

# GOOD SYSTEMS ANNUAL REPORT 2020



# **GRAND CHALLENGES ARE MOONSHOT GOALS**

To reach those goals and address the most urgent issues affecting our society, researchers from different disciplines must share knowledge, ask questions, and tear down academic barriers.

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# Bridging Barriers

we are bridging barriers between fundamental knowledge and real-world problems by connecting disciplines, techniques, and ways of thinking.

In 2016, The University of Texas at Austin introduced an initiative with one overarching mission: break down academic silos and foster research that addresses the toughest questions facing humanity and the world. issues — and figuring out the best way to solve them in less than a decade.

Bridging Barriers serves as an incubator for some of the boldest interdisciplinary projects at UT by supporting researchers from across the Forty Acres as they form broad teams tasked with identifying urgent, realworld These projects are rooted in collaboration and academic freedom to produce practical solutions to social, environmental, and humanitarian crises. From artificial intelligence to climate change to health inequity, teams around campus are working on solutions to some of the greatest problems of our generation.

To learn more about Good Systems and all of UT's research grand challenges, visit the Bridging Barriers website.

# From the chair

Designing Ai technologies that benefit society is our grand challenge.

"Grand challenges involve thorny issues with significant intellectual and societal implications that require collaboration across many fields to make substantial advances."

As I look back on the past year — our first year as a UT Grand Challenge — I can't help but reflect on how amazing it has been to collaborate with such a diverse array of exceptionally talented colleagues from across campus. Most research projects focus on a singular or very narrow set of research questions. Understanding the ethics of artificial intelligence goes beyond what is possible within one research project, however. And given the increasing importance of AI in our everyday lives, it is indeed a worthy focus for a grand challenge.

Over the past year, we have made strong progress toward our initial, critical goal of creating an inclusive research environment that informs the design and implementation of ethical AI. In that time, our team has funded projects that address timely issues affecting not only our country but also our world — from using AI to track COVID-19 in major metropolitan transportation systems to uncovering the sources of electoral disinformation campaigns. Our efforts also have been recognized beyond the Forty Acres, resulting in awarded external grants, ongoing contributions to a national public interest technology dialogue, and a new partnership with the City of Austin.

We are fortunate at The University of Texas at Austin to have tremendous strengths in many fields, including — but not limited to — the social sciences, the humanities, and technical fields. As a grand challenge, Good Systems has facilitated collaborations among faculty with a wide range of backgrounds and expertise to further its goals. It's not often you find mathematicians and roboticists working closely with communication and English scholars.

We have big things ahead, which we will share with you in this report. The 160+ researchers within the Good Systems network — in addition to more than a dozen partners and sponsors in our first year — are a testament to what we hope to accomplish. Please join us.

#### Kenneth R. Fleischmann, Ph.D.

Professor, School of Information Good Systems Inaugural Chair, 2019-2020



September 2016

UT envisions a campus-wide interdisciplinary grand challenge program and invites researchers to submit concept papers for topics that span all disciplines.

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September 2019

Good Systems launches. UT scientists, technologists, and humanists build a team that will create an ethical framework by which to design and develop beneficial AI technologies. Year 1 projects begin.

February 2020 Good Systems begins collaborating with the City of Austin, laying the groundwork for seven joint projects that will enable the City and UT to share expertise and resources to address local challenges ethically and efficiently.

# March 2020

# September 2020

Thanks to a Year 1 grant from the Public Interest Technology University Network (PIT-UN), Good Systems organizes and hosts the inaugural PIT-UN Informatics Education Conference. Researchers and educators from 30 institutions plus government, nonprofits, and industry strategize about preparing students for technology careers that serve the public sector. Subsequently, Good Systems is awarded a PIT-UN Year 2 grant to found the PIT-UN Social Justice Informatics Faculty Fellows Program.

Eight principal investigators are named to direct new research focus areas, which build inter- and transdisciplinary communities of practice around specific topics related to AI. These research focus areas, a novel resource at UT, will enable researchers to find peers with common interests. Year 2 projects begin.

# October 2020

Good Systems hosts its first Annual Symposium to share the results of Year 1 projects with UT colleagues and industry partners.







# What are good systems?

AI-based systems should be developed in accordance with broadly accepted values. These socially beneficial, AI-based technologies are what we call "good systems." We've come to depend on artificial intelligence in nearly every industry and rightly so: they can outperform humans' ability to analyze and find trends in vast amounts of data and make predictions, but advances in AI technologies have brought us to a crossroads. With their benefits come unintended — and often adverse — consequences.

These consequences have included unemployment, election disruption, an over-reliance on biased datasets and algorithms, privacy infringement, and economic inequality — among others.

That's why AI-based systems need to be developed in accordance with broadly accepted values, such as transparency, agency, trust, equality, and justice. These socially beneficial, AI-based technologies are what we call "good systems."

Current Good Systems Chair Junfeng Jiao, associate professor in UT's School of Architecture, leads a team of researchers designing robots that perform contactless deliveries on campus. They rely on a long-term autonomous navigation system that takes into account the permanent features of the environment, like buildings, while using on-board cameras and LiDARsensing technology to detect realtime changes — from construction to cars, pedestrians, and cyclists. The long-term benefit of the research is learning how to design robots that can adapt to rapidly changing conditions. "The challenge of robotics today is to move robots from doing only repetitive work toward existing successfully in a real world full of unpredictability," says Peter Stone, Department of Computer Science professor and director of Temas Robotics.

Our goal as a University of Texas at Austin Grand Challenge is to systematize a way of designing AI technology that meets society's needs and values. We will do this by developing, refining, and testing socio-technical research that supports ethical human-machine partnerships in real-world applications.



# **GOOD SYSTEMS HIGHLIGHTS**

# **EXPANDING NETWORKS**

**370** University of Texas departments and units 160+ Good Systems active members

> external partners

hosted events

# **ENGAGING STUDENTS**

66 undergraduate & graduate student researchers

18 students enrolled in the Good Systems signature course

# IN NUMBERS FY2020



Year 2 Projects

Year 1 Projects

News articles, op-eds, blog posts, & university stories 30+ Scholarly works

# **BUILDING CAPACITY**



Contributed expertise to more than \$22.5M

in externally funded projects and centers across UT over \$1M Internal funding distributed to research project

teams across 19 \_\_\_\_\_ colleges, schools & units Aerospace Engineering and Engineering Mechanics Associate Professor Luis Sentis, part of the Good Systems network, focuses on advancing human-friendly robots that are flexible, safe, and mobile.

# Mobilizing human-machine partnerships

We develop, test, refine, and disseminate basic and applied research in AI-based socio-technical systems, which means we are constantly paying attention to how society influences the development of technology and how the development of technology influences society. This means developing new notions of what ethical AI technologies are and can be; designing

replicable methods for how they can be built across industries; and sharing functional ways for society to judge their utility. In the last year, Good Systems has made advances in four strategic areas that support our grand challenge mission while reinforcing UT's role as an academic leader in artificial intelligence, robotics, and machine learning.

Advances in Critical Science: Focus on research innovation in humanmachine partnerships that addresses the needs and values of society.

Good Systems is engaged in research that will improve the way humans and machines work together, ensuring that technological innovations serve the ethical needs and values of society. Making UT a Public Interest Technology Hub: Enable an inclusive, interdisciplinary environment to support research and education in humanmachine partnerships.

With Good Systems, UT is positioned to become a hub and training center for public interest technologists with special expertise in the responsible development of good systems that repair, reinforce, and advance — rather than damage — our social fabric.

Starting at Home: Enable frameworks, best practices, and methodologies to address ethical issues in the design and implementation of AI technologies.

