

The vision of AI2ES is to create trustworthy Artificial Intelligence (AI) methods for diverse environmental science (ES) users that will revolutionize our understanding and prediction of high-impact atmospheric and ocean science phenomena and create new educational pathways to develop a more diverse AI and environmental science workforce.



# AI2ES News

Edited by Raven Reese, Dr. Amy McGovern,  
Mel Wilson Reyes, and Dr. Philippe Tissot

## August 2024 Edition

### Introduction

In the August edition of our AI2ES newsletter, we focus on the students! This newsletter highlights seven students who are spending their summer discovering new environments, learning new skills, contributing to research efforts, and providing representation for AI2ES at internships across the country. With the amount of beneficial experience shared by our students this month, we hope these stories may be a preview of their future work endeavors! Although graduation still lies ahead for many of these interns, a large number of AI2ES students are completing their studies during our fourth year of existence, including three PhD students graduating from OU this summer. This is a bittersweet moment for their advisors and research teams, but we are super excited to see our students embrace this next step in their careers. We look forward to staying in touch as they continue to succeed in their careers, and are thankful for their major contributions to AI2ES through its beginning years. This newsletter is also an opportunity to reflect on our graduating students' experiences at AI2ES, what helped them in their growth as scientists, and what we could improve upon as an organization.

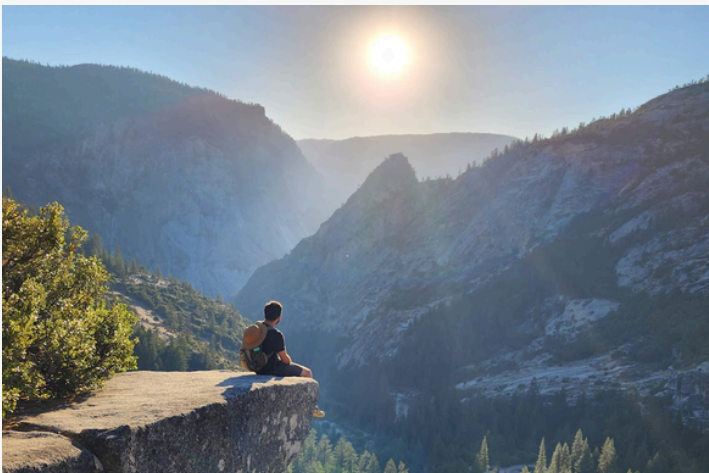
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## Internship Spotlight

This year, AI2ES students took to every corner of the country (and some internationally) in pursuit of different internship opportunities. Undergraduate, graduate, and doctoral team members alike applied and successfully secured a diverse set of internships from coast to coast. Amidst the excitement and exhaustive nature of these new experiences, seven AI2ES students offer a glimpse into their progress during this summer's internship season.

### Western U.S.



Beto Estrada hiking in Yosemite National Park, CA

This first group interview highlights our AI2ES students and their internships on the West Coast of the United States. Far from their home lab at Texas A&M University - Corpus Christi (TAMU-CC), Beto Estrada, Graduate Research Assistant, and Savannah Stephenson, Undergraduate Research Assistant, applied for internships at NRL in Monterey, California, and NOAA in Seattle, Washington. As well-equipped computer scientists, Beto and Savannah are spending their summer honing new skills to grow as scientists

and bring back to their respective AI2ES projects. Beto returns for a third consecutive summer to the Naval Research Enterprise Intern Program (NREIP) at the Naval Research Lab (NRL) in Monterey to continue his work on a machine-learning weather prediction project. Although part of the information remains "classified" from the public, the model should prove important in its ability to forecast extreme weather events such as "haboobs" or intense dust storms, for NRL. His three summers at the lab allowed Beto to grow as a researcher; in his own words, "my personal skill level has changed a lot, especially compared to 2022." In Seattle, soon-to-graduate Savannah joins the NOAA for a second summer under the José E. Serrano Educational Partnership Program with Minority Serving Institutions (EPP/MSI) grant at the Pacific Marine Environmental Lab. Her primary task during the internship is to contribute to the development of a Python library that NOAA will use to access their collected data for the Argo program, an "international program that collects information from inside the ocean using free drifting profiling floats" (AOML). After a malfunction in the previous data library that caused a "denial of service attack" during one of NOAA's research workshops, Savannah and her fellow interns were put to the challenge of coding a functional, user-friendly system for preserving and sorting oceanic data. Savannah embraces this project with enthusiasm, overcoming her seasonal descent into the self-designated role of "evil computer scientist" who avoids coding during her vacation. Rather than falling into the summer slump, Savannah is now contributing to a federal data program with constituents and partners across the globe.



