

An Introduction and Invitation from OPTML Group

*Join us to explore, build, and lead the
future of scalable and trustworthy AI*



MICHIGAN STATE
UNIVERSITY



OPTML

WE MAKE THE GLOBAL OPTIMAL



MSU Campus, East Lansing, Michigan

Welcome to OPTML Group!

- A world top-class research lab for AI (CSRankings #1 @ MSU, score 91)
- Optimization-driven AI for a trustworthy future
- From theory to production: Building scalable & reliable large models
- Shaping the next generation of AI algorithms for efficiency and safety

At OPTML Group, we integrate optimization foundations with modern AI practice to design algorithms and models that are not only powerful but also trustworthy and efficient. Our mission is to advance the technological frontiers of learning while driving real-world impact in areas such as large language models, diffusion models, multimodal AI, and intelligent agents. By blending rigorous mathematics with hands-on experimentation, we train the next generation of researchers to ask bold questions, craft elegant solutions, and transform the future of AI. Whether you are inspired by machine learning theory, optimization algorithms, motivated by the challenges of trustworthy AI, or eager to explore frontier-scale models, the OPTML Group is the place to grow and belong.

OPTML members have published extensively in top-tier AI conferences, including NeurIPS, ICML, ICLR, CVPR, ICCV, and ECCV, and our students have earned prestigious awards such as the IBM PhD Fellowship, MLCommons Rising Star Award, CPAL Rising Star Award, Fitch H. Beach Awards (first place), and UAI Best Paper Runner-Up Award, etc. The group is well funded by both federal agencies and industry partners, with current support from the National Science Foundation, DoE, Open Philanthropy, DSO National Labs (Singapore), Cisco, IBM, and Amazon.

For more information, please visit the Lab Website at <https://www.optml-group.com>



Dr. Sijia Liu

Associate Professor, MSU
Affiliated Professor, IBM Research,
MIT-IBM Watson AI Lab affiliated PI

Hello, and welcome! I'm Sijia Liu, founder of the OPTML Lab at Michigan State University, which I established in 2021 to advance trustworthy and scalable AI. My research bridges foundational methods and use-inspired applications, focusing on robust optimization for frontier models, stress-testing for AI safety, and pioneering machine unlearning to responsibly edit foundation models. My work has been recognized with honors such as the NSF CAREER Award (2024), INNS Aharon Katzir Young Investigator Award (2024), MSU Withrow Rising Scholar Award (2025), Best Paper Runner-Up at UAI (2022), and Best Student Paper Award at ICASSP (2017).

When I founded OPTML, I have a clear vision to build a top-tier research group advancing trustworthy and scalable AI. At the heart of our success are our students, not defined by GPAs or checklists, but by ambition, optimism, creativity, and the drive to tackle AI's toughest challenges. If you have a strong foundation in mathematics or coding and a genuine passion for shaping the future of AI, OPTML is the place to grow.

Our work is consistently recognized at top AI conferences, with evidence that OPTML is ranked #1 at MSU on CSRankings for research productivity. I am incredibly proud of what we have built at OPTML — not just a lab, but a true team and community. As *Nature's Guide for Mentors* notes, "Having a good mentor early in your career can mean the difference between success and failure in any field." My students' success is my greatest achievement, with alumni advancing to leading institutions such as OpenAI, Meta, Amazon, and IBM Research. Our work is consistently recognized at top AI conferences, and OPTML is ranked #1 at MSU on CSRankings for research productivity. Beyond papers and awards, we stand out through a structured PhD training program and personalized mentorship that equip students with the skills, confidence, and vision to thrive during their PhD and beyond.

I hope this gives you a glimpse into what makes OPTML special. If our mission excites you, I truly hope you'll reach out - we'd love to hear your story and see how your passions align with ours.

Our Vision

We envision a future where AI is not only powerful, but also fundamentally safe, reliable, and accessible to all—anytime and anywhere. Our long-term goal is to bridge the gap between foundational research and fast-paced practice, advancing and transforming AI into a trusted partner across the entire data–model–algorithm–application stack.

