Shivendra Agrawal

Resume

Boulder, Colorado
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Summary - I am a final year **Ph.D. student** at CU Boulder. I am interested in Robotics, Accessibility, and Human Robotics Interaction (HRI) and unifying them to create real-world Assistive Technology. My thesis involves developing assistive robotic systems that can assist people with visual impairments in performing daily tasks more independently by providing long-term and fine-grain guidance.

Education

2019– **University of Colorado, Boulder**, *Ph.D. Candidate*, *Computer Science*.

2017–2019 **University of Colorado, Boulder**, *MS*, Computer Science.

2009–2014 **Indian Institute of Technology, Kharagpur**, *Dual Degree*, *Mathematics & Computing*.

Publications

2024 **ShelfMCL: Semantic particle filter localization with low-cost sensors**, *Shivendra Agrawal, Ashutosh Naik, Jake Brawer, Bradley Hayes*, *In development*, Summary - A novel semantic Monte Carlo localization algorithm that requires just an RGB-D camera and a visual odometry camera.(PROJECT PAGE).

2023 **ShelfHelp: Empowering Humans to Perform Vision-Independent Manipulation Tasks with a Socially Assistive Robotic Cane**, *Shivendra Agrawal, Suresh Nayak, Ashutosh Naik, Bradley Hayes*, AAMAS 2023, Summary - A novel product locator algorithm and a Markov Decision Process (MDP) based verbal guidance system that issues fine-grain manipulation guidance to help retrieve desired items from shelves. (PROJECT PAGE).

2022 **Workshop: ShelfHelp: Empowering Humans to Perform Vision-Independent Manipulation Tasks with a Socially Assistive Robotic Cane**, *Shivendra Agrawal, Bradley Hayes*, IROS 2022 Workshop, (PAPER LINK)(PROJECT PAGE).

2021 **A Novel Perceptive Robotic Cane with Haptic Navigation for Enabling Vision-Independent Participation in the Social Dynamics of Seat Choice**, *Shivendra Agrawal, Mary Etta West, Bradley Hayes*, IROS 2022.
Summary - A robotics cane system that enables users to navigate to socially preferred empty chairs optimizing for users' privacy, and intimacy. (PAPER LINK)(PROJECT PAGE)

2019 **Explanation-based Reward Coaching to Improve Human Performance via Reinforcement Learning**, *Aaquib Tabrez, Shivendra Agrawal, Bradley Hayes*, Best paper nominee, HRI 2019.
Summary - A new framework to infer the human collaborators' mental view of the optimum state, predict future failure based on the inferred human mental model and provide interpretable feedbacks to help the human in a shared task. (PAPER LINK)(PROJECT PAGE)

Teaching

Instructor CSCI 3104 Algorithms - Best Part Time Graduate Instructor (2019-2020).

TA CSCI 3104 Algorithms - Outstanding TA award (2018, 2019).

CSCI 3002 Fundamentals of Human Computer Interaction.

CSCI 3302 Intro to Robotics - Outstanding TA award (2022).

CSCI 4302/5302 Advanced Robotics (2023).

Other professional experience

2024 Social Media Chair at HRI 2024.

2023 Volunteer at AAMAS 2023.

2019- Reviewer for HRI, ICRA, IROS, THRI.

Awards and scholarships

2024 Bell Family Endowed CS Scholarship.

2024 Publication Recognition Award, CU Boulder.

2022, 2023 Conference Support Fellowship, CU Boulder.

2022, 2023 Winner at Annual Research Expo, CU Boulder.

2022 Summer Research Fellowship, CU Boulder.

2021-2022 David T. Spalding Graduate Teaching Fund Fellowship for excellence in teaching.

2019-2020 Best part time instructor award for undergraduate Algorithms CSCI 3104.

2017-2019 Outstanding TA awards for CSCI 3104, 3002.

Other Projects

2024 **Autonomous Anomaly Explanation**, *NEC Corporation*, Prof. Brad Hayes, CU Boulder.
We developed a proof-of-concept system that uses a Vision Language Model (VLM) and a mobile robot to autonomously explain spatial anomalies. (Video demo)

Feb 2019 - Apr 2019 **Robot guide dog for visually impaired**, *Prof. Brad Hayes*, CU Boulder.
We emulated a guide dog in indoor scenario to guide the human to the nearest exit. The robot provided navigation assistance and scene explanation to help the visually impaired reach their goal faster and safer. (Video demo)

Feb 2019 - Apr 2019 **Visual memory with sparse demonstrations**, *Prof. Chris Heckman*, CU Boulder.
Investigated LSTM's ability to learn path policies using visual cues so that the robot can re-trace the path without the 3D map of the environment and minimal demonstrations of the path. (Link to project)

August 2018 - December 2018 **An ARKit app to help people with learning disabilities**, *Virtual Reality*, CU Boulder.
We made an IOS app with a python ML backend that parsed text from images and represented it intuitively to foster learning. We also created a focus-enabled text editor that could assist a person with dyslexia. (Link to project)

April 2018 – May 2018 **Logo Generation using GAN**, *Human Centered Machine Learning*, CU Boulder.
We created a GAN based Logo generator to help generate original and unique initial logo designsusing WGAN and ACGAN. (Link to report)

May 2018 **Twitter Trend Analysis**, *Big-Data Architecture*, CU Boulder.
We developed a scalable web app using Kafka, Cassandra, and Spark which could classify upto 6k tweets per minute in real-time. (Video demo)

Previous Work Experience

Sep 2016 – May 2017 **Associate Data Scientist**, Noodle.ai, Bangalore, India.

- ***Exploratory Data Analysis (EDA) tool*** - Developed a Django GUI app to perform automatic preliminary data analysis which included performing statistical tests, and finding interesting inferences.
- *Other projects included developing a demand forecast demo tool and churn analysis for various clients.*

Mar 2016 - Aug 2016 **Co-Founder**, Progyrus, Bangalore, India.

- Progyrus provided (Uber-like) large-scale human-powered translations to help brands go vernacular. We worked with 6 clients and 50 translators on the platform
- Designed the order management and task management/allotment systems using AngularJS and Django REST framework.

2014 - 2016 **Senior Engineer (Analytics)**, Robert Bosch GmbH, Bangalore, India.