Sydney Stephenson, Savannah Stephenson, and Kristen Stephenson at Wallace Falls State Park, WA

The key to their success in securing these beneficial internships is access to a valuable network and the zeal to apply without fear of rejection. For Beto and other students at AI2ES, that vast network of experienced researchers is practically built into the workspace around them. Dr. Chuyen Nguyen, postdoctoral researcher at NRL and AI2ES collaborator, first brought the potential internship offer to Beto and his lab in 2021. Applying for the next summer's session, Beto learned to lean into his team and leverage their advice to further his goals as an AI researcher. Similarly, Savannah did not hold back in applying for every internship recommended by AI2ES faculty and team members. "Apply to things on a whim" she advises, as this approach eventually achieved for her a stellar internship with one of the largest federal research organizations in the country. This is not to say that Beto and Savannah didn't experience the same apprehension as any other student applying for an internship; however, the chance to experience all that an internship can offer is too valuable to squander out of fear. When they aren't acquiring new skills in their respective labs, Beto and Savannah are exploring

the awe-inspiring scenery of California and Washington. During a visit to Big Basin State Park, Beto discovered the beauty of Santa Cruz's dense Redwood population. Savannah, up north in Seattle, spends her free moments visiting local fixtures such as the city's expansive flea market scene. Internships like theirs are not only a great opportunity for research, but to also see the world in ways that students may not even imagine so early into their careers.

## Central U.S.

Farther inland, three students extended their studies through the summer with internships in Boulder, Colorado, and San Antonio, Texas. Miranda White, doctoral candidate and graduate research assistant at AI2ES, discussed the unique opportunity that motivated her move from TAMU-CC to Colorado for 12 weeks: the chance to design an internship experience focused on her doctoral research project. She accomplished this freedom of summer research with support from NOAA's Center for Coastal Marine Ecosystems ([CCME](#)) program, a fellowship that encourages coastal student research (with a required summer internship stipulated in the award agreement). Already destined for Boulder to work alongside NOAA researchers on her project, titled "Quantifying and Visualizing Uncertainty of Machine-Learning Derived Predictions for Enhanced Coastal Decision-Making," Miranda knew it would be a perfect time to build even closer ties with the AI2ES Weather Visualization/Machine Learning and Risk Communication scientists at NOAA and NSF's National Center for Atmospheric Research ([NCAR](#)). This strategic trip to Boulder split



Miranda's time between NOAA's Global Systems Lab ([GSL](#)) and NCAR's Foothills Lab, dividing her summer into a busy interdisciplinary research schedule for even a seasoned researcher of her caliber. However, she wasn't alone while almost a mile above sea level and several states away from the Gulf Coast; another member of her lab, UGRA and Del Mar College student Hector Marrero Colominas, joined her in Boulder at NCAR's Research Application Laboratory ([RAL](#)).



Replica of the torch held by the Statue of Liberty at USAA's San Antonio office, TX

For his second summer internship experience, Hector applied to RAL's internship experience with the Weather Systems and Assessment Program ([WSAP](#)). Earning his spot in the program after several rounds of interviews, Hector works alongside other undergraduate interns to develop a machine-learning model that can ultimately predict fluxes in the "parametric off-shore surface layer for both the East and West Coast of the

U.S." more accurately than the standard empirical approach, the Monin-Obukhov similarity theory (MOST). This internship differs from the project that Hector conducts at home, as his work at TAMU-CC's AI2ES lab is focused on coastal predictions, and his internship position presents a broader atmospheric data set for model development. Though the task poses a greater challenge, Hector benefitted from having a mentor and teammate alongside him in Boulder. Hector and Miranda are both members of the "Cool Turtles" cold-stunning prediction team, so her presence in Colorado provided support and familiarity as he navigated a world away from home. Travel can be intimidating, but for those who prefer staying close to home, there are plenty of internship opportunities still out there! Christian Duff, fellow "Cool Turtle" and UGRA at TAMU-CC, discovered an internship that only required a two-hour car ride from his lab in Corpus Christi. After a successful career fair hosted by his university, Christian earned a spot at [USAA's Enterprise Data & Analytics](#) internship program. This summer work experience allows aspiring data engineers and computer scientists to work with real-time user data as a means of improving client interactions with the banking service. Real, applicable training programs are essential to building a valuable set of research skills that students can bring home to their places of study; even more important, though often overlooked as a benefit of the internship process, are the soft skills acquired through exposure to these new environments.