To achieve this future, our research is built upon two foundational pillars:

- **Pioneering Trustworthy AI:** We are dedicated to building a science of safety and reliability for the next generation of AI. Through foundational work in robust optimization, adversarial robustness, and machine unlearning, we strive to develop AI systems that are transparent, controllable, and aligned with human values.
- **Engineering Scalable AI:** The power of AI should not be confined to a few. Our research advances efficient and scalable learning algorithms, including energy-aware optimization and data–model efficiency methods, to democratize access to frontier models and ensure the benefits of AI are shared globally

But our vision extends beyond technology, it is about cultivating the *next generation of leaders* who will shape AI responsibly. At OPTML, we do not just produce research; we develop researchers. Our structured PhD training, combined with personalized mentorship, empowers students to tackle grand challenges with confidence and creativity, preparing them to become pioneers in their own right.

Red Cedar River in Winter on Campus





Our Commitment to Your Success

MSU Campus in Autumn, The Most Beautiful Season in Michigan Famous to the World

At OPTML, our mission is your success. We are committed to cultivating the next generation of AI leaders through a mentorship philosophy that blends structured training with personalized guidance. Our goal goes beyond publishing papers; we aim to empower you to grow into a **confident, independent, and impactful researcher**.

A Systematic Training to Excellence

Worried about not having enough research experience? **We've built a system to turn motivated students into highly effective researchers.** We provide an extensive library of internal documentation - totaling dozens of pages - that demystifies the entire research lifecycle. Our guides cover everything from conducting a literature survey and proposing a new idea to crafting professional presentations and writing high-impact academic papers and finally to doing rebuttals after submission.

With the right training system, publications become a natural outcome of your hard work. This structured program allows you to quickly adapt to the fast-paced world of AI research, equipping you with the skills you need so you can focus on what truly matters: **your ideas and your growth.**

Personalized Mentorship for Your Unique Strengths

Every student is unique, and OPTML tailors mentorship to individual personalities and strengths. Whether you thrive on fast-paced, frequent meetings or prefer a more methodical rhythm, our approach adapts to you. This guidance extends beyond research to holistic development, including networking and effective presentation skills. At OPTML, we are not only training you to be a strong researcher; we are preparing you to be a future leader in the field. **We want every OPTMLer to truly enjoy life and build a meaningful career here, not just acquire a PhD's degree.**

Computing Resources



MSU Campus Boundary Stones

At OPTML, we provide our members with abundant, cutting-edge computational resources to ensure that great research ideas are never limited by a lack of computing power. Our infrastructure is designed to support the most demanding, large-scale experiments in AI.

Dedicated High-End GPU Servers

To facilitate state-of-the-art research, the OPTML lab is equipped with its own **private**, high-performance computing cluster. We have more than **8** dedicated servers, housing over **60** of the latest NVIDIA A6000 and H100 GPUs. This exclusive access guarantees that our students and researchers can develop and train frontier models without delay.

Extensive Cloud Computing Support

Beyond our in-house hardware, we maintain strong ties with industry partners. The lab benefits from over **\$100,000** in annual cloud computing credits from sponsors like Amazon Web Services (AWS) and Center for AI Safety (CAIS). This provides immense flexibility and scalability, enabling large-scale distributed training and extensive model evaluations on demand.

University-Wide High-Performance Computing

Additionally, lab members have access to Michigan State University's High Performance Computing Center (HPCC). The HPCC provides large-scale computing clusters with a total of **1,047** nodes, over **56,000** CPU cores, and hundreds of GPUs for massive parallel processing tasks with over **300** TB of Memory.

Voices from Our Alumni

The success of our students is our greatest pride. Here, our alumni share their experiences at OPTML and how the journey here has shaped their careers. We hope their stories provide a glimpse into the incredible futures that await you.



“Great OPTML group has great professor, great lab mates, great projects, great GPU resources, and great atmosphere. I was there for my best time ever in my all school life. Besides I got my PhD, I got my life experiences and research skills fully enhanced. For all the future OPTML folks, welcome to OPTML group and you will make your research dream come true!