Good Systems is forming critical partnerships with industry and government agencies to help design AI technologies that respond directly to pressing issues while benefitting multiple stakeholders simultaneously and ethically. Citizen Empowerment: Enhance the understanding of how to use, legislate, and regulate Al technologies.

We work with technology users to understand how they perceive, interact with, and understand AI so they can be empowered to make changes that will lead to better, safer technologies.

# Our network

We recognize that our network both within and outside UT—is our greatest asset and will enable us to produce our best work because no single entity has all the knowledge and resources needed to address a topic as broad and imminently demanding as values-based AI. For Good Systems, this means connecting UT researchers in three ways: to each other on campus; with colleagues at top universities; and to subject matter experts from corporations, government agencies, and community organizations.



Explore <u>our network map</u> or browse the <u>team list</u> on the Good Systems website to see how our connections are contributing to our overall mission of designing AI technologies that benefit society.

# Advances in critical science

Good Systems is focused on research innovation in human-machine partnerships that addresses the needs and values of society. How AI and humans can interact for 'good' outcomes is a complex and multifaceted question that demands new paradigms and ways of thinking.

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surveillance to medical diagnoses, will involve human-machine partnerships but the design and development process that gets us there isn't merely mechanical or logical. Instead, it's informed by each technologist's own biases and lived experiences, not to mention the influence of corporate or government interests. That means an AI technology intended for one purpose could be used in a way that harms certain groups, whether intentionally or not.

We can—and must—reduce the potentially harmful effects of AI, and to do so, we must empower technologists with

critical perspectives and understanding well beyond the view of single disciplines. Good Systems explores how to train the next generation of technologists to be more ethically grounded while simultaneously prioritizing the production of new knowledge that can lead to consequential outcomes across all fields and industries.

Good Systems' socio-technical research digs into the messy (and not always obvious) ways that we can inadvertently create bad AI, and a unifying element across all of Good Systems' scholarly contributions is a Define-Evaluate-Build approach:



# Define

What does it mean for a system that uses AI technology to be good? Values are different across individuals and groups of people and change over time. What defines "good" as it relates to AI and its uses?

# **Evaluate**

Once an AI technology is in use, how do we decide if it is good? Creating an accepted framework, adopted widely across academia and industry, can be the critical starting point for determining if new and existing AI technologies meet established criteria for a "good system."

# Build

How can we ensure that the systems we build will be good? Developing innovative educational approaches for teaching design that cross disciplines and prepare the future workforce to build productive human-AI partnerships is a clear path forward.

# Building a Foundation for Collaboration, Innovation, and Research

But creating this kind of scholarly framework first requires a type of teamwork uncommon within traditional academic units. Grand challenges not only strive to make measurable contributions toward major societal issues but also to forge collaborations ambitious enough to produce them in the first place—on our own campus, in Austin, and with colleagues and scholars around the world.

# Institute for Foundations of Machine Learning

In August 2020, the National Science Foundation announced that UT would be home to its new Institute for Foundations of Machine Learning, which is poised to make the university a world leader in tech innovation. Institute researchers will develop new classes of algorithms that will lead to more sophisticated and beneficial Al technologies. And Good Systems has been named as the institute's AI ethics partner. Grand challenge leaders designed the ethics plan that will inform the institute's project proposals and will offer colloquia that will act as a springboard for future collaborative research. Department of Computer Science Professor Adam Klivans, who led the effort to win the NSF Al institute competition and serves as a

Good Systems research director, will direct both the <u>Institute for Foundations of</u> <u>Machine Learning</u> and the university's new <u>Machine Learning Laboratory.</u>



# **Disinformation Network**

In July 2020, as the election season was in full swing, we established a network for researchers interested in disinformation and misinformation looking to connect with colleagues. Within one week, 45 members from UT and beyond joined, and two researchers who met through the network have already produced a collaborative paper published in The Harvard Kennedy School (HKS) Misinformation Review. **Read the research.** 

# City of Austin

We are also creating valuable human-machine partnerships to solve problems in our neighborhoods, including using computer vision to detect needed infrastructure repairs that traditionally go unreported or unresolved in marginalized communities. As city employees work in tandem with machines, they will be able to identify critical repairs and improvements in areas that are systemically underserved. Good Systems' wide network of humanists

and technologists makes this possible by creating a space where experts across computer science, engineering, social work, and city planning can expand their cultural, historical, and philosophical perspectives while designing realworld solutions. Good Systems researchers from the Department of Computer Science will present their findings at the 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems.

"Simply understanding the algorithms that form the basis of Al-based technologies does not, by itself, prepare someone to anticipate the implications of how people will interact with that Al. Similarly, knowing the implications of Al alone does not equip a person to improve its design."

- Kenneth R. Fleischmann, Ph.D.

Good Systems Inaugural Chair

# Making UT a public interest technology hub

Good Systems enables an inclusive, interdisciplinary

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# environment to support research and education in human-machine partnerships.

Traditionally, academic fields encourage deep expertise with a tightly focused scope, and this has and will continue to serve an important purpose. However, the technologists of tomorrow need to balance specialization with the ability to evaluate problems from multiple points of view. They need to be public interest technologists.





# **Good Systems Serve the Public Interest**

# Joining the PIT-UN

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The Ford Foundation, Hewlett Foundation, and New America identified the need for a new generation of scholars and professionals who can deploy technology for the public good. Together, they launched the Public Interest Technology University Network (PIT-UN) in 2019. It is now a formal association of 43 colleges and universities committed to supporting curricula and academic programming that foster a new generation of civic-minded scientists and engineers. Good Systems is proud to have been key in facilitating UT's participation as one of the 21 charter members and to have received a grant from PIT-UN's inaugural funding cycle to convene public interest technology scholars across the country for a conference in March 2020.

The Urban Health **Risk Mapping** project leverages crowdsourced data and machine learning technologies to predict the census tract-level health outcomes in Austin, Baltimore, Boston, Dallas, Washington, D.C., Houston, Los Angeles, New York City, San Antonio, and San Francisco.

#### Actual



"Public Interest Technology adopts best practices in human-centered design, product development, process re-engineering, and data science to solve public problems in an inclusive, iterative manner — continuously learning, improving, and aiming to deliver better outcomes to the public."

- New America

#### Census Tract-Level Health Outcome (Obesity) in Austin, TX

Predicted



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# Designing Smarter Cities

Good Systems researchers used machine learning to map the probability for certain major health risks — from obesity and cancer to heart disease — in 10 U.S. cities. Algorithms predict how much certain community modifications, such as increasing greenspace or housing density, reduce or amplify those risks. The team, spanning Architecture, Nursing, UT Libraries, and TACC, correlated data from the U.S. Centers for Disease Control and local 311 calls with information about neighborhoods' socioeconomic variables and built environments — such as the presence or lack of trees, sidewalks, and bike lanes. City planners can use the portal to adjust those variables to see how infrastructure modifications will affect the prevalence of disease. **Read the research.** 

# Machine Learning for the Developing World

Maria De-Arteaga, assistant professor in McCombs' Information, Risk, and **Operations Management Department**, was working as an investigative journalist as an undergraduate student when she realized that data mining and machine learning could help uncover social problems in the developing world. She was looking into a highway that Brazil had built through the Amazon rainforest to reach a port on the Pacific Ocean. She was scanning hundreds of contracts and spreadsheets, hunting for financial anomalies between what the contracts promised and what was actually delivered. She thought machine learning would more quickly allow her to recognize patterns and irregularities in the data, speeding up the process.



De-Arteaga did find inconsistencies and also discovered connections between the construction process and a rise in environmental concerns and local criminal violence.

