Kaustav Chakraborty

CONTACT INFORMATION

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RESEARCH INTERESTS

Robot perception and safe navigation, autonomous systems, machine learning, machine intelligence, computer vision, control theory.

EDUCATION

University of Southern California - Los Angeles, California 08/2020 - 2025(exp.)
Ph.D Student — GPA: 4.0/4.0

- **Advisor:** Somil Bansal
- **Research Direction:** *"Safety in Vision-based Control of Robotic and Autonomous Systems"*

Coursework: Deep Learning Systems, Random Processes, Probability Theory

University of Michigan - Ann Arbor, Michigan 08/2018 - 06/2020
M.S. Robotics - April 2020 — GPA 3.86/4.0

Coursework: Robotics Systems Lab, Mobile Robotics, Computer Vision, Matrix Method for Signal Processing, Math for Robotics.

Vellore Institute of Technology - Tamil Nadu, India 07/2014 - 05/2018
B.Tech. Mechanical Engineering - May 2018 — GPA 9.35/4.0

- **Thesis Advisor:** Anthony Xavior M.
- **Thesis:** *"Effect of Graphene Reinforcement on the Mechanical Properties of* Al6061"

Coursework: Robotics, Kinematics of Machines, Dynamics of Machines, Industrial Automation, Mechatronics, Data Structures and Algorithm.

EXPERIENCE

University of Southern California
Research Assistant — Safe and Intelligent Autonomy Lab 01/2022 - Present
PI: Prof. Somil Bansal

Research Area: Discovering and Improving System Level Failures of Vision-based System.

Research Assistant — Robot Locomotion and Navigation Dynamics Lab 08/2020 - 05/2022
PI: Prof. Feifei Qian

Research Area: Planning of Obstacle-aided Navigation for Multi-legged Robots using a Sampling-based Method over Directed Graphs

University of Michigan, Ann Arbor
Graduate Student Research Assistant — Bipedal Robot Laboratory, MI 05/2019 - 12/2019
PI: Prof. Jessy W. Grizzle

Research Area: Combining KNN and Continuous 3D Loss for 3D Object Detection and Classification

Graduate Researcher — Ford Center for Autonomous Vehicles, Ann Arbor, MI. 01/2020 - 05/2020
PI: Prof. Ram Vasudevan

Research Area: Intent communication in Autonomous Vehicles

PUBLICATIONS

Gupta* A. , **Chakraborty* K.** , and Bansal S. . Detecting and mitigating system-level anomalies of vision-based controllers. *To appear ICRA*, 2024.

Borquez J. , **Chakraborty K.** , Wang H. , and Bansal S. . On safety and liveness filtering using hamilton-jacobi reachability analysis. *arXiv preprint arXiv:2312.15347*, 2023.

Chakraborty K. and Bansal S. . Discovering closed-loop failures of vision-based controllers via reachability analysis. *IEEE Robotics and Automation Letters; Presented at 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2023) Michigan, USA*, 8(5):2692–2699, 2023.

Chakraborty K. , Hu H. , Kvalheim M. D. , and Qian F. . Planning of obstacle-aided navigation for multi-legged robots using a sampling-based method over directed graphs. *IEEE Robotics and Automation Letters. Presented at 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2022), Kyoto, Japan.*, 7(4):8861–8868, 2022.

Kumar H. P. , Xavior M. A. , Joel J. , Ashwath P. , and **Chakraborty K.** . Effect of flake reinforcement on mechanical properties of aa 6061 nano composite with secondary nano platelet-graphene processed through powder metallurgy. *Materials Today: Proceedings*, 5(2):6626–6634, 2018.

Kumar H. P. , Xavior M. A. , Ashwath P. , Joel J. , Hosmani S. , Shivalli P. M. , Singh H. , and **Chakraborty K.** . Synthesis and property evaluation of hot extruded aa2024–mwcnt nanocomposites. *Materials Today: Proceedings*, 5(5):12545–12550, 2018.

Teaching [1]

EE599: Learning and Control of Safety-Critical Systems — Spring 2023
Teaching Assistant

EE482: Linear Control Systems — Fall 2022
Teaching Assistant

EE482-Linear Control Systems — Summer 2022
Course Preparation

EE599-Robotics Mobility — Spring 2022
Course Preparation

EE141L-Applied Linear Algebra for Engineering — Fall 2021
Teaching Assistant

Student Mentorship

Aryaman Gupta (IIT-BHU, ECE B.Tech, IUSSTF-Viterbi Summer Research Program)
Vishnu Velayuthan (USC CS, B.S.E, CURVE 2022-2023)
Jake Futterman (USC ME, B.S.E, CURVE 2021-2022)
Ethan Fulcher (USC ASTE , B.S.E, 2021-2022)

Invited Talk

Allerton Conference on Communication, Control, and Computing — 2023

Honors and Awards

Winner—Annenberg Research Symposium	2021
Annenberg Scholarship	2020
Top 3% among 800 students in class of 2018 Mechanical Engineering(B.tech)	2018
Winner — Innovation Event, ASME HPVC Asia Pacific	2018
1st position in Invention Showcase at Student Led Design Conference India	2016
Merit Scholarship for Academic Excellence in Sophomore year	2016

Activities

Secretary - BALAKA - USC Bengali Cultural Committee	2023-Present
Innovation and Electrical Chair - Team Anant (Human Powered Vehicle Team)	2016-2017
American Society of Mechanical Engineers, VIT Chapter	2015-2017

[1] All Teaching Assistant(TA) positions were at University of Southern California.