- Yuguang Yao

OPTML Alumni, 2024

Current: Research Scientist @ Intuit

My two years at OPTML were an unforgettable part of my research journey. Prof. Liu is passionate about research and offers unique insights into his fields. I truly enjoyed brainstorming and shaping the ideas with him during our collaborations; each session was both inspiring and fascinating. Complementing this, he maintains a rigorous yet approachable attitude toward research, offering thoughtful guidance that helps newcomers build a solid foundation. If you have strong execution skills, OPTML is a great place to start your research career.

- Jiancheng Liu

OPTML Alumni, 2025

Current: Member of Technical Staff @ OpenAI



“My PhD journey at OPTML was incredibly rewarding. Professor Liu’s mentorship provides the perfect balance of structure and intellectual freedom, but what truly sets this lab apart is the deeply collaborative culture; my work was forged through constant partnership with brilliant peers. More than just publications, OPTML prepares you to become an independent researcher ready for any future challenge. If you’re looking for an environment that will both challenge and support you, this is the place to be.

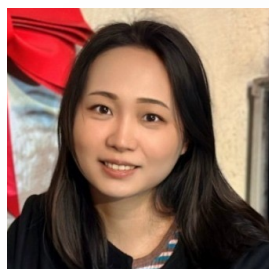
-Yimeng Zhang

OPTML Alumni, 2025

Current: Applied Scientist @ Amazon

The Journey Begins: Insights from Junior Students」

The first few years of a PhD are a critical period of transformation - a time of shifting from coursework to hands-on research, discovering your passion, and building the foundations for your future work. It's a journey filled with both challenges and excitement. Here, our junior students and visitors share their stories from this pivotal stage. They offer a fresh perspective on what it's like to get started at OPTML, from navigating the initial learning curve to celebrating early breakthroughs, all within our supportive.

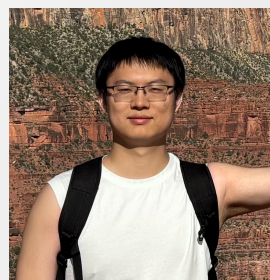


Yiwei Chen

OPTML Ph.D. Candidate
(Fall 2024 - Present)

“I am a second-year PhD student, and my experience at OPTML has been truly rewarding. Both Prof. Liu and the lab members are exceptionally supportive, which makes it easy to adapt to the research life here. Prof. Liu is highly professional and always encouraging, while the lab mates are not only talented but also warm and collaborative. After one year at OPTML, I genuinely enjoy my life at MSU, and I believe this is an excellent environment to grow as a researcher. I would strongly recommend anyone interested in cutting-edge research and a supportive community to join us !!!

The professors and senior members in our group will guide you in learning how to conduct research, from the smallest details to the broader big picture. This mentorship is not only about supporting you in individual research projects, but also about shaping your long-term PhD journey and academic growth. Ultimately, no one will care more about your development than yourself, but here at OPTML you will find a community deeply committed to helping you succeed. Welcome to OPTML - come and achieve your dreams with our great lab!



Changsheng Wang

OPTML Ph.D. Candidate
(Fall 2024 - Present)



Changchang Sun

OPTML Visiting Student
(08/2023 - 05/2025)
Ph.D. student in UIC

My visit to OPTML was originally planned for one year, but I chose to extend it to two years because of the inspiring academic atmosphere and supportive lab culture. Professor Liu provided invaluable hands-on guidance, and his high standards for clarity helped me develop a more professional approach to writing. His commitment was inspiring and effective, and significantly enhanced the quality and success rate of our submissions. He is one of the most dedicated mentors I have met, and I am deeply grateful for the collaborative, friendly environment of the lab.

”

From Summer Interns to PhD Candidates: Growing with OPTML

There is no greater testament to a lab's culture and research environment than when a talented intern chooses to call it home for their PhD. Here, our students who began as interns share their stories: why they came, what they discovered, and why they ultimately decided that OPTML was the best place for them to grow into the researchers and innovators they aspire to be.



