THE MONTHLY OPT-IN

AI4OPT Monthly Newsletter

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FROM THE DIRECTOR

This month marks AI4OPT's one-year anniversary. Leading up to this milestone, we hired a managing director, executive assistant and directors for our finance, corporate engagement, and communication needs. This year, our research Institute completed a comprehensive strategic and implementation plan, its annual report and its annual review conducted by the National Science Foundation (NSF). The Institute is funding more than 30 research projects, covering methodologies and end-use cases, and started its high school and undergraduate educational programs, working with minority serving institutions. Additionally, AI4OPT has established its Industrial Partners Program that can have substantial societal and technological impacts.

I'd like to also introduce you to the first issue of our monthly newsletter which will serve as a vehicle to inform stakeholders about the life of the Institute. Each month a student and researcher will be featured. This issue showcases our outreach efforts and activities held in the first year of the Institute and highlight the contributions of AI4OPT to the democratization of AI and data science.

When looking towards the future, we are excited to welcome a new cohort of Ph.D. and undergraduate students while ramping up our research activities in fusing AI and Optimization for energy, supply chains, sustainability and circuit design and control. We will continue the expansion of our AI4OPT education and workforce efforts while bridging the gap between education and research. I would like to thank Georgia Tech and the NSF for continued support. And, of course, I would also like to express my gratitude to all members of AI4OPT for their commitment and continuous contributions. THANK YOU!

- Pascal Van Hentenryck

MEMBER RESEARCH SPOTLIGHT
WORK AND CONTRIBUTIONS OF AI4OPT TEAM MEMBERS

The research of Professor Chelsea C. White has been driven by the challenges faced by U. S. supply chains since the start of the pandemic from both private and public perspectives.

AI4OPT and Supply Chain Disruption, Visibility and Next Generation Supply Chain & Ecosystem Design

By Chelsea C. White

Prior to the COVID-19 pandemic, risks in supply chains were typically local and of short duration, a perfect environment for lean supply chain design focused on cost reduction. In contrast, the pandemic has had long-term impact on everything from suppliers to manufacturing to distribution, and has caused a significant increase in demand volatility. Right now, the worst kind of design for supply chains - if you're going to be faced with disruptions - is a lean supply chain. With no resilience built-in, no buffer stock, and no buffer manufacturing capacity, lean supply chains don't hold up well when faced with disruptions.

Considering this new trade environment, global supply chains have had to adjust from lean to more expensive agile supply chains that have contributed to inflation and have raised questions like: How do we now balance risks of disruptions in supply chains versus the reduction of costs? We are working toward supply chain design solutions as we face the lingering effects of Covid-19, as well as the recent increase in extreme weather events and geopolitical risk, and a way of better aligning private sector and public sector interests when faced with disruptions that can affect the United States public health, defense, or economic security. This alignment is a significant challenge as large companies typically do not share the same devices, platforms, objectives, or data among themselves or with the public sector.

A current interest of mine is to develop a stress test process to better understand how we can find the right balance of risk and cost for a company in an environment of increased volatility. My colleagues and I are being supported by two Manufacturing Innovation Institutes, BioMADE and ARM (Advanced Robotics for Manufacturing), to develop and test such a process. Through BioMADE, we are collecting data from a large multinational corporation and a startup company. Through ARM, we are working with a small to medium size enterprise that makes oxygen concentrators to better understand how disruptions can affect their supply chain performance and how best to mitigate disruption risks.

Read more of White's work on the Brookings TechStream publication website. The open platform is designed for researchers, technologists, and policy analysts.

REFERENCES

- Click: How to build more secure, resilient, next-gen U.S. supply chains
- Click: A data-sharing approach for greater supply chain visibility

DEVELOPMENTS & ACCOMPLISHMENTS

WE TAKE PRIDE IN OUR WORK AND ACHIEVEMENTS

Director of AI4OPT, Pascal Van Hentenryck and his team have collaborated with Ryder System, Inc. on the industry's first data-driven study of the potential impact of autonomous trucking using AI and optimization.

Van Hentenryck wins 2022 Caspar Bowden PET Award for Outstanding Research in Privacy Enhancing Technologies.