Networking is a skill that is often learned without intention. Pushing students in a new place with different faces is an effective approach, as seen in the growing class of AI2ES alumni who go



Now well-acquainted with the Risk Communication team at NCAR and Jebb Stewart, branch chief of Weather Visualization and AI Research Development at GSL, Miranda White understands how her network and the skill of meeting new researchers allows her to further pursue professional research goals and opportunities. This summer's joint internship with NOAA and NCAR highlights their offices' "capacity for convergent, interdisciplinary, and team-oriented sciences." With a fine-tuned network of knowledgeable scientists such as AI2ES's Jebb Stewart, Dr. Julie Demuth, Dr. Chris Wirz, and Dr. Mariana Cains, Miranda was empowered to build upon her skills and experience with use-inspired ML research, creating a highly impactful summer research experience to advance her doctoral research for the next semester. At NCAR, Hector jumpstarts his college career by working directly under renowned researchers such as Dr. Sue Haupt, Senior Scientist, and Dr. Susan Dettling, Senior Software Engineer for both RAL and WSAP. However accomplished these many leading scientists are in their fields, Miranda has found that "it's not just them being at a high-level in their domain, but they're also just great leaders. They care about me and the research." In all, she emphasizes to students preparing for internship opportunities to "know who you know. It's always great to know what you know, but it's also about knowing who you know and who empowers you to grow." At AI2ES, "there are so many people we can contact for different types of opportunities," and as Hector concurs, "don't be afraid to ask! It's more welcomed than I initially thought to just reach out to people." Even for external opportunities, Christian found that "nine times out of ten, they are more than willing and

even eager to help, because they've been where you've been and want to see you succeed." The tenacity to ask, combined with material preparedness (CVs, resumes, application procedures), sets up any student for a summer of successful research.



Christian Duff dominating the intern-versus-intern match of ultimate frisbee, San Antonio, TX

Research is not everything, though it is the intended purpose of these internship journeys. Miranda, Hector, and Christian still manage to fit fun into their packed schedules in Boulder, CO, and San Antonio, TX. Surprisingly, Christian discovered that the bland environment of a typical bank was not fated for him during his experience at USAA. If anything, "USAA is very much like a college campus", and "during the summer, they have rec leagues for ultimate frisbee and basketball." The internship even hired professional photographers for the game to capture action shots of the data engineers, like the one seen above. Up in Boulder, Miranda and Hector also



find time to enjoy their summer outside of the lab. NCAR's Risk Communication team arranged dinners and extra-internship activities such as a trip to Colorado State University. There, alongside AI2ES members such as Dr. Imme Ebert-Uphoff, Dr. Elizabeth Barnes, Dr. Marie McGraw, and AI2ES University of Albany graduate student Carly Sutter, the students received priceless guidance over their projects. Hector reminisces, "the feedback we got for our research, such as discussions on how to progress with our uncertainty quantification research, was something we would never hear if we didn't go to Colorado State" for that meeting. After new collaborations, outdoor excursions, and passions sparked for ultimate frisbee, the three researchers will return to Texas at the end of July with a fresh outlook on their role as AI scientists.

## Eastern U.S.

Finally, on the east coast of the U.S., TAMU-CC UGRA Andrew DeSimone and graduate research assistant Matthew Kastl pursue internships that bear little resemblance to their projects at home. In Washington D.C., Matthew Kastl joins the legacy of AI2ES members interning at the Naval Research Lab (NRL) NREIP program to work with AI integration and stereovision in robotic systems. After "this really cool guy named Beto Estrada" recommended the NRL internship experience to Matthew, he applied. "Sadly, we ended up in different locations," but this division of the two research buddies allowed Matthew to discover the vast expanse of NRL projects across the country. This summer, NRL's internship program asked Matthew and his cohort to develop AI models that use "stereo-imagery and object detection to have

