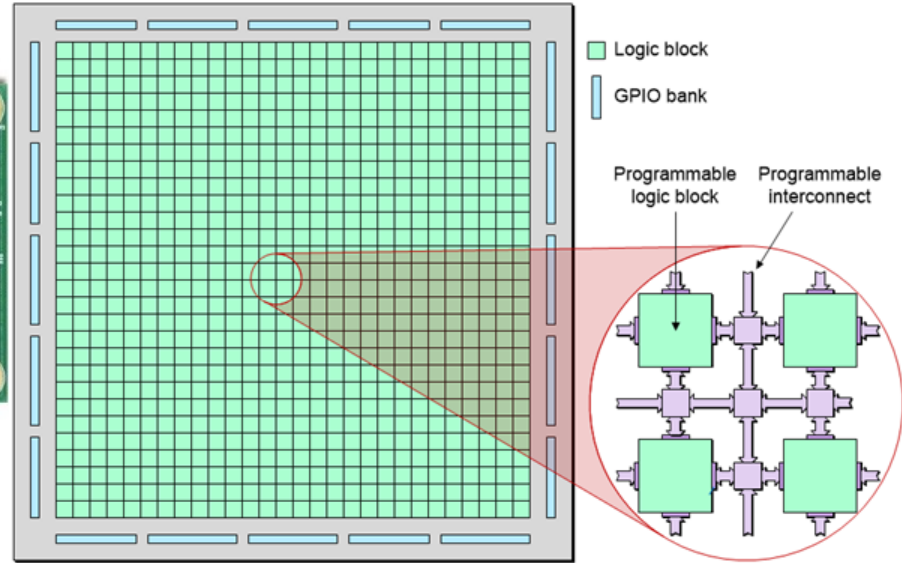
Stick to the NIC





The need for speed

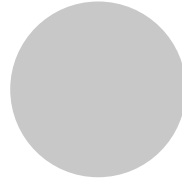
Reprogrammable hardware is the only way!



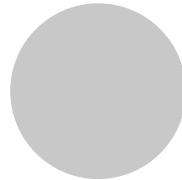
Bird's-eye view of FPGA



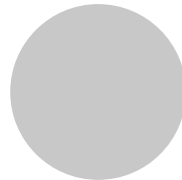
Summary



Markets have evolved over millennia



The injection of technology into financial markets is accelerating their evolution



The drive to be first to market is accelerating innovation in many technology areas



Interested in Technology and Markets?

[Learn More](#)



Blog Post: How Today's
Stock Markets Work



YouTube Series:
Introduction to Financial
Markets



Optiver 

Thank you!

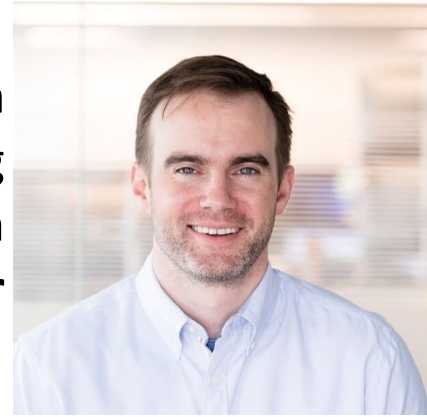
Questions?



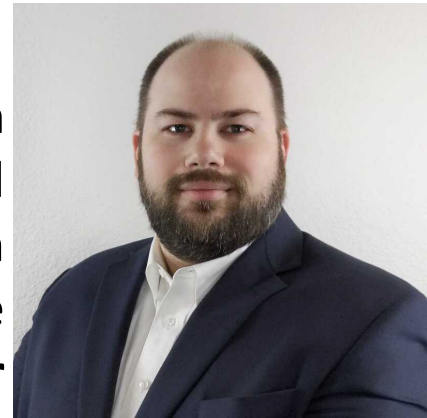
Q&A for

How Technology is Innovating (and Improving) Global Financial Markets

Scott Richardson
Managing
Partner-Austin
Optiver



Luke Wilson
Head of Global
Research
Infrastructure
Optiver




Q: What is the best thing you learned tonight?

(30 seconds)

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21 22 23 24 25 26 27 28 29 

More Great March Events!



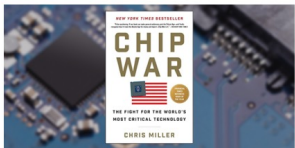
March 23, 2023

5:30 p.m. CDT | Discussion | **In-person**

Highlights of SXSW Interactive & Future Austin Forum Programming

Moderated by **Jay Boisseau**, Executive Director, [Austin Forum on Technology & Society](#); **Jeff Brooks**, Director of America, [Helena Group Foundation](#); **Hugh Forrest**, Chief Programming Officer, [SXSW](#); **Steve Krant**, President, [Creative Technology Associates](#); **Susan Meredith**, CEO, [MentaMorph Money](#); **Keiarra Ortiz-Cedeno**, Computer Science Student; **Maxime Peabody**, Senior Software Engineer, [Wombo.ai](#); and **Michael Scharf**, Co-Host, [Austin Next LLC](#)

REGISTER



March 30, 2023

7:15 p.m. CDT | Discussion | **Online**

Discussion of "Chip War: The Fight for the World's Most Critical Technology"

Moderated by **Mike Ignatowski**, Senior Fellow, [AMD](#)

REGISTER

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AI April is Almost Here!

April 4, 2023

6:15 p.m. CDT | Presentation | **In-person** (including networking) and **Online** (Zoom)

AI in 2023: Exciting Developments and Heightened Risks

Presented by **Dr. Steve Kramer**, Chief Scientist, [KUNGFU.AI](#)

REGISTER

April 12, 2023

7:00 p.m. CDT | Presentation | **In-person**

How Close/Far Are We from “Her” - Movie + AI Panel

Moderated by **Numa Dhamani**, Principal Machine Learning Engineer, [KUNGFU.AI](#)

REGISTER

April 18, 2023

7:30 p.m. CDT | Discussion | **In-Person**

AI & Whiskey Chat

Moderated by **Jay Boisseau**, Executive Director, [Austin Forum on Technology & Society](#) and **Sherri Greenberg**, [The University of Texas](#)

REGISTER

April 26, 2023

7:15 p.m. CDT | Discussion | **Online**

Discussion of "The Threshold: Leading in the Age of AI"

Moderated by **Hugh Forrest**, Chief Programming Officer, [SXSW](#)

REGISTER

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#moneyAF

Join Us for More Great Content in 2023

- **Schedule will be posted at www.austinforum.org**
- Presentation and discussion topics for 2023 will include
 - **AI April!**
 - Digital Twins and Multiverses
 - Robotics, autonomous vehicles/drones,
 - Health tech
 - Food tech
 - Energy
 - Manufacturing tech
 - and more!



Plus:

- New podcast episodes **now**
- Rebooted blog Feb 1
- and stay tuned for hands-on labs and tutorials!

Our Annual Partners Make This Possible!



Please contact us if you want to become an annual partner!

Support the Austin Forum!

We need your help! Like many other non-profits, the pandemic impacted us (and our sponsors) negatively. If you can help, it is appreciated, tax-deductible, and will be rewarded with schwag and praise!

<https://www.austinforum.org/support.html>



Join us to learn, share, discuss!!



Please share the upcoming events with your friends and colleagues!

Networking is back! Join us at Upstairs at Caroline



621 Congress (Aloft Hotel)

KEEP YOUR NAMETAGS FOR A FREE DRINK!

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