



ENVISION | 2019
CONFERENCE | Booklet

THE FUTURE OF US

Nov 22 - 24, 2019

Princeton
University



WELCOME

We live in a rapidly changing world. Technology advances at an exhilarating yet frightening pace and political and economic upheaval are increasingly frequent, making it difficult to ascertain the implications of today's events for humanity's future. Underpinning these surface-level changes is a convergence of evolutionary-scale revolutions still in their infancy. These revolutionary technologies include artificial intelligence, enhanced interfaces, nanoscale materials, and synthetic biology. The Envision Conference focuses on these technologies and their potential to catalyze catastrophic and existential risk, material advancement, space development, economic and social change, and human enhancement.

We also live in a world of small-scale, short-term thinking. Even as technology advances, much of the technology industry's resources flood into ventures that lack far-reaching societal impact. Despite political and economic upheaval, quarterly profits drive companies, and lack of vision prevents political systems from meeting the challenges posed by emerging technologies.

As future leaders, we must adopt a radically different, forward thinking approach to technological advancement. At Envision, we recognize that though the technologies we will be discussing have the potential to better humanity greatly, they can also irreversibly harm us. We aim to visualize the full picture and focus on what's important, not chase the latest fad. We also strive to remain grounded in reality, taking the small steps needed to realize a brighter future.

We've invited visionaries and practitioners who will not only share with you what is possible, but also help you understand how you can contribute to the evolutionary-scale revolutions in a concrete manner. As we make progress, it's important to account for and properly address the dangers. You will be hearing from experts on what the potential risks are and what we can do to integrate prudence into advancement.

Technological advancement has already fundamentally altered the human experience and will continue to do so, but we can still influence our collective future. Welcome to a select global community of tomorrow's top leaders, researchers, engineers, and academics committed to that goal.

Welcome to the Future of Us.



Elizabeth Petrov
Envision Co-President



Amichai Feit
Envision Co-President

CORE VALUES

Envision aims to inspire the new generation to pioneer a brighter future through the prudent advancement of breakthrough technologies.

We're guided by our five core values:

Mindset

The future cannot be predicted; we can't know who will make which important decisions about what. Our goal is thus not to provide specific information, but to cultivate and share a mindset.

That mindset has two key components:

Rationality

An expansive but realistic view of what is possible. We want to remain grounded in reality, but also take into account the full range of what is possible.

Prudent Advancement

We want to realize the best outcomes and avoid the worst. We want to actively steer prudent advancement, not just let things happen.

Addition

There is no point in doing what has already been done - we focus on improving existing technologies or designing new ones.

Grounded Ambition

If we work hard and smart, it's possible for us to have a significant impact on the future trajectory of humanity. However, it's important to remain grounded in reality and execute well on that ambition for it to be realized.

Open-Mindedness

Envision is ideologically neutral. There is no one correct way of looking at the future, and circumstances will change. We aren't tied to any single technology or approach and don't hold an official ideology aside from our core values. We're also open to both conventional and unconventional ideas and approaches.

Community

It's valuable to build a community of people passionate about our collective future and with the Envision mindset, and to maintain the cohesion of this community. We're stronger together.

TECHNOLOGIES

Synthetic Biology



While natural selection has thus far driven evolution, breakthroughs in science and technology are enabling purposeful self-evolution. Technology such as CRISPR will allow us to modify the genome of any living thing, including us. Synthetic biology unlocks the potential of life-based materials, the result of billions of years of refinement into highly complex processes that we are on the verge of harnessing. Evolution has only explored an infinitesimally small subset of the total possibility space of life, and is only at a local optimum; we can now begin to explore the rest, and use it to enhance ourselves and engineer unprecedented biological machines.

Artificial Intelligence, Robotics & Computation

With accelerating advancements in the field of computing and machine learning, experts predict that in the next few decades computers will reach and surpass the computational speed and complexity of the human brain. AI researchers predict that there is a median 50% probability of reaching human intelligence level AI by 2040 and 90% probability by 2070. Machines will not only be able to complete any intellectual task the human brain is capable of, but recursively self-improve to a level far beyond human capabilities known as artificial superintelligence (ASI). This brings both unprecedented risks, as well as limitless possibilities. And along the way, AI will fundamentally transform society as it enables new ways of harnessing data and makes more and more jobs obsolete.