The prestigious award is presented annually to researchers who contribute to the theory, design, implementation, or deployment of privacy enhancing technologies.

AI4OPT welcomed Los Alamos National Laboratory researchers and scientists for an in-depth discussion about reshaping research in AI and optimization.

The long-term collaboration is at the intersection of AI, optimization, and complex energy infrastructures.
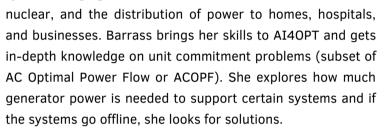
STUDENT HIGHLIGHTS

GET TO KNOW OUR STUDENTS!

Meet **Rosemary Barrass**, a first-year Ph.D. student in Operations Research in ISyE at Georgia Tech. As a undergrad in the Department of Mathematics and Statistics at Washington State University, she studied optimization and focused on power systems ranging from coal, windfarm to nuclear, and the distribution of power to homes, hospitals, and businesses. Barrass brings her skills to AI4OPT and gets in-depth knowledge on unit commitment problems (subset of AC Optimal Power Flow or ACOPF). She explores how much generator power is needed to support certain systems and if the systems go offline, she looks for solutions.

Q: What sparked your interest in Artificial Intelligence (AI) and optimization?

A: The connection was a natural next step to join AI4OPT to discover the next phase of optimization through unit commitment or robust ACOPF.

Q: What's something unique about you?

A: I used to do a lot of swing dancing, which is so much fun. There seems to be a small swing dancing scene here in Atlanta, and I'm trying to find a place to go and continue doing just that.

Q: What do you do when you're not studying?

A: I play a lot of computer video games; at the moment I play a lot of Project Zomboid. It's 'surviving in the zombie apocalypse.' Playing video games allows me to turn my brain off after doing lots of very heavy math and programming.

AI4OPT's first Student Social was an optimal success!

More than 60 students gathered at Coda to learn more about the research Institute, its members, and the research being done.

AI4OPT GRAND OPENING

It's been one year since the launch of the AI4OPT Institute. We are overjoyed about this major milestone as we continue our work in expanding pathways and advancements in worlds of AI, education, and also the workforce. Rob Butera, Georgia Tech's Vice President of Research Development and Operations, presented at the event.

WATCH VIDEO

PUBLICATIONS

- Click: The Impact of Autonomous Trucking: A Case-Study of Ryder's Dedicated Transportation Network

- Click: Spatial Network Decomposition for Fast and Scalable AC-OPF Learning

- Click: State Entropy Maximization with Random Encoders for Efficient Exploration

- Click: Machine Learning for Optimal Power Flows

- Click: Mutual Information-based State-Control for Intrinsically Motivated Reinforcement Learning

- Click: Algorithmic Challenges in Ensuring Fairness at the Time of Decision

NEWS

HERWILL DATATHON

In partnership with AI4OPT, HerWILL held a Datathon between women in tech from around the world. The the intense 48-hour comp-etition included a series of data science workshops.

HerWILL

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SETH BONDER CAMP

Through AI4OPT's mission to inspire high school age Georgians and beyond to pursue STEM, the Institute is setting the stage for fut-ure engineers and leaders.

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FACULTY TRAINING PROGRAM

The program gives more STEM study access to minority colleges and uni-versities across the US. This year, members of the AI4OPT team helped kick off the program and wor-ked with a number of edu-cators and institutions inc-luding Victor Valley College in Victorville, CA.
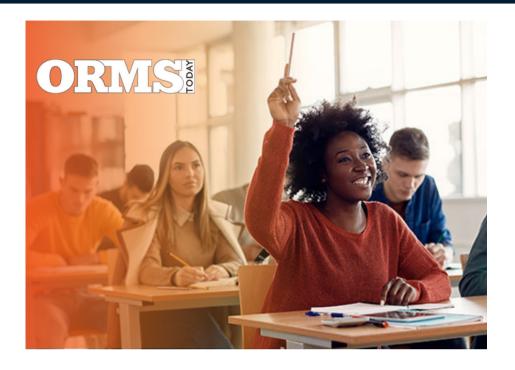
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AI4OPT NEW HEADQUARTERS

AI4OPT has found a new home! We've moved to the 12th floor of the CODA building located in Midtown Atlanta, GA's Tech Square. The area is known for its many different startup companies, corpo-rate innovators and acad-emic researchers.