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Inspired by that experience, De-Arteaga launched an annual workshop called ML4D — Machine Learning for the Developing World — where researchers from across the globe come together physically (and now virtually) to talk about the ways they use machine learning to tackle pressing issues, from deploying ML technologies in developing communities to sustainability to — most recently disease outbreak preparedness.

"When we talk about machine learning, we are actually talking about taking a large amount of data, using math models to find statistical patterns in the data, then using those patterns to make predictions and assessments when we encounter future data," De-Arteaga says. "The main thing that motivates me and my work is understanding how we can use machine learning for positive societal impact." **Read more.** 

Maria De-Arteaga: "When we talk about machine learning and AI, it's easy to imagine this sci fi, impossible-to-understand technology. But behind all the mysticism are math and statistics."

# Fostering Early Careers

Graduate students and postdoctoral fellows have seen their career options grow after joining the Good Systems research network.

School of Information graduate student Tina Lassiter discovered Good Systems after taking a course in Ethics and AI as part of her master's program. She then joined Good Systems' Bad AI & Beyond project, which examined human perceptions of Al in popular media. She interned with the technology company KUNGFU.Al as part of a capstone project, looking into how companies can implement Al more responsibly. She credits Good Systems with introducing her to a possible career path she would have never considered. "It's cool what Al can do, but it raises a lot of red flags," Lassiter says. "Building educational and career pathways for future technologists who prioritize advancing the public good is one of PIT-UN's central goals. UT Austin, as one of 21 original PIT-UN charter members, has taken leadership roles in advancing this work."

> - Eric Meyer, Ph.D. Dean, School of Information

"We really need to ensure people are aware of what issues there are and try to use AI for good and not only for profit."

Postdoctoral fellow Tara Zimmerman, also in the School of Information, had



**Tina Lassiter,** Information Studies graduate student and public interest technologist, studies ethical and legal questions surrounding big data and privacy.



been researching what she calls "online social noise," or how people choose to post or respond to content based on what they feel other people will think about them. She saw how her work aligned with Good Systems' mission and joined an ongoing project to understand how older adults receive and respond to COVID-19 misinformation. She hopes to continue working with the grand challenge long term. "That Good Systems focuses on making sure technology actually does some good in the world and is helpful to the humans who use it gives me real hope for the future."

**Tara Zimmerman**, School of Information postdoctoral fellow, is developing a Social Noise framework to understand misinformation on social media.



# PIT-UN Conference on Undergraduate Informatics Education

"Artificial intelligence and its related, emerging technologies are affecting every aspect of human life. Good Systems

Held March 3-4, 2020 on the UT campus, this inaugural conference funded by a PIT-UN grant explored how to prepare undergraduate students for careers in the public and non-profit sectors, particularly in support of social justice. Participants represented 30 universities and colleges, including major public research universities, minority-serving institutions, polytechnic universities, community colleges, and Ivy League schools, as well as companies, nonprofit organizations, and government agencies. **Read more.**  understands this, and the team's interdisciplinary approach enables us to work with faculty experts from the LBJ School, Moody College of Communication, College of Fine Arts, and the College of Natural Sciences. Good Systems sets a template for the future of higher education in an Al-driven world."

> - Will Griffin, Chief Ethics Officer. Hypergiant Industries



# Starting at home

Good Systems acts a pool of knowledge and resources to enable frameworks, best practices, and methodologies to address ethical issues in the design and implementation of Al technologies. As we prepared to launch our grand challenge in Year 1, we knew it was critical to build partnerships with the agencies and organizations implementing AI technologies in realworld environments. Good Systems has partnered with the City of Austin to share knowledge and resources for implementing AI-based interventions city wide.

Good Systems began holding meetings with the City to see how our expertise and interests could align to tackle local issues. We hosted a one-day workshop in February 2020, which brought together Austin police, fire, EMS, transportation, communications and other departments to see how they could work with UT researchers to harness AI to improve city processes. This laid the groundwork for the seven collaborative projects that Good Systems will embark on in the coming years, such as optimizing EMS response during hazardous events and using artificial intelligence to improve access to social services for people experiencing homelessness.



School of Architecture Associate Professor Junfeng Jiao (right) talks with James Snow, assistant director of Public Works at the City of Austin, during the AI and Machine Learning for Social Good for Policy Makers in February 2020.

# Austin to Become a Better 'Laboratory' for UT Research Under Interlocal Agreement

The work will benefit from a \$7.5 million master interlocal agreement between the City of Austin and The University of Texas, which the City Council unanimously approved in August 2020. Key leaders in Good Systems and the Office of the Vice President for Research paved the way for this partnership. The agreement will streamline the City's ability to contract and collaborate with UT researchers on unique data sharing and assessment initiatives. The agreement benefits UT by giving faculty a real-world 'laboratory' while helping the city meet the critical needs of its residents. **Read more.** 

"By collaborating on seven Al research projects with city staff, Good Systems demonstrates that UT Austin and the City of Austin are further enhancing a mutually beneficial relationship for the benefit of our community."

- Austin Mayor Steve Adler

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# AI/ML for Social Good Project Design Workshop

In February 2020, Good Systems hosted a joint workshop with the City of Austin to explore how we could work together in the coming years. Attending the workshop were 45 City of Austin employees from 19 departments and 36 UT researchers representing 15 academic departments and units. UT's School of Design and Creative Technologies facilitated the workshop using design thinking methodology to identify overlapping interests among participants and form groups to embark on specific projects. Teams had a month to formalize and submit proposals, which formed the foundation of our seven joint City of Austin projects, kicking off this year.

# **Our Partners**

Community organizations, as well as some of the biggest technology companies and government entities in Austin and around the world, have supported Good Systems' work by hosting hackathons, inviting our researchers to serve on panels, soliciting our insight about employing just practices, and establishing a career pipeline for our students to work as ethical technologists. Good Systems thanks them for their interest, engagement, and commitment to ethical AI.



Alegion Austin Energy Austin Smart City Alliance Austin-Travis County Emergency Medical Services Capacity Catalyst Capital Factory Cisco City of Austin Communications & Technology Management City of Austin Neighborhood, Housing and Community Development

City of Austin Planning and Zoning City of Austin Public Works City of Austin Transportation Facebook Developer Circle: Austin Hypergiant KUNGFU.AI MEASURE Micron Microsoft Postpartum Support International Travis County Information Technology Services

# Citizen empowerment

Good Systems promotes citizen empowerment to enhance the understanding of how to use,

# legislate, and regulate Al technologies.

To empower people to understand AI so they have the knowledge to advocate for safer technologies, participate in processes to develop human-centered AI, and vote for policies and regulations that will ensure the ethical use of AI—we must first know how people think about AI. That can include older adults, who are often susceptible to misinformation online, as well as people with different cultural backgrounds, many of whom often encounter discrimination through technologies like facial recognition software and even digital assistants.

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We have spent our first year engaging in projects to help understand how these groups interact with AI, including researching how Black and Latinx kids use technologies like Alexa and Siri, and exploring how people were misled by online misinformation during the 2016 presidential election. Each of these projects will increase our awareness about how people use AI, which ultimately helps us empower the public to advocate for technologies that meet the needs and values of society.

