Arijit Ray

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Goal

To train machines to understand the 3D visual world and language to help people complete tasks faster.

Appointments

Fall'21 - ? **Research Fellow**, Boston University
Advised by Kate Saenko, Bryan Plummer, and Ranjay Krishna (University of Washington). Partly funded by DARPA Semantic Forensics with UC Berkeley.

Fall'23 **Teaching Fellow**, Boston University
Designed and co-instructed graduate-level CS 541, Applied Machine Learning.

Summer'23 **AI Resident**, Google X Moonshot Labs
Worked in the Mineral Team- adapted multimodal language models for custom phrase localization - useful for detecting specific diseases on strawberries described by language.

Summer'22 **Research Scientist Intern**, Meta (Facebook) AI (FAIR)
Developed a benchmark to explore adaptation strategies for compositional reasoning in vision-language models.

2017 - 2021 **Computer Scientist**, SRI International
Developed vision-language models that can rationalize for DARPA Explainable AI Program.

Summer'16 **Deep Learning Intern**, Blue River Technology
Developed weed detection - a key selling point leading to John Deere acquisition for $305M.

2016 - 2017 **Graduate Research Assistant**, Virginia Tech
Improved robustness of models that can answer questions about images. Advised by Devi Parikh

Education

2021 – ? **Ph.D., Boston University**, Computer Science
Teaching machines to compositionally reason about vision, language, and action.
Advised by Kate Saenko, Bryan Plummer, and Ranjay Krishna (University of Washington).

2022 – 2023 **Visiting Student, MIT**, AIForImpact Venture Studio, Media Lab
Formulating how vision-language AI can impact various verticals.

2015 – 2017 **M.S., Virginia Polytechnic Institute and State University**, Computer Engineering
Thesis: *Developing models that can converse with humans, advised by Devi Parikh.*

2011 – 2015 **B.Tech., SRM University, India**, Electrical Engineering
GPA: 9.05/10*, First-Class Distinction. Received Academic Merit Scholarship.*

Research Publications

Pre-prints

1. **A. Ray**, D. Bashkirova, R. Tan, K.-H. Zeng, B. A. Plummer, R. Krishna, and K. Saenko, *R2d3: Imparting spatial reasoning by reconstructing 3d scenes from 2d images*, in submission, 2024.

2. D. Bashkirova, **A. Ray**, R. Mallick, S. Bargal, J. Zhang, R. Krishna, and K. Saenko, *Lasagna: Layered score distillation for disentangled object relighting*, in submission, 2023.

Peer-reviewed Conferences

1. J. Zhang, Z. Huang, **A. Ray**, and E. Ohn-Bar, "Feedback-guided autonomous driving," *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2024, (Highlight, top 2.8%).
2. **A. Ray**, F. Radenovic, A. Dubey, B. A. Plummer, R. Krishna, and K. Saenko, "Cola: How to adapt vision-language models to compose objects localized with attributes?" *Conference on Neural Information Processing Systems (NeurIPS)*, 2023.
3. R. Tan, **A. Ray**, A. Burns, B. A. Plummer, J. Salamon, O. Nieto, B. Russell, and K. Saenko, "Language-guided audio-visual source separation via trimodal consistency," *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, pp. 10 575–10 584, 2023.
4. K. Alipour, **A. Ray**, X. Lin, M. Cogswell, J. P. Schulze, Y. Yao, and G. T. Burachas, "Improving users' mental model with attention-directed counterfactual edits," *Applied AI Letters*, vol. 2, no. 4, e47, 2021.
5. **A. Ray**, M. Cogswell, X. Lin, K. Alipour, A. Divakaran, Y. Yao, and G. Burachas, "Generating and evaluating explanations of attended and error-inducing input regions for vqa models," *Applied AI Letters*, vol. 2, no. 4, e51, 2021.
6. K. Alipour, **A. Ray**, X. Lin, J. P. Schulze, Y. Yao, and G. T. Burachas, "The impact of explanations on ai competency prediction in vqa," *2020 IEEE International Conference on Humanized Computing and Communication with Artificial Intelligence (HCCAI)*, pp. 25–32, 2020.
7. **A. Ray**, K. Sikka, A. Divakaran, S. Lee, and G. Burachas, "Sunny and dark outside?! improving answer consistency in vqa through entailed question generation," *Proceedings of the 2019 Conference on Empirical Methods in Natural Language Processing (EMNLP)*, pp. 5860–5865, 2019.
8. **A. Ray**, Y. Yao, R. Kumar, A. Divakaran, and G. Burachas, "Can you explain that? lucid explanations help human-ai collaborative image retrieval," *Proceedings of the AAAI Conference on Human Computation and Crowdsourcing*, vol. 7, no. 1, pp. 153–161, 2019.
9. **A. Ray**, G. Christie, M. Bansal, D. Batra, and D. Parikh, "Question relevance in vqa: Identifying non-visual and false-premise questions," *Proceedings of the 2019 Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2016.

