Faculty Search Committee
Space Resources Program
1310 Maple St
Golden, CO 80401

November 13, 2023

Dear Search Committee,

I am writing to apply for the Assistant Professor faculty position in the Department of Mechanical Engineering at the Colorado School of Mines. I am currently an Assistant Researcher (equivalent to a tenure-track Assistant Professor with an emphasis on research) in Space Systems at the University of Hawai‘i at Mānoa (R1 University). Some quick statistics about my performance in the four years since I started at Hawaii in January of 2020:

- Grants: As Principal Investigator, I have won $1,923,997 in grant money from NASA and from the State of Hawai‘i in the form of 5 grants. As Co-Investigator or as senior personnel, I have collectively won $2,544,723 to UHM directly (from a total of $21,044,723 across all institutions) in the form of 2 grants from NSF.
- Publications: I have 5 peer-reviewed papers in publication, 5 conference papers in publication, 2 peer-reviewed papers in review, and 2 abstracts since the start of my current position. I am the lead author of an open source, digital textbook, "A Guide to CubeSat Mission and Bus Design".
- Teaching: I've taught at least 6 credits every year. My courses span all the way from freshman level to Ph.D. level and contribute to five different programs across campus: Earth and Planetary Exploration and Technologies (EPET), Earth Science (ERTH), Electrical Engineering (EE), Information and Computer Science (ICS), and Mechanical Engineering (ME). In fact, I have graduate cooperating faculty status, or the ability to advise graduate students, in all of these degree-granting departments. My courses are Spacecraft Mission Design (EPET/ME 400) and Machine Learning in Dynamics Systems (ICS 699/ME 696).
- Personnel: My current lab members, who I define as engineers and academics I directly advise on at least a biweekly basis (and fund), total 16 people: 2 engineers, 1 postdoctoral scholar, 3 PhD students, 6 Master's students, and 4 undergraduate students. I have graduated and funded 1 Master's student, 5 undergraduate students, and 1 post-bac turned engineer. I indirectly advise a rover project team of 30 – 40 undergraduate students every year.
- Service: I helped create a Diversity, Equity, and Inclusion (DEI) committee at my institute, a Diversity Director position at my school, and a DEI committee at UW's NSF AI Institute for Dynamic Systems. I've given talks to over 1000 students and professionals. I serve in the executive conference committees for the IEEE Aerospace Conference and the new International Space Robotics Conference. I review an average of 20 journal and conference papers a year.

I want to expand our capabilities as a species to explore the universe and my ikigai is to do so by studying how robots move and think about their own movement. My research foundation resides in dynamics and controls with building blocks in robotics, machine learning, and planetary science. While I've had a solid footing in maturing spacecraft technology in orbit, I've expanded my research portfolio to include robots on planetary surfaces, specifically terrain. My research output encompasses the entire product cycle from design to deployment, in hardware and in software. The hardware keeps me relevant in spaceflight (I want to participate in missions) and the algorithms are my research contributions. The autonomy-motivated algorithms I particularly love crafting are around system identification. Recently, I've cultivated a love for active learning or sparse sensing in the context of learning about an environment through robotic exploration. All of

my research has potential to expand into multi-agent collaboration, human robot interaction, and exploration of ocean/subterranean environments.

In the past four years since starting this faculty position, I've learned about what I need for my lab's success and in short, I need students, colleagues, industry, and facilities. I want to do my research at Mines because the program attracts top-notch students and faculty. I will be able to pursue more ambitious projects with talented colleagues implemented by incredibly capable students. I'll be able to tap into space and tech industry connections and partnerships, such as Honeybee, Acroname, and AITech. The lively McNeil Center startup culture will help transition spin up companies from my lab into a higher likelihood of success. Since I work with hardware, I'm hoping for well-maintained lab space, fabrication facilities and nearby prototyping manufacturers, and well-connected shipping/distribution centers, all of which Golden satisfy. I want to grow roots and invest in the Colorado School of Mines community for the long term.

Thank you for your consideration.

Sincerely,

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