# Bad AI & Beyond

"Bad" Al means different things for different people, whether it's robots taking over the world or social media taking over our lives. A team led by Department of English Associate Professor Sam Baker is examining how media representations in film, TV, and prose shape popular perceptions about Al, including what possibilities they offer and what biases they create. The team, which includes Department of Radio-Television-Film Associate Professor Suzanne Scott and Department of Computer Science Instruction Professor Paul Toprac, has held focus groups and surveyed 1,000 students and found that most see media representations of AI as unrealistic. Respondents actually had little concern about AI doing things like taking over the planet. In the summer of 2020, Good Systems funded undergraduate students so they could create their own short films, poetry, and short stories depicting their perceptions of AI. These works debuted at a virtual festival in October. You can find them on their **website.** 



As digital assistants like Siri and Alexa

typically white women's voices, as well as

become more common in our lives, people increasingly see them as companions that accompany them throughout their day. Young children, especially, are more apt to see these devices as real people or friends. School of Journalism and Media Professor S. Craig Watkins says that's why it is more important than ever that these devices reflect the diverse backgrounds of their users. Watkins and his team have been interviewing Black and Latinx children, ages 8 to 12, to see how they experience digital assistants. Researchers are looking at issues with digital assistants' programmed voice options, which are

how the technologies may struggle to answer culturally specific questions about race and racism. The team's ultimate goal is to be able to pass the research findings on to developers so they can design technology that is more inclusive.

"There's a lot of hype and hope about artificial intelligence and how it can benefit humankind and transform society in ways that are impactful and that empower us to create more equitable outcomes," says Watkins. "But it's not going to do that on its own. It's only going to do that through the human ingenuity and human intentionality." **Read more.** 

# Disinformation in the 2016 Election

Social media platforms like Twitter and Facebook failed to manage or curtail content posted by Russians that was meant to influence the 2016 presidential election outcome. These platforms' algorithms can only respond to this kind of interference if they know what they are looking for, and many times they don't. A team led by School of Journalism and Media Professor Sharon Strover set out to locate this "bad" content, analyzing roughly 3,500 Russian-originated Facebook ads posted during the 2016 election. As part of the project, the research team has examined the techniques and appeals used in the ads to understand more about how they circulate on social media.

discovered these ads had little to do with sensible logic. Instead, they were meant to elicit emotional reactions that compelled people to share that content more broadly. Those with positive sentiments led to more clicks and more sharing. Another study has found that Russians used more negative appeals when they were posing as leftleaning trolls or targeting Black users and lesser forms of manipulating when they were posing as right-leaning trolls. The ultimate goal of the ongoing work is to detect and mitigate the harmful effects of disinformation. Through this research, people could be encouraged to call upon their governments to further regulate political content shared online.

Good News, Bad News: A Sentiment Analysis of the 2016 Election Russian Facebook Ads International Journal of Communication

"We argue that 'fake news' insufficiently describes the Russian disinformation campaign. Our analysis of Facebook ad texts shows that they incorporated emotional appeals differently at unique moments in the 2016 political campaign." **Read the research.** 



"We are already actively working with Good Systems researchers to implement frameworks around the ethical use of AI, which is a top priority for us. Good Systems is elevating the awareness of the importance of ethical AI and advancing state-of-the-art of thinking about the topic."

> - Stephen Straus, Managing Director KUNGFU.AI

Government's Al Principles Overlook Two Important Issues By: Peter Stone, Ph.D.

"Al can make people more productive and efficient, but only those with access to these technologies (along with the computational resources and large-scale data that fuel them)." **Read more.** 

# The Grand Challenge of Ethics and Al

In October 2019, Good Systems hosted a fireside chat with Tim Hwang and School of Journalism and Media Professor Sharon Strover. Hwang, former director of the Harvard-MIT Ethics and Governance of Al Initiative, researches and writes about the social implications of artificial intelligence. A poster session and reception followed so guests could meet Good Systems research teams and learn about projects that launched in 2020.

# The Truth About Killer Robots: Al in the Media

Also in October 2019, Good Systems hosted an Alamo Drafthouse screening of the film "The Truth About Killer Robots," a documentary that explores the many ways in which artificial intelligence is taking over people's lives and making humans increasingly obsolete. This was followed by a panel discussion with the film's director Maxim Pozdorovkin and members of the UT Good Systems grand challenge team.



# Fighting COVID-19

In early February, with only 13 confirmed cases of COVID-19 in the United States, Good Systems grand challenge researchers were already anticipating the societal implications of a disease that has now come to dominate our lives. Since that time, our diverse team of researchers from across the Forty Acres and beyond has continued to pivot to COVID-19 research because we understand the urgency. Today, our teams are working on everything from mapping the spread of coronavirus through transportation systems to helping health care workers to communicate news. To date, Good Systems researchers are leading more than a dozen projects related to COVID-19.

# Trust in Public Health Information During a Pandemic

With a National Science Foundation Grant, School of Information Professor and Good Systems Inaugural Chair Kenneth R. Fleischmann has been examining the role social media plays in the public's understanding of and response to the pandemic. His team, which includes School of Nursing Professor Bo Xie and School of Information Assistant Professor Min Kyung Lee, has distributed surveys and conducted experiments to understand the effectiveness of different health messages, coming up with a set of recommendations to guide public health officials as they tailor those messages for a particular audience based on things like age and ehealth literacy. The goal is to help healthcare workers as they encourage people to take appropriate actions that will reduce the spread of the coronavirus.

The ongoing health crisis is also an information crisis. **Read more.** 

"Trust in Public Health Information During a Pandemic" is funded by a **RAPID grant** from the National Science Foundation.

# Tracking COVID-19 Through Transportation Systems

When COVID-19 began spreading around the globe in early 2020, Community and Regional Planning Associate Professor and Good Systems Chair Junfeng Jiao decided to look at the transportation system as a way to predict virus spread. He and two research associates in UT's Urban Information Lab began gathering commuter train and highway traffic data from across New York state to determine where the virus would strike next: greater New York City. They did this by ranking the severity of disease spread in each of New York's 62 counties, using the numbers of confirmed cases and deaths and comparing them with population density. They then created a giant network model using train and highway trips both within and between counties to forecast the state's next hot spots. The model was duplicated to look at other parts of the

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United States, including Texas, identifying the next crisis areas. **Read more.** 



Learn more about the team's findings in <u>New York City, New York State, Texas,</u> and the U.S.

Department of Mechanical Engineering master's student Nick Machak and Department of Aerospace Engineering and Engineering Mechanics senior Asha Jain helped build an autonomous (and contactless) delivery system on the UT campus during the COVID-19 pandemic, which ferries lemonade to people who place an order via a mobile app.

# Improving the Lives of Postpartum Mothers

We anticipate that one of the enduring effects of the COVID-19 pandemic will be a drastic rise in mental health cases, and this will necessitate more inventive ways to deliver care, including the use of technology. UT's Institute for Media Innovation is designing a chatbot that can assist individuals dealing with postpartum depression. To do this, the team will combine insights from user interviews with natural language processing analyses of text messages exchanged between caregivers at risk of postpartum depression and postpartum support providers. People who experience postpartum depression often struggle with acknowledging their condition or they may feel guilt. A chatbot makes it more likely that people with postpartum depression will seek help. Previous research suggests that technologies that allow individuals to maintain anonymity may increase the likelihood of them divulging an illness or identifying and acknowledging symptoms important first steps. **Read more.** 



Good Systems researchers were among the more than 200 scholars from across the Forty Acres who participated in UT's COVID-19 Conference, a two-day virtual event in November 2020 with live panels, lightning talks, and poster sessions showcasing the research community's collective pandemic response.

# **UT COVID-19 CONFERENCE**

NOVEMBER 10-11, 2020 ATTEND.COM/UTCOVID19







# Looking ahead

As we enter our second year, Good Systems is coalescing our interests and expertise around a set of core research projects, which build on the initial learning and achievements of the Year 1 and 2 research projects to chart a path for implementing Good Systems' vision into the long term. In addition, we are focusing on three core tactics in the coming months: convening eight new research focus areas, expanding our City of Austin partnership, and continuing to develop foundational coursework in ethics across disciplines.