Enhanced Interfaces



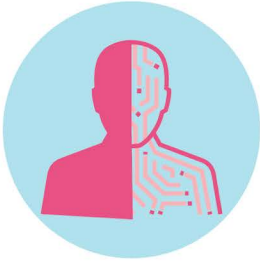
Advances in AI, virtual reality, and augmented reality are rapidly increasing the sophistication of simulated realities we are able to create. Upcoming developments in neural engineering, such as brain-computer interfaces, promise to change how we interact with each other and with the world, and what we are able to experience. Meanwhile, virtual reality could eventually even change where we spend most of our time. If a virtual world could give you far more power and access to experiences than the physical world does, why still bother with the real world at all?

Nanotechnology

As increasingly sophisticated nanobots enable manipulation of matter at the nanoscale, our ability to harness nanoproperties and access previously impenetrable areas enable revolutions in manufacturing, electronics, materials science, medicine, and clean energy. Yet nanoscience is more than seeing and moving objects at the atomic level - it enables the creation of materials with properties that have never been observed before. Other technologies in development include energy conversion and storage at the nanolevel as well as sustainable nanomanufacturing to create the nanodevices and nanoelectronics that will be the default materials and tools of our future.



IMPLICATIONS

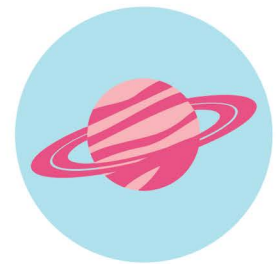


Human Enhancement

Advancements in synthetic biology, nanotechnology, and enhanced interfaces possess massive potential for human enhancement. When used correctly, these tools have the potential to cure previously incurable disease and injuries, eliminate disability, increase longevity, and improve human abilities beyond their base state. When used incorrectly, they have the potential to irreversibly harm us as a species.

Space Exploration

With the advent of start-ups like SpaceX, Planetary Resources, Planet, Blue Origin, and many more, the space industry has been revived in terms of ambition, talent, and growth. SpaceX, NASA, and Boeing are in a space race to get to Mars; Planetary Resources seeks to exploit the resources of asteroids, orders of magnitude greater than what's available on Earth. Others are looking at nanosatellites, orbital habitats, and other projects. Access to a vast new trove of raw materials in far greater amounts than what is available on Earth, a greater understanding of the universe we live in, and the ability to form colonies and orbital habitats beyond Earth open many possibilities for the future of humanity.

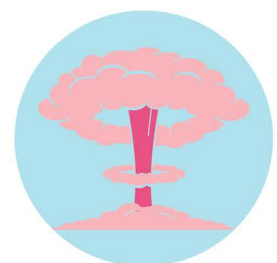


Social, Political & Economic Change

Structural changes to our social, political, and economic systems are both caused by, and enabled by, new technologies. As technology advances, the global economy is likely to become increasingly dependent on technological manufacturing and development, and raw materials from asteroid mining will drastically alter the economy of resources. Meanwhile, political structures and organizations must adapt accordingly to accommodate technology-driven social and economic trends.

Catastrophic & Existential Risk

Finally, catastrophic and existential risk must be considered as a possible implication of technological progress. Catastrophic risk refers to an event with the potential to damage human well-being on a global scale, while existential risk refers to an event capable of catalyzing human extinction. Technology with the potential to do good is inherently saddled with the contrasting ability to harm. For example, nuclear technologies can lead to clean energy, but also to nuclear war. CRISPR can lead to curing disease, but to irreversibly harming the human genome or enhancing another species. We must critically consider the broader implications of progress as technology becomes exponentially more advanced and far-reaching.