Chongyu Fan

OPTML Ph.D. Candidate
(Fall 2024 - Present)

B.Eng., HUST, China
Visiting Time: 05/23-09/23
Publication: ICLR'24 Spotlight

“Reflecting on my summer internship, I am deeply grateful for Professor Liu’s patient and meticulous guidance, both in shaping research ideas and in improving my writing. The lab also provided abundant computational resources, which ultimately enabled me to publish my very first paper on machine unlearning, presented as a spotlight at ICLR 2024. Because of this rewarding summer experience, I decided to continue my PhD journey at OPTML. Looking back, it was absolutely the right choice. At OPTML, Professor Liu builds strong academic and industry connections, and I am fortunate to work alongside many like-minded peers who share the same passion and drive. We warmly welcome anyone interested in artificial intelligence to join the OPTML family!”

I worked in OPTML as a summer intern and I was welcomed quite warmly by both my labmates and Dr. Liu. From the start, it was clear that Dr. Liu is quite invested in our success. Additionally, my technical expertise grew significantly due to many fruitful discussions. This experience inspired me to joining his lab. A few things stand out to me personally. Dr. Liu is very flexible and supportive in his approach of supervising, while also helping me stay focused and on track. Another important thing is having labmates who are highly engaged in research, promoting a collaborative environment. I warmly welcome and encourage students who want to build a career in AI to join our lab 😊



Soumyadeep Pal

OPTML Ph.D. Candidate
(Fall 2024 - Present)

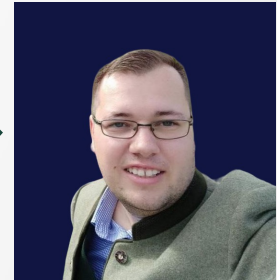
B.Eng, Jadavpur University, India
Visiting Time: 05/22-09/22
Publication: SafeAI Workshop@AAAI'23
(Best Paper Award Finalist) & ICLR'24

More Internship Spotlights

Mentoring the next generation of researchers is central to our mission, and we collaborate with talented students through summer internships. Past interns share how their experiences at OPTML reflect the vibrant, hands-on learning environment we foster for all members.

“I'm grateful for my internship with Professor Sijia Liu's group in 2022. His mentorship was exceptional; he provided clear instructions and well-organized resources that made complex research feel accessible. His adaptive, hands-on approach was instrumental to our success, leading to our award-recognized ICASSP paper". Professor Liu creates a productive and enjoyable research environment that I highly recommend to any student seeking a stimulating, collaborative experience.

Visiting Time: 05/23-02/24
Publication: top 3% @ ICASSP23



Peter Lorenz

Ph.D. Student,
Heidelberg University



Zhuoshi Pan

MS. Student,
Tsinghua University

internship here was a pivotal experience where I dove into fascinating topics like adversarial attacks and diffusion models, culminating in a paper at NeurIPS'24. This achievement was only possible thanks to the incredible mentorship from Professor Liu and my senior, Yuguang Yao; their guidance on research direction and unwavering support were invaluable throughout the process. If you're passionate about creating impactful AI research, I sincerely recommend this lab—it's the perfect place to realize your ambitions.

Visiting Time: 05/23-02/24
Publication: NeurIPS'24

My internship at OPTML was an unforgettable experience. From brainstorming the initial idea and designing experiments to writing the final paper, Professor Liu and my mentor, Yihua Zhang, provided me with incredible resources and support. Most importantly, I learned valuable habits and qualities throughout this process that are worth far more than the paper itself. The group's research is top-notch, the resources are abundant, and the atmosphere is amazing. OPTML is an excellent choice! 🙌

Visiting Time: 05/24-10/25
Publication: ICCV'25



Yuhao Sun

MS. Student, USTC

From High School to MIT: An OPTML Story

Our commitment to mentorship extends to supporting the next generation of talent even before university. We were delighted to host Brian Zhang, a Michigan high school student, for a three-month externship. A member of the U.S. Physics IPhO team and winner of the 2025 Gold Medal, Brian's research at OPTML also earned him recognition as one of the Top 300 Scholars in the 2025 Regeneron Science Talent Search.