# Research Focus Areas

Good Systems has named directors for eight specific research focus areas to build communities of practice around select topics related to AI while enabling Good Systems to expand its network and engage in projects directly tied to the following areas:

# Critical Surveillance Inquiry

Work with scholars and organizations to curate conversations and exhibitions that help people understand the social and ethical implications of surveillance and explore the experiences of people who are subject to Al-based surveillance.

# Disinformation

Support an interdisciplinary community that makes monthly research presentations and sponsors special programming to advance the understanding of disand misinformation. Research improves the public's ability to identify and combat misinformation.

# Fair and Transparent Al

Work to create equitable and interpretable AI technologies that people can easily use and rely on and explore the most important strategies for responsibly developing these technologies.

# **Future of work**

Find new ways for people and Al to work together. Research explores the changing nature of how and where people work.

# Public Interest Technology

Build teams that gather public, open, and accessible data to help communities. Prioritize connecting with local organizations in Austin and Central Texas, aspiring to integrate research with policy,

# Machine Learning and Robotics

Focus on how fairness and other ethical considerations are applied in AI/ML and robotics. Ask what key foundational questions need to be solved so that machine learning and robotics can rise above their

#### journalism, and local activism.

#### current limitations.

# **Racial Justice**

Serve as a resource for education, community engagement, and research at the intersections among race, technology, and Al. Craft a framework and set of principles to mitigate the presence and effects of bias in the deployment of technological systems.

# **Smart Cities**

Develop transformative technologies that achieve resiliency and sustainable growth in urban communities while improving equity and addressing societal needs across six domains of innovation: Smart Economy, Smart People, Smart Governance, Smart Mobility, Smart Environment, and Smart Living.

The atrium of UT's Engineering Education and Research Center

1000

# Infusing Coursework with Good Ethics

In the fall of 2021, the School of Information will begin offering an undergraduate major in informatics. All six concentrations will be closely aligned with the mission of Good Systems, including: Cultural Heritage Informatics, Health Informatics, Human-Centered Data Science, Social Informatics, Social Justice Informatics, and User Experience Design. For graduate students, Good Systems Chair Junfeng Jiao is pursuing a National Science Foundation Research Traineeship program that will focus on integrating ethics and policy components into the robotics curriculum. Good Systems is also continuing its signature course, which is an introduction to the ethics of AI. 41

# Building Our City of Austin Partnership

City of Austin subject matter experts meet with Good Systems researchers at the AI/ML for Social Good Project Design Workshop in February 2020.

After our February 2020 workshop, Good Systems and the City of Austin decided to launch seven collaborative projects. These bring together experts from 12 City and 13 UT departments and units. Example projects include:



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# Optimizing EMS Responses during Extreme Events

Austin-Travis County EMS receives as many as 1,700 calls a week for ambulances, which requires the agency to make complex decisions about where and how to send out medics — a process that could be optimized through the use of mathematics and complex modeling. Department of Mathematics Assistant Professor Ngoc Tran and Department of Electrical and Computer Engineering Assistant Professor Evdokia Nikolova have been working with the City to gather EMS call history logs for neighborhoods across Austin and pair that with census and demographic data to predict the demand for medics in particular areas. The team is now feeding that information into a model that looks at supply and demand, including where ambulances are staged, how long it takes them to move between locations, and the time needed to complete calls. "We are hoping to come up with a report of how well Austin EMS is doing relative to the theoretical optimum and make recommendations about how the system could run better," says Tran.

# Austin Al Housing Analysis

Austin, like many cities cross the U.S., is struggling with a lack of affordable housing. And with more people moving to the area every day, the economic disparity will only worsen without interventions. This research project will develop a values-driven Al system that evaluates historic housing data in Austin over the last 50 years and helps policymakers shape equitable, inclusive, and sustainable plans for future growth.

Researchers will start by building a web-based repository that links demographic, development, transportation, and energyconsumption data from the last five decades. They will then conduct a historical housing analysis and use deep learning technology to build a predictive AI system that can inform future urban residential development policies in Austin.

# Inspection of City Infrastructure via Peripheral Perception

One of the main tasks of any city government is keeping infrastructure

infrastructure inspection to improve equitability, effectiveness, and efficiency. As city workers work in tandem with machines, they will become aware of community needs that people might otherwise fail to report.

such as roads, signs, accessibility ramps, and sewers in perpetual working order. The first step is timely identification of the need for maintenance. However, many infrastructure defects are left undetected and unattended for long periods of time. The City of Austin possesses several vehicle fleets that work regularly around the city, and therefore form a seamless network covering many of those inspection targets. One of our research teams will investigate how to leverage those vehicles using state-of-the-art computer vision, robotics, and data science techniques to automate



"Ye shall know the truth and the truth shall make you free" is inscribed above the entrance to UT's Main Building.

# Research Course the entrance to the entrance t

In the grand challenge's first two years, Good Systems researchers produced more than 30 scholarly works, including peerreviewed articles, preprints, conference proceedings, and presentations. Those that

KNOW

formally acknowledge financial support from Good Systems are included below with an asterisk. All academic contributions are archived on <u>Texas ScholarWorks</u>.

# Agents Teaching Agents: A Survey on Inter-agent Transfer Learning

Autonomous Agents and Multi-Agent Systems

Felipe Leno Da Silva, Garrett Warnell, Anna Helena Reali Costa, Peter Stone

view

THE REAL PROPERTY.

44

# APPLD: Adaptive Planner Parameter Learning from Demonstration

IEEE Robotics and Automation Letters, presented at the International Conference on Intelligent Robots and Systems (IROS)

Xuesu Xiao, Bo Liu, Garrett Warnell, Jonathan Fink, Peter Stone

# ASIS&T Webinar and **Discussion: The Role of Information During a Global Health Crisis**

**Association for Information Science** and Technology

Bo Xie, Daqing He, Youfa Wang, Dan Wu, Kenneth R. Fleischmann, Yan Zhang, Linda H. Yoder, Keri K. Stephens, Min Kyung Lee

#### view

**A Bibliometric Overview of Transportation Research Part B: Methodological in the Past** Forty Years (1979–2019)

**Transportation Research Part B:** Methodological

# **Balancing Individual Preferences and Shared Objectives in Multiagent Reinforcement Learning**

**Proceedings of the 29th International Joint Conference** on Artificial Intelligence

Ishan Durugkar, Elad Liebman, Peter Stone

view

**Big Data, Traditional Data, and** the Tradeoffs Between **Prediction and Causality in Highway Safety Analysis** 

45

**Analytic Methods in Accident Research** 

Chenming Jiang, Chandra R. Bhat, William H.K. Lam

view

# **A Broader, More Inclusive Definition of AI**

**Journal of Artificial General Intelligence** 

Peter Stone

view

Fred Mannering, Chandra R. Bhat, Venky Shankar, Mohamed Abdel-Aty

view

**CobWeb: A Research Prototype for Exploring User Bias in Political Fact-**Checking\*

Anubrata Das, Kunjan Mehta, Matthew Lease

A Comparison of Online and In-Person Activity Engagement: The Case of Shopping and Eating Meals

#### **Transportation Research**

Felipe F. Dias, Patrícia S. Lavieri, Shivam Sharda, Sara Khoeini, Chandra R. Bhat, Ram M. Pendyala, Abdul R. Pinjari, Gitakrishnan Ramadurai, Karthik K. Srinivasan

view

Designing Across Distributed Agency: Values, Participatory Design and Building Socially Responsible Al