SPEAKERS



Ruha Benjamin

Associate Professor of African American Studies at Princeton University

Dr. Ruha Benjamin is an Associate Professor at Princeton University, founder of the JUST DATA Lab, and author of *People's Science: Bodies and Rights on the Stem Cell Frontier* (2013) and *Race After Technology: Abolitionist Tools for the New JimCode* (2019), among other publications. Her work investigates the social dimensions of science, medicine, and technology with a focus on the relationship between innovation and inequity, health and justice, knowledge and power. Professor Benjamin is the recipient of numerous awards and fellowships including from the American Council of Learned Societies, National Science Foundation, Institute for Advanced Study, and the President's Award for Distinguished Teaching at Princeton. For more info visit www.ruhabenjamin.com



Aubrey de Grey

Chief Science Officer of SENS Research Foundation

Dr. Aubrey de Grey is a biomedical gerontologist and is the CSO of SENS Research Foundation, a biomedical research charity that performs laboratory research dedicated to combating the aging process. He is VP of New Technology Discovery at AgeX Therapeutics, a biotech startup developing new therapies in biomedical gerontology. His research interests encompass the characterisation of self-inflicted cellular and molecular damage that constitute mammalian aging and the design of interventions to repair and/or obviate that damage. He is Editor-in-Chief of *Rejuvenation Research*, a journal focusing on intervention in aging, and received his BA in CS and Ph.D. in biology from the University of Cambridge.



Hod Lipson

Director of Creative Machines Lab at Columbia University

Hod Lipson is a professor of Engineering and Data Science at Columbia University in New York, and a co-author of the award winning book *"Fabricated: The New World of 3D printing"* and *"Driverless: Intelligent cars and the road ahead"*. His work on self-aware and self-replicating robots challenges conventional views of robotics, and has enjoyed widespread media coverage. Lipson has co-authored over 300 publications that received over 20,000 citations to date. He has co-founded four companies. Hod directs the Creative Machines Lab, which pioneers new ways to make machines that create, and machines that are creative.



Anders Sandberg

Senior Research Fellow at the Future of Humanity Institute in Oxford

Anders Sandberg is a senior research fellow at the Future of Humanity Institute in University of Oxford. His research centers on management of low-probability high-impact risks, estimating the capabilities of future technologies, the ethics of human enhancement, and very long-range futures. He is also senior research fellow at the Oxford Martin School, research associate to the the Oxford Uehiro Centre for Practical Ethics, the Oxford Centre for Neuroethics, the Center for the Study of Bioethics (Belgrade) and the Institute for Futures Studies (Stockholm). Anders has a background in computer science, neuroscience and medical engineering. He obtained his Ph.D. for work on neural network modelling of human memory.



Kai Landre

Artist and Cyborg

Kai Landre, born in Barcelona in 2000, joined the Cyborg Foundation movement in 2017 when he met its founder, Neil Harbisson. Kai showed interest in space since his childhood and could only connect to its sounds through music. His dream was to take part in outer space, the inability to do so made him start his transition in 2018 to cyborgism, when he created the Cosmic Sense, which allows him to create music with sounds from space.



Johannon Ben Zion

Transhumanist Party Candidate for President

J Ben Zion is United States Transhumanist Party's endorsed Presidential Candidate for 2020. He advocates for a public health service which would treat aging as a disease and for a broad slate of e-governance and decentralization initiatives including a blockchain voting option across the United States. He's presently undertaking to break the Guinness world record for the longest period of virtual reality immersion in January of 2020.



Michele Reilly

Founder of Turing Inc.

Michele Reilly is the founder of Turing Inc., a pioneer in spin-based quantum systems. Turing develops quantum compiler back-ends, quantum error correction IP, and other control components as the basis of a quantum Operating System. Turing's advocacy and focus on post-supremacy computing led to a chipset, which is the basis for a global trunkline system for provably secure quantum communications. Prior to Turing, Dr. Reilly managed \$130M in assets as Chief Investment Officer for Victor Niederhoffer's Manchester Trading in NYC.



Phil Torres

Founder of X-Risks Institute

Phil Torres is an author and scholar specializing in existential risk. His work has spanned many topics such as cognitive enhancement, omniscient agents, space colonization, superintelligence, anti-natalism, and emerging technologies. He is an Affiliate Scholar at the Institute for Ethics and Emerging Technologies and the director of the Project for Future Human Flourishing, as well as the founder of the X-Risks Institute.