a robot solve a problem." The learning curve became clear to Matthew soon into the ten week period; although his home institution equipped him well with the skills to process stereo-imagery through his work on the AI2ES Coastal Inundation project, Matthew never previously developed AI for robotic systems. Similarly, Andrew DeSimone embarked on a robot-centric internship in Charlotte, North Carolina with the University of North Carolina (UNC) REU program. Andrew applied for multiple REUs after his first experience at TAMU-CC, and eventually received an invitation to North Carolina for their summer internship. This REU focused on creating an AI model that assists their robot mechanism in avoiding objects along a designated path. Though equally uninitiated to the world of robotics, Andrew was surprised to find that much of what he was learning "can be applied in a more rigorous sense" to his custom loss function project from last year's REU and his AI2ES research at TAMU-CC.

The summer was challenging for Matthew and Andrew. Robotics opened an entirely new world of research for the two interns with only a few weeks to explore. However, the reward for their valiant efforts is not for naught. By the end of his internship, Andrew DeSimone will produce both a presentation on his AI-driven robot and a research paper to take home or publish if he so chooses. This is a feat for an undergraduate, as many do not produce publishable papers until they enter a graduate program! In Matthew's case, the independent research environment provided by NRL was his "first internship doing academic research" rather than following modules or a guided set of courses. Despite the challenge created by an internship in both robotics and