PDC '20: Proceedings of the 16th Participatory Design Conference

# Cost-effective Learning for Classifying Human Values

Emi Ishita, Satoshi Fukuda, Toru Oga, Yoichi Tomiura, Douglas W. Oard, Kenneth R. Fleischmann **view** 

Evaluation of Penalty and Enforcement Strategies to Combat Speeding Offenses Among Professional Drivers: A Hong Kong Preference Experiment

Tiantian Chen, N.N. Sze, Shobhit Saxena, Abdul Rawoof Pinjari, Chandra R. Bhat, Lu Bai

view

Stephen Slota **view** 

# Exploring Ethics in the Lifecycle of Natural Hazards Open Data

45th Annual Natural Hazards Research and Application Workshop

Sharon Strover, Maria Esteva, Soyong Park

view

Fast, Accurate, and Healthier: Interactive Blurring Helps Moderators Reduce Exposure to Harmful Content\*

Proceedings of the AAAI Conference on Human Computation and Crowdsourcing

Anubrata Das, Brandon Dang, Matthew Lease

# Global Health Crises are Also Information Crises: A Call to Action

Journal of the Association for Information Science and Technology

Bo Xie, Daqing He, Tim Mercer, Youfa Wang, Dan Wu, Kenneth R. Fleischmann, Yan Zhang, Linda H. Yoder, Keri K. Stephens, Michael Mackert, Min Kyung Lee

view

# Good Systems, a UT Grand Challenge: Socially Responsible AI\*

PDC '20: Proceedings of the 16th Participatory Design Conference

Kenneth R. Fleischmann

# Good News, Bad News: A Sentiment Analysis of the 2016 Election Russian Facebook Ads\*

International Journal of Communication

German Alvarez, Jaewon Choi, Sharon Strover

view

How Do People Feel While Walking? A Multivariate Analysis of Emotional Well-Being for Utilitarian and Recreational Walking Episodes

International Journal of Sustainable Transportation

view

# Incorporating Autonomous Vehicles in the Traditional Four-Step Model

Transportation Research Record: Journal of the Transportation Research Board

Felipe F. Dias, Gopindra S. Nair, Natalia Ruiz-Juri, Chandra R. Bhat, Arash Mirzaei

#### view

Aupal Mondal, Chandra R. Bhat, Meagan C. Costey, Aarti C. Bhat, Teagan Webb, Tassio B. Magassy, Ram M. Pendyala, William H.K. Lam

Jointly Improving Parsing and Perception for Natural Language Commands Through Human-Robot Dialog

The Journal of Artificial Intelligence Research

Jesse Thomason, Aishwarya Padmakumar, Jivko Sinapov, Nick Walker, Yuqian Jiang, Harel Yedidsion, Justin Hart, Peter Stone, Raymond J. Mooney

view

# Learning and Reasoning for Robot Dialog and Navigation Tasks

Proceedings of the 21st Annual Meeting of the Special Interest Group on Discourse and Dialogue Joint Model of App-Based Ridehailing Adoption, Intensity of Use and Intermediate Public Transport (IPT) Consideration Among Workers in Chennai City

Aravinda Devaraj, Ganesh Ambi Ramakrishnan, Gopindra S. Nair, Karthik K. Srinivasan, Chandra R. Bhat, Abdul R. Pinjari, Gitakrishnan Ramadurai, Ram M. Pendyala

view

# Mapping the Spatiotemporal Patterns of COVID-19 Risk in the

Keting Lu, Shiqi Zhang, Peter Stone, Xiaoping Chen

view

# Mapping the Intercounty Transmission Risk of COVID-19 in New York State

Shunhua Bai, Junfeng Jiao, Yefu Chen

#### view

### **United States**

Shunhua Bai, Junfeng Jiao, Jiani Guo **view** 

# Modeling the Spatial Factors of COVID-19 in New York City\*

Yefu Chen, Junfeng Jiao, Shunhua Bai, Josiah Lindquist

# A Model of Deadheading Trips and Pick-up Locations for Ride-Hailing Service Vehicles

Gopindra S. Nair, Chandra R. Bhat, Irfan Batur, Ram M. Pendyala, William H.K. Lam

#### view

On Investigating the Potential Effects of Private Autonomous Vehicle Use on Home/Work Relocations and Commute Times

Michael A. Moore, Patrícia S. Lavieri, Felipe F. Dias, Chandra R. Bhat **view** 

# On Achieving (Urban) Social Equity

The Microsoft Urban Futures Summer Workshop

Wendy Chisholm, Alaysia Brown, Daniel Aliaga, Mikayla Buford, Paul Johns, Kevin Miller, Sid Espinosa, Kim Lucas, Junfeng Jiao, Roy Zimmerman **view** 

# A Penny for Your Thoughts: The Value of Communication in Ad Hoc Teamwork

Proceedings of the 29th International Joint Conference on Artificial Intelligence

Reuth Mirsky, William Macke, Andy Wang, Harel Yedidsion, Peter Stone

# Reducing Sampling Error in Batch Temporal Difference Learning

Proceedings of the 37th International Conference on Machine Learning

Brahma S. Pavse, Ishan Durugkar, Josiah P. Hanna, Peter Stone

#### view

view

Rental Housing Spot Markets: How Online Information Exchanges Can Supplement Transacted-Rents Data

Journal of Planning Education and Research

Geoff Boeing, Jake Wegmann, Junfeng Jiao

Relationship Between Socio-Demographics and COVID-19: A Case Study in Three Texas Regions\*

Yefu Chen, Junfeng Jiao

view

# Understanding the Shard E-Scooter Travels in Austin, TX

**International Journal of Geo-Information** 

Junfeng Jiao, Shunhua Bai

view

# When Going Digital Becomes a Necessity:

# The Robot Economy: Here It Comes

International Journal of Social Robotics

Miguel Arduengo, Luis Sentis **view** 

# Using Open-Source Data to Identify Transit Deserts in Four Major Chinese Cities

International Journal of Geo-Information

Junfeng Jiao, Mingming Cai **view** 

Ensuring Older Adults' Needs for Information, Services, and Social Inclusion During COVID-19

Journal of Aging & Social Policy

Bo Xie, Neil Charness, Karen Fingerman, Jeffrey Kaye, Miyong T. Kim, Anjum Khurshid



# Awards & grants

From FY19 through FY20, Good Systems researchers received \$1.9M in external grants, gifts, and awards for Good Systemsrelated research. These awards are listed below. In addition, Good Systems has also contributed its expertise to more than \$22.5M of other externally funded research projects and centers at The University of Texas at Austin to date. Good Systems' researchers contributed their expertise to more than \$22.5 million in externally funded projects and centers across UT, including the new Institute for Foundations of Machine Learning, which will reside in the Gates-Dell Complex.

#### Air Force Office of Scientific Research

# **Young Investigator Award**

"Robot Learning from Demonstration with Auxiliary Contextual Data"

# \$450,000

**Microsoft Foundation** 

Microsoft Ability Initiative \$299,786

**Micron Foundation** 

# **Advancing Curiosity Grant**

"Tackling Misinformation Through Socially Responsible AI"

# \$150,000

**National Science Foundation** 

# Rapid Response Grants (RAPID)

"RAPID: Trust in Public Health Information During a Pandemic"

\$194,774



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**National Science Foundation** 

# Smart & Connected Communities – Planning Grant

"Empowering Community-centric Electrified Transportation"

# \$150,000

#### Wipro, Ltd.

"HELIOS: Hate, Hyperpartisan, and Hyperpluralism Elicitation and Observer System"



New Venture Fund: Public Interest Technology Network

"The PIT-UN Undergraduate Informatics Education for Public Interest Technology Conference"

# \$90,000

# FY20 projects

# Bad AI & Beyond

Team: Sam Baker (English), Suzanne Scott (Radio-Television-Film), and Paul Toprac (Computer Science)

This team is examining how media representations, including film, television and prose, shape popular perceptions about AI, including what possibilities they offer and what biases they create. Through focus groups and surveys of 1,000 students, initial findings suggest that most people see media representations of AI as unrealistic. Good Systems funded undergraduate students have created their own short films, poetry and prose depicting their perceptions of AI.