Natlie Kofler

Founder of Editing Nature

Natalie Kofler is a trained molecular biologist and a leading voice in CRISPR and synthetic biology ethics. She advocates for equity in science and the inclusion of diverse perspectives in technology design and governance. She is an affiliated scholar of the Yale Interdisciplinary Center for Bioethics and the Solomon Center for Health Law and Policy at the Yale Law School. She teaches Environmental Ethics and Justice at Harvard Medical School. Natalie received her PhD in cellular, molecular, and medical biosciences and MS in human nutrition and metabolic studies from Columbia University and her BS in human anatomy and cell biology from McGill University. She is currently the Levenick Resident Scholar at the Institute of Sustainability, Energy, and the Environment at the University of Illinois Urbana-Champaign and founder of Editing Nature, a global initiative to steer responsible development and deployment of environmental genetic technologies.



Brett Frischmann

Professor in Law, Business and Economics at Villanova School of Law

Brett Frischmann is the Charles Widger Endowed University Professor in Law, Business and Economics at Villanova University, teaching courses in intellectual property, internet law, and technology policy. His research covers three overlapping areas: infrastructure, knowledge commons, and techno-social engineering of humans (the relationships between the techno-social world and humanity). His latest book, co-authored with philosopher Evan Selinger, *Re-Engineering Humanity* (Cambridge University Press), examines techno-social engineering of humans, various 'creep' phenomena and modern techno-driven Taylorism. In addition, he has written a number of online articles on the intersection of technology and humanity for *Scientific American*.

SPEAKERS



David Yaden

Research Fellow and Doctoral Candidate at University of Pennsylvania

David Bryce Yaden works in both The Positive Psychology Center and The Center for Cognitive Neuroscience. His research focuses on the psychology, philosophy, and neuroscience of spiritual, self-transcendent, and other positively transformative experiences. Specifically, he is interested in understanding how these experiences can result in long-term changes to well-being and how they alter fundamental faculties of consciousness such as the sense of time, space, and self. He is the editor of *Being Called* and is currently writing a book called *The Varieties of Spiritual Experiences: A Twenty-First Century Update*. His work has been covered by *The New York Times*, *The Wall Street Journal*, *The Washington Post*, *New York Magazine*, and *NPR*.



Sures Kumar

Speculative Designer at Google AI

Sures Kumar is an interaction designer and a recognized digital artist, specializing in speculation design. He works in Google's Research and Machine Intelligence team (Google AI) to advance new, human-centered artificial intelligence experiences. Kumar has led interactions for multiple high profile projects like TensorFlow and next generation Google Lens and has also contributed to Google Pixel Camera, Android, Google Play and G Suites. Prior to Google, Kumar worked at Microsoft where he designed Microsoft Office mobile apps and interactive museum installations. Kumar's works have been exhibited internationally across various galleries, referred in academic books and featured in magazines like *Wired*. www.sureskumar.com



Susan Schneider

Director of AI, Mind and Society ("AIMS") Group, The University of Connecticut.

Susan Schneider writes about the nature of the self and mind, especially from the vantage point of issues in philosophy, AI, cognitive science and astrobiology. In her new book, *Artificial You: AI and the Future of the Mind* she discusses the philosophical implications of AI, and, in particular, the enterprise of "mind design." Her work in philosophy of AI has now taken her to the Hill (Washington, DC), where she will meet with members of Congress on AI policy. Schneider appears frequently on television shows, and writes opinion pieces.



Courtney D. Cogburn

Associate Professor of Social Work at Columbia University

Courtney D. Cogburn employs a transdisciplinary approach to examining the role of racism in the production of racial inequalities in health. She is on the faculty of the Columbia Population Research Center and a faculty affiliate of the Center on African American Politics and Society and the Data Science Institute. She has focused on examining the effects of cultural racism in the media on acute physiological, psychological, and behavioral stress responses as well as associations between chronic psychosocial stress exposure and Black/White disparities in cardiovascular health and disease. She is also developing a project using data science to explore links between media-based racism and population health.



Noam Cohen

Journalist and Author

Noam Cohen is a journalist and author of *The Know-It-Alls: The Rise of Silicon Valley as a Political Powerhouse and Social Wrecking Ball*, which uses the history of computer science and Stanford University to understand the libertarian ideas promoted by tech leaders. While working for *The New York Times*, Cohen wrote some of the earliest articles about Wikipedia, bitcoin, Wikileaks, and Twitter. He lives with his family in Brooklyn.