Workshops

1. K. Deng, R. Tan, S. Gabriel, B. Plummer, K. Saenko, and **A. Ray**, *Socratis: Are large multimodal models emotionally aware?* ICCV Worskshop on Emotionally and Culturally Aware AI (Oral), 2023.
2. S. Ghosh, G. Burachas, **A. Ray**, and A. Ziskind, *Generating natural language explanations for visual question answering using scene graphs and visual attention*, IJCAI/ECAI Workshop on Explainable Artificial Intelligence, XAI 2018, 2018.

Patents

1. G. Burachas, **A. Ray**, and Y. Yao, *Attention-based explanations for artificial intelligence behavior*, US Patent 10,909,401, Feb. 2021.
2. A. Divakaran, K. Sikka, **A. Ray**, X. Lin, and Y. Yao, *User targeted content generation using multimodal embeddings*, US Patent App. 17/191,698, Sep. 2021.

Awards

2019 **Shark Tank Award**, SRI International, Center for Vision Technologies.
Received $50,000 *for* 6 *months that supported my project on generating personalized content. Awarded to 3 projects in the center.*

2016 **Employee of the Fortnight**, Blue River Technology.
Only intern to win this award for quickly prototyping a plant detection model, a key selling point for the company.

2013 **Silver Medal**, Research Day, SRM University.
For designing a white paper on an exoskeleton suit. Rank 2 *out of* ~300 *students in the department.*

2012 **Academic Merit Scholarship**, SRM University.
Rank 3 *out of* ~300 *students in the Electrical Engineering Department.*

Mentoring

2023 – ? Xavier Thomas (MS BU)
Gitika Jha (AI4All Undergraduate BU)
Katherine Deng (AI4All Undergraduate BU)

2023 Jiayi Shen (AI4All Undergraduate BU; now MS student at Brown University)

2022 Praneeth Chandra Bogineni (MS BU; now at a startup, Oplus.ai)

2018-2021 Kamran Alipour (UC San Diego; now Senior AI R&D Engineer, Williams Sonoma)

2019 Julia Kruk (SRI International; now MS student at Georgia Tech)

Leadership

Spring'23 **Student Leadership**, AI For Impact Venture Studio, MIT Media Lab
Part of the student leadership council organizing networking events with over 100 attendees from 3 schools in the Boston area.

2021 – 2022 **Co-chair**, AI+X of BU and Harvard
Started a graduate student workshop investigating how AI can impact contemporary research areas.

2016 – 2017 **Vice President**, Tau Beta Pi Engineering Honor Society
Vice President of the Virginia Tech Chapter

Venture Experience

Summer'24 **Build @ Pillar VC**, Pillar VC
Selected as one of the Build @ Pillar VC summer cohort (40 out of 300+ applicants) working on Robotics and AI.

Professional Service

2016 – ? **Reviewer**
Neurips'22-24, CVPR'24, ECCV'24, EMNLP'23, COLING'22, ACM Multimedia 2021, CVPR 2016.

2022, 2017 **Judge**, Blue Ridge Highlands Regional Science Fair
Science fair for high-school students

Media

2019 **TechXplore, Phys.org**
An image-guessing game to evaluate the helpfulness of machine explanations, presented also as a CVPR 2019 Demo and AAAI HCOMP 2019 Poster.

2014 **Indian Express, Deccan Chronicle, Engineering.Careers360**
Prototyped an Unmanned Autonomous Drone for identifying disaster victims.

Early Achievements

2011 All India Undergraduate Entrance Examination (SRM-JEE)
99%*ile among students in India.*

All India Central Board Examinations
Mathematics score: 97/100, 99%*ile among students in India.*

2007 National Science Olympiad
All India Rank: 168, *City Rank:* 7. *Maintained a national rank* < 600 *in National Science Olympiads* 2008, 2009, 2010

2006 Founded middle-school science society
Goal of encouraging middle-school students to take an interest in science. Won accolades in multiple school/city-level exhibitions.