# Building and Testing Machine Learning Methods

Team: Tanya Clement (English), Aaron Choate (Libraries), Weijia Xu (TACC), and Maria Esteva (TACC)

Audiovisual materials play a fundamental role as historical and scientific records and provide evidence for every activity on earth: from endangered languages to rare bird calls. This team is developing a methodology and workflow for libraries, archives, and museums to use machine learning and supercomputing resources to generate metadata for audiovisual materials to help preserve and make use of them.

# Design of Fair Al Systems via Human-Centric Detection

Team: Amelia Acker (Information), Anubrata Das (Information), Joydeep Ghosh (Electrical and Computer Engineering), Soumyajit Gupta (Computer Science), and Matthew Lease (Information) Designing Human Al Partnerships for Information Search and Evaluation

Team: Jacek Gwizdka (Information), Matthew Lease (Information), Nilavra Bhattacharya (Information), and Anubrata Das (Information)

Al systems may not only reproduce data bias but even amplify it. Often this is through bias by omission, or people overlooked or underrepresented in data. Humancentered approaches to assess bias and fairness can address a critical gap to inform algorithmic fairness. This team is engaging people to help identify bias in datasets and identify alternative algorithms and evaluation metrics through literature surveys, writing activities, and workshops.

This team is exploring the design space for socially responsible human-AI partnerships to combat misinformation. The goal is to do this by designing an AI search engine that not only helps people to find reliable and relevant information, but works to transparently establish trust, ensure diversity of results, and empower people to better explore, interpret, and evaluate information.

# Disinformation in Context: Al, Platforms and Policy

Team: Sharon Strover (Journalism and Media), Natalie Stroud (Communication Studies), Mary Neuburger (History), Kiril Avramov (Slavic and Eurasian Studies), and Jason Roberts (Slavic and Eurasian Studies)

This team has analyzed roughly 3,500 Russian-originated Facebook ads posted during the 2016 election to identify "bad" content. Their initial findings suggest these ads had little reference to what one might call news. As part of their project, the research team examined the techniques and appeals used in the ads to understand more about how they circulate on social media. The ultimate goal is to bring "good" Al into social media systems.

# Ethical Data Design for Good Systems

Team: Maria Esteva (TACC), Soyoung Park (Radio-Television-Film), Christopher Rossbach (Computer Science), Sharon Strover (Journalism and Media), and John **Thywissen (Computer Science)** 

Data is the centerpiece of Al applications, but there is often a disconnect between developer intent to make good systems and the actual results. This is worrisome in a future built on AI and data. The goal of this study is to look at the relationship between software evolution and ethics. The team is developing a tool that performs automated large-scale cross-version analyses on pieces of software underpinning Al infrastructure to see in the code how people respond to security incidents.

# How Black and Latinx Youth Evaluate Their Experiences with Digital Assistants

Team: Jakki Bailey (Information), Kenneth Fleischmann (Information), Stephen Slota (Information), and S. Craig Watkins (Journalism and Media)

This team is interviewing Black and LatinX children ages 8 to 12 to see how they experience digital assistants. They are looking at several issues, including the voice used for devices like Siri and Alexa, which is typically a white woman, as well as how the technologies may struggle to answer culturally specific questions about race and racism. The team's goal is to be able to pass the research findings on to developers so they can design technology that is more inclusive in the future.

# Privacy Preferences and Values for Computer Vision

Team: Kenneth Fleischmann (Information), Danna Gurari (Information), and Bo Xie (Nursing)

Researchers are examining technologies that assist the visually impaired, including computer vision technology that automatically provides verbal descriptions of visual media. This media often includes sensitive information like credit card numbers or other financial information. This team has conducted interviews with visually impaired people to ask about their experience with these technologies and is developing a table that developers can use to design algorithms to better recognize content and images that contain private information.

# Probabilistically Safe and Correct Imitation Learning

Team: Scott Niekum (Computer Science), Ravi Srinivasan (Applied Research Laboratories), and Peter Stone (Computer Science)

Most AI research is concerned with best case or average case performance. However, average case performance is often not good enough - we don't want autonomous cars that perform well on average, but rather that with high confidence. This team is creating an algorithm that can reason about uncertainty and risk and can outperform the human demonstrator. The team has tested the algorithm in robot simulations and now has moved onto a real robot. This work will help algorithms to be deployed in the real world with a greater level of safety.

# Urban Health Risk Mapping

#### Team: Valerie Danesh (Nursing), Chen Feng (Architecture), Junfeng Jiao (Architecture), Katie Pierce Meyer (Libraries), Weijia Xu (TACC)

Researchers used machine learning to map the probability for certain major health risks — from obesity and cancer to heart disease — in 10 U.S. cities and to predict which community modifications, such as increasing green space or housing density, would reduce or amplify those health risks. City planners can adjust variables in the portal to see how potential modifications are likely to affect the prevalence of disease.



Designing Al Technologies that Benefit Society, By: Kenneth Fleischmann, Medium (Sept. 24, 2019)

Fleischmann, School of Information professor and Good Systems inaugural chair, talks about embarking on an 8-year mission to design Al technologies that are driven by human values. "We believe it is ethically irresponsible to think about Al only in terms of what it can do; we believe it is even more important to consider what Al should — and should not — do."

# A year in stories

Last year, Good Systems researchers and their work were featured in news stories, blog posts, op-eds, and podcasts. We are excited to have our achievements and expertise recognized by these important outlets. Read more about how our contributions are making a difference in the collective understanding of ethical AI.

### **2019 State of the University** Address (Sept. 18, 2019)

Former University of Texas at Austin President Gregory L. Fenves announces the launch of the Good Systems grand challenge at a university-wide address.

#### Read more.

**Vice President for Research Iaunches Good Systems Grand Challenge, The Daily Texan** (Sept. 24, 2019)

UT's award-winning student paper shares the news about Bridging Barriers' third grand challenge.

#### Read more.

### Al Is Tricky, By: Trish Morrison, Medium (Sept. 24, 2019)

Tim Hwang, former director of the Harvard-MIT Ethics and Governance of Al Initiative, says Al is not the Terminator. "It's not going to climb out of your computer and destroy you." Negligence and incompetence around the use of AI are the real threats.

#### Read more.

### **Good Systems Team Hosts Fireside Chat to Celebrate Launch, The Daily Texan (Oct. 7, 2019)**

Tim Hwang, former director of the Harvard-MIT Ethics and Governance of AI Initiative, joins School of Journalism and Media professor Sharon Strover at a Good Systems launch event to discusses the importance of ethics when creating AI.

## **New Grant to Help Align** Information Science Curriculum with Serving the Public Good, **UT News (Oct. 8, 2019)**

UT's School of Information announces a new grant from the Public Interest Technology University Network (PIT-UN) to host a national conference focused on the intersection of informatics and public interest technology both fields critical to the mission of the Good Systems grand challenge initiative.

### **20/20 Foresight: The Next 50 Years,** The Texas Scientist (2020 Edition)

The College of Natural Sciences' awardwinning magazine looks ahead at the scientific challenges expected in the next 50 years, among them the crucial need to develop best practices for designing and using artificial intelligence.