Robin Hanson

Associate Professor of Economics at George Mason University

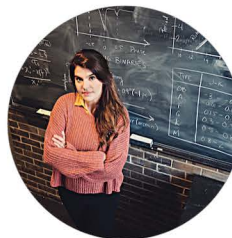
Robin Hanson is an associate professor of economics at George Mason University. He is an expert in idea futures and markets, and he was involved in the creation of the Foresight Institute's Foresight Exchange and DARPA's FutureMAP project, and is currently a chief scientist at Consensus Point.



Elizabeth Parrish

CEO of BioViva

Elizabeth Parrish, the Founder and CEO of BioViva, is a leading voice for genetic cures. As a strong proponent of progress and education for the advancement of regenerative medicine modalities, she serves as a motivational speaker to the public at large for the life sciences. Dedicated to the cause of improving and safeguarding more and more lives, Elizabeth asserts, "We are focused on saving as many lives as possible by making tomorrow's therapies available. This is about Life and Death. Risk aversion and the delaying the approval of therapies that have been successful in research simply kills."



Melinda Soares-Furtado

NSF Graduate Research Fellow at Princeton Astrophysical Sciences

Melinda Soares-Furtado is a National Science Foundation Graduate Research Fellow in the Department of Astrophysical Sciences at Princeton University. Soares-Furtado built an image subtraction pipeline that reveals exoplanets, eclipsing binaries, pulsating stars, and rotational variables in stellar clusters. She is also interested in how close-orbiting planetary companions impact the evolution of a host star. She builds computational models to investigate these effects. Soares-Furtado is also committed to exploring the philosophical dimensions of science and technology. While she believes that efforts to advance space colonization are worthwhile, she is concerned that unbridled optimism has led to a faulty conclusion: that if all fails on Earth, we have an escape hatch.



Francesca Ferrando

Philosopher of the Posthuman

Francesca Ferrando teaches Philosophy at NYU-Liberal Studies, New York University. A leading voice in the field of Posthuman Studies and founder of the NY Posthuman Research Group, she has been the recipient of numerous honors and recognitions, including the Sainati prize with the Acknowledgment of the President of Italy. She has published extensively on these topics; her latest book is *Philosophical Posthumanism* (Bloomsbury 2019). In the history of TED talks, she was the first speaker to give a talk on the topic of the posthuman. *US* magazine "Origins" named her among the 100 people making change in the world. More info: www.theposthuman.org



Umer Hassan

Assistant Professor of Electrical and Computer Engineering at Rutgers

Dr. Umer Hassan is an assistant professor at Rutgers University. Previously, he worked as a Research Scientist in the Department of Bioengineering at University of Illinois Urbana-Champaign (UIUC) with a Research Affiliate appointment at Carle Foundation Hospital, Urbana. Dr. Hassan completed his B.Sc in Electrical Engineering from UET, Lahore and M.S. and Ph.D. studies in Electrical and Computer Engineering from UIUC in 2015. His research has been focused on developing point-of-care (PoC) translational biosensors for infectious disease diagnostic applications. In 2014, Dr. Hassan cofounded a startup, Prenosis, Inc. that is working on commercializing his developed biosensors.

SPEAKERS



Whitney Huang

Embedded Software Engineer at Zipline

Whitney Huang is an Embedded Software Engineer at Zipline, a high-speed drone medical delivery company. She was formerly the president of the Princeton Rocketry Club and Princeton Robotics Club, and has built everything from underwater ROVs to sensors for soft robotics to autonomously controlled quadcopters. She is passionate about using technology to tackle important problems our world faces today. She got her degree in Mechanical Engineering from Princeton University.



Nathan Danielson

Software Engineer at CTRL-Labs

Nathan Danielson graduated from Princeton University with an AB in mathematics and a certificate from PACM. He spent a year working as a computational neuroscience research assistant, and from there did his MD/PhD at Columbia, where he received a degree in neurobiology and behavior; his doctoral research was in hippocampal learning and memory. After graduation in 2017 he joined CTRL-labs, where he manages a team of neuroscientists and engineers working to build a wearable neural interface to support the next generation of computing platforms.



