Doncey Albin

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Education

University of Colorado, Boulder — **Boulder, CO**

Computer Science Ph. D. — 2021–Present
  Advisor/Lab: Christoffer Heckman, Autonomous Robotics and Perception Group (ARPG)
  Areas of Focus: Perception and navigation.

Computer Science M.S. — 2021–2023
  Coursework: State Estimation, Decision Making Under Uncertainty, Algorithms, Advanced Robotics, Neural Networks and Deep Learning, Object Oriented Design and Analysis

Colorado State University — **Fort Collins, CO**

Mechanical Engineering B.S. — 2017–2021
  Coursework: Mechatronics, Control Theory, Linear Controls, Robotic Manipulator Control
  Activities: ASME, NASA DemoSAT, NSF Research Experience for Undergraduates (REU) recipient

Awards

Won third place for CSU's 2021 senior capstone showcase	May 2021
Top ten winning team for the 2019 CSU Mechatronics course final project showcase	December 2019
Second-place winning team for 2019 CSU Mechanical engineering design final project	December 2019

Publications

Under Review

Reed, Alec, Doncey Albin, Anuh Pasricha, et al. (Feb. 2024). *Transformer-based Learning Models of Dynamical Systems for Robotic State Prediction*. PREPRINT (Version 1) available at Research Square. DOI: `10.21203/rs.3.rs-3919154/v1`. URL: `https://doi.org/10.21203/rs.3.rs-3919154/v1`.

Reed, Alec, Brendan Crowe, Doncey Albin, Lorin Achey, Bradley Hayes, and Christoffer Heckman (2024). *SceneSense: Diffusion Models for 3D Occupancy Synthesis from Partial Observation*. arXiv: 2403.11985 `[cs.RO]`.

Published

Albin, Doncey and Steve Simske (2021). "Design, Implementation, and Evaluation of a Semi-Autonomous, Vision-based, Modular Unmanned Ground Vehicle Prototype". In: *Proceedings of the IS&T International Symposium on Electronic Imaging: Autonomous Vehicles and Machines*, pp. 214-1–214-9. DOI: `10.2352/ISSN.2470-1173.2021.17.AVM-214`. URL: `https://doi.org/10.2352/ISSN.2470-1173.2021.17.AVM-214`.

Research Experience

CU - Lockheed Martin — **Boulder, CO**

Graduate Research Assistant — May 2023–Jan 2023
  – Engineered an asynchronous semantic mapping package leveraging 3D semantic segmentation models, optimized for ROS, enhancing perception and planning in austere environments.
  – Transitioned the developed packages to the managing team for further integration and use, with a research paper detailing the implementations and outcomes currently in preparation.

Medtronic — **Boulder, CO**

Graduate Student Researcher — Jan 2022–Aug 2022
  – Worked as the primary engineer on the development of a novel surgical robotic system, marking the first time a graduate student-based project at Medtronic transitioned to production. Initiated the patent process for innovative elements of the system, demonstrating significant contributions to the field of medical robotics. Details are protected under a non-disclosure agreement.

– Led the development of the motion planning and control systems, including the creation of a search-based path-planning algorithm and a controllability-informed path-tracking algorithm, contributing to the system's innovative features.

NSF REU   **Fort Collins, CO**
Undergraduate Researcher   Summer 2020
– Led the design and construction of a semi-autonomous unmanned ground vehicle aimed at fire extinguishment, incorporating mechanical, electrical, and software components. This project marked my first major foray into robotics.
– Gained a comprehensive understanding of robotics through a mechatronics approach, integrating various engineering disciplines to develop a cohesive robotic system.
– Authored my inaugural publication in the 2021 IS&T International Symposium on Electronic Imaging: Autonomous Vehicles and Machines, detailing this project's innovations and outcomes.

NASA DemoSAT   **Fort Collins, CO**
Undergraduate Researcher   Summer 2019
– Contributed as a Mechanical Engineering Intern to CSU's NASA DemoSAT team, focusing on the design, fabrication, and testing of a payload destined for stratospheric exploration via weather balloon. Responsibilities included crafting the payload's housing and developing an onboard control system for temperature regulation, ensuring the experiment's integrity during flight.

Project Experience

ROS-Based Autonomous Control of a Amazon DeepRacer Platform   Dec 2021
– Worked on a team of four to implement SLAM, autonomous control, and other advanced robotics modalities on a Amazon DeepRacer platform.

Household Fire Elimination System   Aug 2020–May 2021
– Designed and developed a household fire tracking, following, and elimination system for my senior research practicum. This project ultimately won 3rd place for the Engineering Days showcase.
– This project incorporated mechanical design (SolidWorks), 3D printing, computer vision using TensorFlow lite, USB communication protocal implementation, and PID-based visual servoing.

Automated Beer-Pong Machine (Beruit)   Dec 2021
– Worked with three other students to design and fabricate an automatic beer-pong machine named Beruit. We were awarded as a top team and had the opportunity to present the final project to our class. This project was a ton of fun and seriously inspired me to do more robotics.

Teaching Experience

Graduate Teaching Assistant at University of Colorado-Boulder   **Boulder, CO**
Algorithms Teaching Assistant   Jan 2023–May 2023
– Supported Professor Ryan Layer in delivering course content for two dynamics sections, engaging over 60 students.
– Conducted bi-weekly exam review sessions, managed 1-on-1 office hours twice weekly, proctored exams, maintained course materials on Canvas, and evaluated student work.

Dynamics Teaching Assistant   Jan 2022–May 2022
– Assisted Professor Rong Long with instructional responsibilities for two sections of dynamics, including conducting review sessions, holding office hours, proctoring, and grading.

System Dynamics Teaching Assistant   Aug 2021–Dec 2021
– Collaborated with Professor Shalom Ruben to facilitate learning in two system dynamics sections. Responsibilities included attending lectures, completing and grading assignments, conducting office hours, and leading exam prep sessions.

Internship Experience

Lightning E-Motors   **Loveland, CO**
Controls and Data Analytics Engineering Intern   Summer 2021

- Conducted comprehensive analysis of telematics data feedback utilizing test benches and sandbox environments, focusing on CAN bus data interpretation via various emulation tools and MySQL for server-based data analysis. Produced and submitted a detailed investigative report upon conclusion.
- Engineered testing protocols for a Linux-based vehicle driver interface to identify and troubleshoot software issues in CAN bus data retrieval. Acquired proficiency in Python, Linux OS, HTML, PHP, and network/device management, contributing to the enhancement of driver interface functionality.

Czero Engineering R&D   **Fort Collins, CO**
Controls Engineering Intern   Dec 2019–May 2020
- Designed wiring diagrams and assembled control cabinets.

Mechanical Engineering Intern   Aug 2019–Dec 2019
- Experience with real design-to implementation scenarios in industry. This included both mechanical design, GD&T, and assembly experience. I was able to design various parts in SolidWorks that were used for a new engine dyno, as well as parts that were used for various ARPA-E projects.