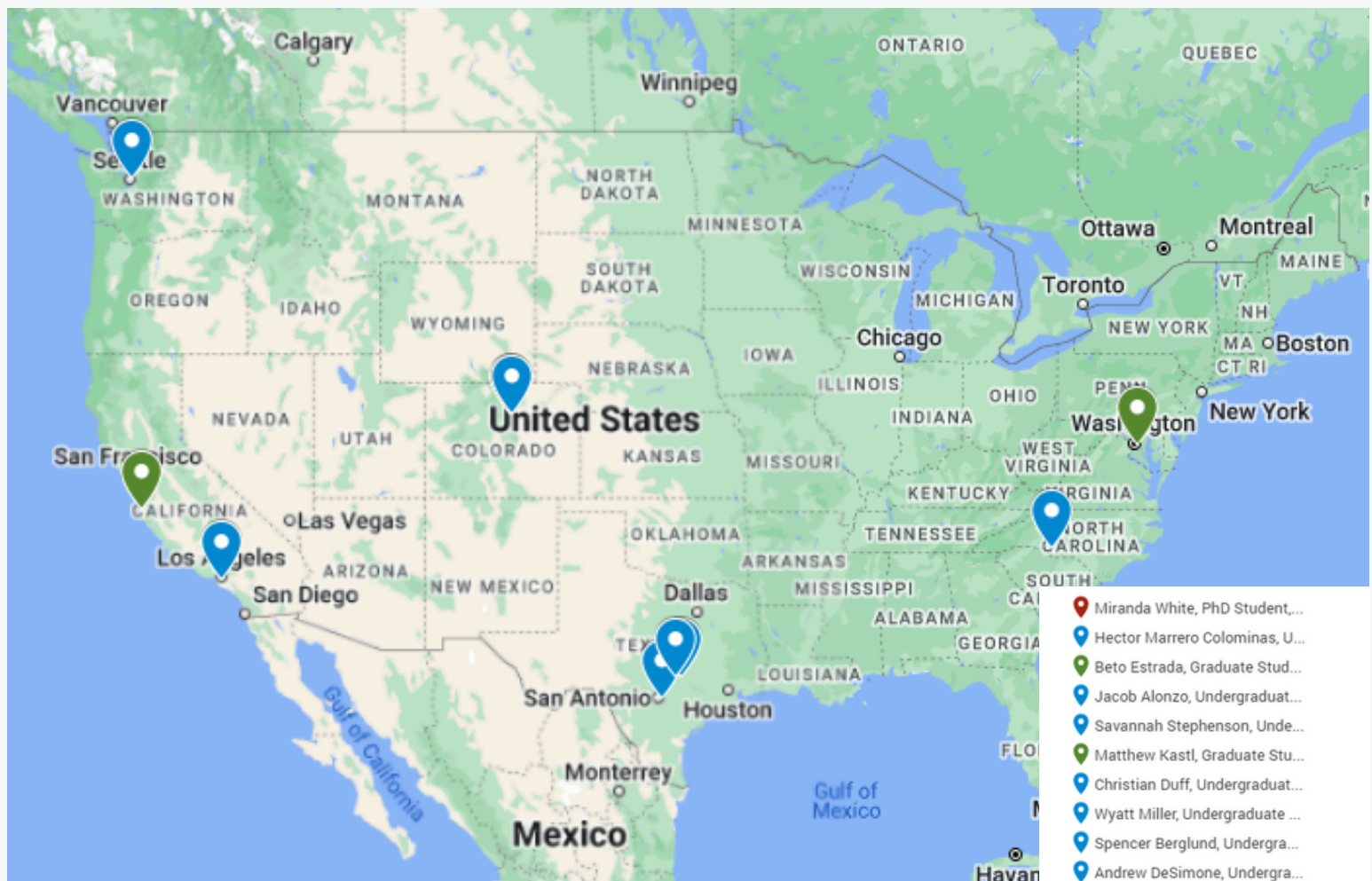




independent study, Matthew found that “running experiments with robotics is fun because you get to see things move” when successfully integrated with his AI model. This new experience with robotics is not one that Matthew and Andrew would dissuade any other student from pursuing, even if they have never worked in the field before their internship. Andrew reassures potential applicants to not “be burdened by what you feel you’re capable of or what you’ve done before. They’re not going to let you fail.” These programs are designed to teach, not to discourage, so any student who may find robotics interesting is a perfect candidate before they even begin. Matthew shares a similar sentiment, reminding students that “if you’re in AI2RES, you’ve already made it, and you can do it. It’s going to be hard, but no matter what it is, it’s something that you’re learning, it’s something that is helpful, and you’re going to get through it.” Above all else, even in the face of adversity during any internship, the best advice to abide by is to “Have fun!”

## Google “Intern-”active Map

Below is a visualization of the vast expanses that our students travelled for their summer internships. Check out the map below, or click on [this hyperlink](#) to interact with the map markers for more details on each location.





## AI2ES Graduates: 2023-2024

We want to offer another congratulations to every student who graduated from their college program under AI2ES! Your contributions to our team are immeasurable, and we trust that your skills will carry you far into your career. Thank you for your brilliance, dedication, and friendship over the past four years; though we are sad to see you go, we know that your mark on AI2ES's legacy will remain through our future as an NSF research institution. Below, we have recapped many of our graduate's favorite memories and experiences with AI2ES for us all to reflect on as we hit our four-year benchmark.

### Student

- Position at AI2ES
- Graduated Program
- Next Step Post-Graduation

### Marina Vicens-Miquel

- Graduate Research Assistant
- PhD. in Geospatial Computer Science, TAMU-CC
- Postdoctoral position with Dr. Amy McGovern, AI2ES

### Beto Estrada

- Graduate Research Assistant
- B.S in Computer Science, TAMU-CC
- M.S in Computer Science at TAMU-CC

### Katherine Colburn

- Undergraduate Research Assistant
- B.S. in Kinesiology, TAMU-CC
- PhD. of Occupational Therapy, TTU Health Sciences Center

### Matthew Kastl

- Graduate Research Assistant
- B.S. of Computer Science, TAMU-CC
- M.S. in Computer Science at TAMU-CC

### Amanda Burke

- Research PhD Student
- PhD. in Meteorology, OU
- Support Scientist at NASA Data Science Group

### Bethany Earnest

- Graduate Research Assistant
- PhD. in Computer Science, OU
- Principle Data Scientist in Industry

### Tiffany Le

- Undergraduate Research Assistant
- B.S. in Computer Science, OU

### Amanda Murphy

- Graduate Research Assistant
- Ph.D. in Meteorology, OU
- Dataflow Analyst at NCEP Central Operations

### Michael Yu

- Undergraduate Assistant
- B.S. in Computer Science, B.S. in Math, and B.A. in Music, OU
- PhD. in Computer Science at UW—Madison

### Kristina Moen

- Graduate Research Assistant (CIRA)
- M.S. in Mathematics, CSU
- PhD. in Mathematics at CSU





## We asked our graduates: What AI2ES activities have been the most impactful for you? Can you offer any potential advice for AI2ES to improve their students' journey?