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EDUCATIONAL INITIATIVES

LONGITUDINAL EDUCATION PROGRAMS

E ducation is one of AI4OPT's core focuses. With our innovative educational programs including the Seth Bonder Camp and Faculty Training Program, we are trying to create a space for AI education, data science research, and job opportunities. We foster STEM spaces that may not exists in circumstantial communities. AI4OPT is building pathways into "AI in Engineering" for African-American and Hispanic communities through education initiatives in high schools, community colleges, and universities.

These collaborative efforts promote future partnerships and engagements to broaden the scope and participation in AI study.

Read the full INFORMS magazine article now on the Innovative Education page of OR/MS Today by clicking, here.

Charles Pierre is the thrust leader for the educational and diversity initiatives of AI4OPT. He also leads the Undergraduate Initiative with his team at Clark Atlanta University (CAU), including the delivery of many data science and artificial intelligence courses. Charles is an associate professor of mathematics at CAU and was a 2020 INFORMS DEI Fellow.

Pascal Van Hentenryck is the director of AI4OPT. He also leads the high school initiative, including the Seth Bonder summer camps (SBC) and high school classes in collaboration with high school faculty. Pascal is the A. Russell Chandler III chair and professor in industrial and systems engineering at Georgia Tech and the recipient of several teaching awards at Brown University and Georgia Tech.

Kevin Dalmeijer is the managing director of AI4OPT, where he supervises all operations, including those of the educational and diversity initiative. Kevin has a Ph.D. in operations research from the Erasmus School of Economics and has worked on challenging problems in mobility, transportation and logistics.

Tuba Ketenci helps organize and run the Seth Bonder summer camps for AI4OPT. She is director of education outreach in the School of Industrial and Systems Engineering at Georgia Tech.

OUTREACH

Deep dive into our work!

We at AI4OPT have established a website, YouTube channel, and Twitter so that you can be part of the conversation and connect. We have also taken the initiative to reach educators, scientists, students, and researchers.

Our AI4OPT members give talks and updates on AI4OPT's work at different events including our seminar series, which features researchers from Google Research, Microsoft Research, and partnering institutions.

Our Principal Investigator and Director, Pascal Van Hentenryck, showcased the overall vision of the Institute with Georgia Tech students and faculty and invited Los Alamos National Lab (LANL) researchers and scientists to showcase their work and exchange ideas.

This month, AI4OPT leaders have also been featured on WABE 90.1 Atlanta GA - Atlanta's NPR Station - addressing one of the biggest challenges for the eighth-largest transit system in the United States: MARTA.

Our partnership with Atlanta's oldest charter school, Drew Charter led to the recent announcement of a STEAM certification for its senior academy. We're always interested in community outreach, education and partnerships. We hope to have you part of our rapidly growing team.

CONNECT WITH US!

We aim to broaden community contribution through the development of an AI and mathematical optimization-based system to address societal challenges in energy, logistics and supply chains, resilience, and sustainability and circuit design and control.

Subscribe and follow us to learn more about our latest projects and research and upcoming community events. If you are interested in media relations or AI4OPT's research, education and partnership initiatives emails us by clicking **here**.

Email, subscribe, and follow us to learn more!

OCTOBER EVENTS

- AI4OPT Grand Opening (Oct 4)
- Seminar Series
  - Speaker: Chi Jin (Oct 6)
  - Speaker: Spyros Chatzivasileiadis (Oct 13)
  - Speaker: Karthyek Murthy (Oct 20)
  - Speaker: Dylan Foster (Oct 27)
- COMBASE Conference (Oct 20–22)

View Full List

You can watch our past seminars by clicking, **here**.

OCTOBER CONFERENCE

- AI4OPT is hosting a cluster of sessions at INFORMS Annual Meeting (Oct 17–18)
- Meet members of our team
- Ask about our open Ph.D. and Postdoctoral positions

Link To Sessions

Hosted by:

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