Brian Zhang

Bachelor of Science, Physics and EECS, MIT, 2025-2029

U.S. Physics IPhO team 2025 (Gold Medal)

Top 300 Scholar, Regeneron Science Talent Search 2025
(recognized for research at OPTML)

Research Project: Elevating Visual Prompting in Transfer Learning via Pruned Model Ensembles: No Retrain, No Pain [Paper at ICASSP'24]

Visiting Time: 05/2023 – 09/2023

“Working with the OPTML group was a transformative first research experience for me. I researched the accuracy improvement of the efficient AI technique visual prompting and the effectiveness of adversarial attacks on other efficient AI methods. This taught me significantly about both the efficient AI subfield and the research process as a whole, from understanding papers to analyzing data and writing a paper. Throughout my projects, I was very lucky to receive dedicated mentorship and guidance from Professor Liu and Yuguang. I'm now excited to explore deeper into other ML research in the years to come.”



[Up] OPTMLers at Burggarten, MI
 [Mid. L] Yihua's Fitch Beach Award Ceremony
 [Mid. R] OPTML and IBM/GDM at CVPR'24, Seattle
 [Down L] OPTMLers at NeurIPS'24, Vancouver, CA
 [Down R] OPTMLers hiking around Lake Lansing, MI



OPTML Having Fun!

At OPTML, we believe that groundbreaking research is powered by a vibrant and supportive community. While our work is demanding, we cherish the moments that build strong bonds of friendship and collaboration outside of the lab.





[Up L] Kicking Off Fall 2024!
[Up R] OPTML Reunion in Bay Area, California, when everyone is doing summer interns, 2025
[L] OPTMLers celebrating Chinese New Year, 2025.

Fueling Our Neurons

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Yes, OPTMLers love food and most importantly, we explore delicious food together! It's one of our most vital, non-peer-reviewed research activities.



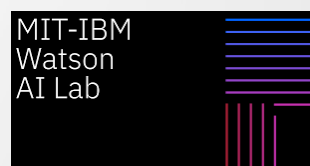
[L] Jiancheng's birthday!
[Down L] BBQ at Lake Lansing, Fall 2025!
[Down R] Yuguang and Jinghan sharing a Tonkatsu in Hawaii at ICML 2023.



Collaborations

At OPTML, collaboration is central to our research identity. We cultivate strong partnerships with industry pioneers and world-renowned academic institutions to create a dynamic ecosystem that bridges foundational research with real-world challenges. This ensures our work is not only cutting-edge but also deeply impactful. For our students, this vibrant network provides invaluable opportunities to gain industry experience through internships, co-author papers with leading experts, and build a global professional network that will support them throughout their careers.

Industry Collaborators



Other Supporters



Join Us !

Shape the Future of AI at OPTML

We are looking for the next generation of AI pioneers: passionate, ambitious thinkers and builders who want to create real-world impact. At OPTML, you won't just be joining a world-class research lab at the forefront of trustworthy and scalable AI; you'll be joining a vibrant, supportive community dedicated to launching your career.

Fully Funded PhD Students

Who We Are Looking For

We maintain a high bar for PhD applicants and seek ambitious, optimistic individuals who combine strong technical foundations with collaborative spirit. Competitive candidates will demonstrate

- Strong foundations in mathematics, ML algorithms, and programming.
- Academic excellence shown through GPA, publications, or impactful projects.
- Implementation skills, particularly with generative models (Diffusion models, LLMs, VLMs).
- Collaborative mindset, being easy-going, motivated, and innovative team players.

How to Apply

We strongly encourage interested candidates to reach out directly to Dr. Liu at liusiji5@msu.edu with your CV and a short message on why you are interested in our group. Applications are competitive, so reaching out early is highly recommended. Inquiries made before **November 1, 2025**, are preferred. You are also welcome to connect with any of our current members to learn more about life at OPTML

Post-doc Positions

OPTML also welcomes highly capable near-graduation PhD students to apply for postdoctoral positions. Please send your CV and three representative works to Prof. Sijia Liu. We look forward to hearing from you!



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