Wei Liu

Head of ML at Nuro

Wei Liu is the Head of Machine Learning at Nuro, leading the effort of applying machine learning to the whole autonomy stacks, including mapping, perception, prediction, and planning, etc. Before that, he was a Ph.D. student with Prof. Alex Berg at UNC Chapel Hill, working on large scale object classification and object detection, such as GoogleNet and SSD, he was also the organizer of ImageNet Challenge in 2015 and 2016, and received Google Ph.D. fellowship.



Daniel Elton

Staff Scientist at the National Institute of Health

Daniel Elton is a staff scientist at the National Institutes of Health, where he works on applying deep learning and AI to medical imaging. Previously he worked as a postdoc at the University of Maryland, where he researched applications of deep learning to molecular design. Originally from upstate New York, he earned a Ph.D. in physics from Stony Brook University in 2016 and has a bachelors degree in physics from Rensselaer Polytechnic Institute. His website is www.moreisdifferent.com.



Rachel McClure

Grad Research Fluno Fellow at Uni of Wisconsin-Madison in Astronomy

Rachel McClure is a Graduate Research Fluno Fellow at University of Wisconsin-Madison in the Astronomy Department. Her prior work isolated contributions to the motion of the plasma in the photosphere of the sun. Currently, she works on measuring the orbital and rotational velocities of variable stars to identify blue stragglers and other binary system remnants in clusters. She is passionate about science education and improving public attitude towards the natural sciences. With a B.A. in Philosophy and Astrophysics, McClure is especially interested in the interplay of ethics and scientific exploration at this pivotal time of increasing astrophysical exploration where ethical theories will serve as a tool for developing a more equitable, globalized society.

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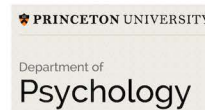
We would like to thank our generous sponsors for making the Envision Conference possible. With their support, Envision continues to urge future leaders, engineers, entrepreneurs, and policymakers to pioneer a brighter future.



Growing customer expectations. Market-shaping AI. Self-optimizing systems. The post-digital age shows no signs of slowing down, and the need for new ideas powered by intelligent technologies has never been greater.

But a vision for the future can't be realized without know-how. We partner with our clients to drive real innovation—the kind that turns an idea into an industry—helping them transform and grow their organizations.

While every business challenge is unique, we believe that innovative people—enabled by technology—can find surprising solutions. From ideation and development to the launch and scale of a solution, we step in when and where clients need us most.



OUR TEAM

Our team has been hard at work putting together "The Future Of Us", and we are excited for you to experience it. Be sure to say hi, we would love to meet you!

Presidents

Elizabeth Petrov
Amichai Feit

Directors

Addison Jung
Michelle Woo
Kyra Acquah

Logistics

Sophie Goldman
Jacqueline Xu
Jeremy Bernius
Sophia Martinez
Jordan Bowman-Davis
Anya Sharma

Speakers & Programming

Iroha Shirai
Rohan Jinturkar
Lindsey Moore
Thomas McBride
Aditya Gollapudi
Colton Wang

Participant Outreach

Ben Gelman
Mayu Takeuchi
Aliza Haider
Aneesha Manocha
Samuel Li

Digital Media & Design

Miguel Opena
Diana Zhang
Shriya Bhatt
Sowon Lee
Joshua Spergel
Anna Lyubarskaja

Finance

Ritvik Agnihotri
Brendan Wang
Hanna Xu
Nina Onyemeziem

Advisors

Baran Cimen
Noa Zarur
Andrew Spencer
Luca Rade

STAY IN TOUCH

We are not only an annual gathering of leaders, thinkers, and individuals interested in the future of technology - **we are a community that wants to make the world a better place.** We urge you to continue to stay involved in the community.

Ways to stay in touch:

- Continue the conversation in the Slack group and on the Facebook page
- Join our monthly Newsletter, to begin post-conference
- Participate in our other exciting new initiatives, such as our Article Series and Podcast
- Start Envision groups in your own schools and institutions
- Continue the discussions and projects started here long after this conference is over

Don't hesitate to reach out, we would love to hear from you - send us updates, suggestions for new events, meetup opportunities, and more!



www.envision-future.org/community

info@envision-future.org