### Read more.

60

### **Read more.**

## **Can Al Support Youth Mental** Health? UT News (Feb. 11, 2020)

With mental health issues on the rise, UT researchers look at how AIbased technologies could remove or reduce barriers for adolescents or young adults seeking mental health help.

#### **Read more.**

## **Government's AI Principles Overlook Two Important Issues, By: Peter Stone, The Hill (Feb. 18, 2020)**

In early 2020, the White House released guiding principles for regulating artificial intelligence. Peter Stone, Department of Computer Science professor and Good Systems founding researcher, argues that while the principles are a great start, they overlook two critical risks: that Al technologies could dramatically increase economic inequality, and that we need explicit international regulatory coordination.

### Truth, Ethics, and Information, By: Rebecca Taylor, Medium (Feb. 27, 2020)

How do ethics and truth play a role in the way information is gathered, used, and viewed — as well as misused? Rebecca Taylor, a senior-level technology executive and Industry Fellow for the UT Ethics Project, answers these questions in Good Systems blog post.

## Read more.

#### Podcast: Al Designed to Make Life Better, featuring Peter Stone, Point of Discovery (April 2020)

Artificial intelligence has the potential to have extremely beneficial but also detrimental effects on society as we know it. Department of Computer Science Professor Peter Stone joins host Marc Airhart to explore this dichotomy.

### Listen.

## One Thing We Must Do Now, By: S. Craig Watkins, Joan Ganz Cooney Center Blog (April 7, 2020)

Since the COVID-19 global pandemic took hold, screen use has increased dramatically, sparking ongoing debate about children's relationship to their smart phones. The real debate, of course, is not about their relationship to screens but, rather, their relationship to a rapidly evolving information environment that is marked by disinformation, bullying, and toxicity.

#### Read more.

## Underutilizing the Ultimate Technology During COVID—the Human Imagination, By: S. Craig Watkins, NYU Press Blog (April 10, 2020)

As COVID-19 began spreading across the U.S., many schools decided to transition to remote or online learning. Concerns sparked about how the disparate access to technology among students would only widen the achievement gaps in education. These concerns are valid, but School of Journalism and Media Professor and Good Systems researcher S. Craig Watkins says this overlooks the deeper structural conditions that drive the racial achievement gaps in education.

### Read more.

#### TACC COVID-19 Twitter Dataset Enables Social Science

Research About Pandemic, By: Aaron Dubrow, Texas Advanced Computing Center News (May 4, 2020)

Researchers are fighting the spread of the coronavirus in a surprising way: using people's tweets. Tapping into one of the world's leading realtime messaging service can help identify new pandemic hotspots, highlight new symptoms, or interpret how people and communities are responding to orders to practice social distancing.

### Read more.

### Driving Disease, By: Mary Huber, Medium (May 8, 2020)

Good Systems Chair Junfeng Jiao and research associates at UT's Urban Information Lab look at commuter train and highway traffic data to determine where the coronavirus will strike next.

## Why COVID-19 Won't Change Long-Term Travel Behavior, By: Chandra Bhat, Texas Engineering (May 21, 2020)

The coronavirus pandemic has brought the air travel industry, and most forms of transportation, to its knees. Department of Civil, Architectural and Environmental Engineering Professor and Good Systems researcher Chandra Bhat explores whether these travel patterns will become a new normal after the pandemic fades.

### Read more.

## Good Systems Responds to the COVID-19 Crisis, By: Kenneth R. Fleischmann, Medium (May 26, 2020)

After the pandemic forced UT to close its campus and move all of its classes online, Good Systems pivoted its research to focus on issues related to the pandemic.

#### Read more.

**Coronavirus Perspectives: An information breakdown,** 

## Al, Mental Health, and COVID-19, By: S. Craig Watkins, Medium (May 26, 2020)

It is widely anticipated that one of the enduring impacts of the COVID-19 pandemic will be a drastic rise in mental health cases. Watkins, a School of Journalism and Media professor and Good Systems racial justice research director, discusses the ways his team is working to address the growing issue.

#### Read more.

# By: Mary Huber, Medium (May 26, 2020)

Three UT researchers who have been sheltering in place amid the pandemic explain how the COVID-19 crisis is also an information crisis.

### Podcast: Trustworthiness in Al, featuring Joydeep Ghosh, Pulse of Al (June 29, 2020)

Department of Electrical and Computer Engineering Professor Joydeep Ghosh discusses the importance of trust in a world that is increasingly reliant on artificial intelligence.

### Listen.

### Using AI to Assist Those Experiencing Homelessness in Austin, Government Technology (July 17, 2020)

A partnership between The University of Texas at Austin and the City of Austin looks at how AI can identify residents at risk of experiencing homelessness, as well as helping those currently in need.



Powerful Al Can Now Be Trained on a Single Computer, By: Edd Gent, featuring Peter Stone, IEEE Spectrum (July 17, 2020)

The enormous computing resources required to train state-ofthe-art artificial intelligence systems means well-heeled tech firms are leaving academics in the dust. But a new approach could help balance the scales, allowing scientists to tackle AI problems on a single computer.

#### **Read more.**

#### The Rise of Campaign Apps, By: Mary Huber, Medium (July 22, 2020)

Over the past two decades, candidates from both parties have worked to amass as much information about their constituents as humanly possible to put them at the greatest advantage to win elections and influence voters. Samuel Woolley, School of Journalism and Media assistant professor and Good Systems disinformation research director, explains why we should be wary of a new tool in their arsenals — their own campaign apps.

#### Read more.

#### UT Austin Selected as Home of

#### **Good Systems Enters Second**

National Al Institute Focused on Machine Learning, UT News (Aug. 26, 2020)

The National Science Foundation selects The University of Texas at Austin to lead the NSF AI Institute for Foundations of Machine Learning, bolstering the university's existing strengths in the emerging field.

#### Read more.

Year with New Projects, New Leadership, By: Kenneth R. Fleischmann and Junfeng Jiao, Medium (Aug. 31, 2020)

Good Systems has made strong progress in its first two years toward achieving its mission of creating an inclusive research environment that informs the design and implementation of ethical AI. Inaugural Chair Kenneth Fleischmann and current Chair Junfeng Jiao discuss what's next for the grand challenge.

# Good Systems Leadership

Samuel Baker English Chair-Elect, Founding Member Executive Team

Chandra Bhat Civil, Architectural, and Environmental Engineering Founding Member Executive Team

Tanya Clement English Founding Member Executive Team

Kenneth R. Fleischmann Information Inaugural Chair, Founding Member Executive Team Peter Stone Computer Science Founding Member Executive Team

Sharon Strover Journalism and Media Founding Member Executive Team

Amelia Acker Information Public Interest Technology Research Director

Simone Browne African and African Diaspora Studies Critical Surveillance Inquiry Research Director

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Junfeng Jiao Architecture Chair, Founding Member Executive Team

Matthew Lease Information Founding Member Executive Team Joydeep Ghosh Electrical and Computer Engineering Fair and Transparent Al Research Director

Sherri Greenberg Public Affairs Future of Work Research Director Adam Klivans Computer Science Robotics and Machine Learning Research Director

Josephine "Jo" Lukito Journalism and Media Disinformation Research Director

S. Craig Watkins Journalism and Media Racial Justice Research Director

Samuel Woolley Journalism and Media Disinformation Research Director Weijia Xu Texas Advanced Computing Center Smart Cities Research Director

Tessa Green Office of the Vice President for Research Program Director

Andrea Christelle Office of the Vice President for Research Network Relationship Manager

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A short-to-medium range autonomous delivery system (SMADS) robot learns to maneuver the UT campus and avoid obstacles — all while delivering cookies and lemonade safely during a pandemic.

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