"There have been many impactful moments within AI2ES. Some of the most impactful AI2ES activities, to me, are:

1. AI2ES Retreats: Meeting AI2ES researchers and students in person made a significant difference for me. Engaging with people in real life was completely different from virtual interactions. Additionally, the AI2ES retreat was extremely important for understanding the research being conducted by other institutions within AI2ES. This year, we also had the opportunity to meet the new institutions joining AI2ES through the NSF Expand grants (I was not aware that we grew that much!). However, the most important activity for me was the postdoc panel at the AI2ES 2023 Retreat. This panel had a major impact on me, as everything discussed was highly relatable to my PhD journey, and I learned a tremendous amount. I missed having this panel this year.

2. Site-Wide Meetings: These meetings are essential for gaining insights into the work being done by other universities within AI2ES. They are also extremely useful for keeping up with the rapid developments in research.

One of the most impactful aspects for me, though not an AI2ES activity per se, is the AI2ES culture. The culture within AI2ES fosters an environment where researchers and faculty are happy and excited to engage in discussions with students. Everyone's opinions are listened to and valued, which is not common within the CS or Mathematics departments at TAMUCC. AI2ES makes you feel like an important part of the team, and this respect and inclusivity are how I was educated and how I interact with the undergraduate and graduate researchers I work with. The AI2ES culture makes me feel respected, and I want to continue promoting this culture." - **Marina Vicens Miquel, TAMU-CC**

"The AI2ES AMS meetings were great experiences, especially for networking. Even just attending the AMS conference itself and watching the other AI2ES member's presentations helped me to realize what work was being done at each level and where my own research could lead to." - **Beto Estrada, TAMU-CC**

"Conferences for sure, those connections are priceless" - **Amanda Burke, OU**



"The most impactful activity for me was attending and presenting at AMS for the last three years. Not only did I learn a lot from all the other students, but I thoroughly enjoyed interacting with people and receiving positive ideas each time about how I could improve my methods" - **Katherine Colburn, TAMU-CC**

"AI2ES gave me a jump start on the academic world. It got my foot in the door to research propelling me forwards into my masters." - **Matthew Kastl, TAMU-CC**

"Interacting with the other students who came in for the summer REU program was really helpful since it showed me that everyone is kind of lost and it's not just me. So, on that note, it'd be nice if the students (either pursuing the same degree level or across levels) worked together more on projects to encourage that interaction." - **Michael Yu, OU**

## **We followed up with another question: Any memorable experience or quote you would like to share with the AI2ES Newsletter?**

"My most memorable experience was eating at the Rusty Scupper Restaurant & Bar in Baltimore with other AI2ES members during the AMS 2024 Conference week. Dr. Philippe Tissot was able to reserve the top floor." - **Beto Estrada, TAMU-CC**

"The time I made a ML model that predicted temperatures in the US as hotter than the surface of the sun" - **Amanda Burke, OU**

"My most memorable experience occurred while presenting a poster at AMS 2024. Two individuals from AI2ES (outside my usual circle of interactions) came up who remembered me from AMS 2023 and asked how my kinesiology degree was going. This left an impression on me because it made me feel like I still belong with AI2ES despite my unconventional major. I think it shows how supportive AI2ES is and the desire for collaboration and innovation, no matter your area of expertise." - **Katherine Colburn, TAMU-CC**

"When we got together to watch the baby turtles released in the summer of 2021!" - **Bethany Earnest, OU**

"Going to conventions such as AMS has been incredibly rewarding and impactful." - **Matthew Kastl, TAMU-CC**

"You just started. You're supposed to be dumb. Everyone is, so ask lots of questions." - **Amy McGovern" - Michael Yu, OU**



## **Thank You Again Graduates for Contributing to AI2ES's Mission!**

We are excited to see what lies ahead for you and your research! Thank you again to mentoring professors, researchers, and team members for guiding these graduates to the finish line. One of AI2ES's strong suits is our collaborative nature, and we will continue to uplift students until the end of their educational journey and beyond!



Group Photo at AI2ES @ AMS 2024 in Baltimore, MD

**Don't forget to prepare for January 12th, 2025 for the next AI2ES @ AMS gathering in New Orleans, Louisiana!**

More details to come, so check for updates in your email!

To view recordings for past Site-Wide meetings, please visit:  
<https://www.ai2es.org/publications/ai2es-talks/>