Alvin D. Harvey

Diné – Navajo Nation
PhD Candidate, Human Systems Lab
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EDUCATION

PhD, Aeronautics and Astronautics, Humans in Aerospace Program
Massachusetts Institute of Technology, Cambridge, MA GPA: 5.00/5.00 Expected: May 2024
Thesis Chair: Dr. Dava Newman
Thesis Committee: Dr. Danielle Wood, Dr. Emilie Siverling, Dr. Juan-Carlos Chaves, Dr. Ren Freeman

Master of Science, Aeronautics and Astronautics, Humans in Aerospace Program
Massachusetts Institute of Technology, Cambridge, MA GPA 5.00/5.00 Completed: August 2020
Research Advisor: Dr. Dava Newman

Bachelor of Science, Mechanical Engineering Minor: Mathematics, Graduated with University Honors
New Mexico State University, Las Cruces, NM GPA: 3.70/4.00 Completed: May 2018

RESEARCH EXPERIENCE

Indigenous Relationality for Space Cambridge, MA November 2021-Present
PhD Thesis Research MIT Committee Chair: Dr. Dava Newman
- Thesis focusing on Diné relationality and application of Indigenous Research Methodologies and Methods
- Co-creating and applying Diné and Indigenous pillars of knowledge to four aspects of engineering
- Focus areas including Indigenous protocol in space, Peacemaking, K-12 education, and decolonizing institutions

Visiting Indigenous Scholar – SKC IRC Pablo, MT July 2022 -Present
Visiting Scholar Salish Kootenai College Research Advisor: Ren Freeman
- Invited to participate in first Visiting Indigenous Scholar program in SKC Indigenous Research Center
- Co-created and redefined thesis research around growing own Indigenous Research Methodology and Methods
- Focused on aspects of positionality and journey through research as an Indigenous scholar

Parabolic Flight and Indigenous Education Cambridge, MA August 2021- Present
Education Outreach Researcher MIT Research Advisor: Ren Freeman
- Created and operated Indigenous centered education outreach project on a parabolic "zero-g" flight
- Developed and filmed educational demonstrations of Diné and Indigenous centric activities for parabolic flight
- Further grew understandings of Indigenous Research Methodologies and Methods in STEAM Education

Constellation Virtual Mission Control Cambridge, MA August 2020-August 2022
Research Assistant Research MIT Research Advisor: Dr. Dava Newman
- Research assistant in MIT-Portugal joint program ocean observation AEROS nanosatellite constellation
- Researched use of virtual reality to develop, monitor, and control complex constellation systems
- Developing theoretical framework to use VR system to support Indigenous collaboration and training

Satellite Observation for Tribal Sovereignty Cambridge, MA February 2021-August 2022
Media Lab Course Research MIT Research Advisor: Dr. Danielle Wood
- Developing systems architecture approach to examining satellite observation as a tool for tribal sovereignty
- Performed stakeholder analysis, developed theoretical framework to advance stakeholder objectives
- Created discussion points in connecting and advocating for Indigenous Nations to use satellites

MIT's Indigenous History Cambridge, MA January 2020-Present
History Course and Sponsored Research MIT Research Advisors: Dr. Craig Wilder
- Researching MIT's history with its own Indigenous students, Indigenous Nations, and its ties to the Morrill Acts
- Leading oral history project, interviewing MIT Indigenous alumni about their life and education experiences
- Using student leadership position to access and discuss research with upper echelons of MIT administration
- Presented initial findings and writings to MIT President's Office and Indigenous Alumni

RESEARCH EXPERIENCE cont.

Native American Perspectives on Space Cambridge, MA August 2019-August 2022
Media Lab and Space Policy Course Research MIT Research Advisors: Dr. Danielle Wood & Dr. Dava Newman

- Researching conflicts and culture dichotomy between Native American cultures and modern space exploration
- Conducted review of Native American perspectives and influences in STEM education and space exploration
- Created a comprehensive research proposal to examine the modern perspectives of Native Americans

Partial Gravity Biomechanics Cambridge, MA August 2018-Present
Master of Science Thesis Research MIT Research Advisor: Dr. Dava Newman

- Conducting human experiments to assess metabolic and muscle activity performance in partial gravity
- Characterized and redesigned vertical partial gravity simulator and body weight suspension harnesses
- Redesigned novel suspension harness for non-restricted gait and extended periods of suspension

Evaluation of Trust in Automated Drones Cambridge, MA August 2018-Decemeber 2019
Human Factors Course Research MIT & Draper Laboratory Research Advisors: Dr. Leia Stirling

- Evaluated trust in automated surveillance drones using heuristic based designs and design tradeoffs in GUIs
- Conducted human subject-based testing of subjective trust of multiple graphical user interfaces for drones
- Evaluated human subject situational awareness and surveillance performance evaluated with GUIs

Microgravity Liquid Cooling Garment Las Cruces, NM November 2017-May 2018
Undergraduate Honors Research NMSU Research Advisor: Dr. Krishna Kota

- Adapted and tested microgravity phase change material cooling system to liquid cooling garment
- Designed woven and networked cooling garment modeled in form of spacesuit undergarments
- Adapted phase change material to absorb excess body temperature in microgravity conditions

MIT Man Vehicle Lab Research Intern Cambridge, MA June 2017-August 2017
Undergraduate Summer Research MIT Research Advisor: Dr. Leia Stirling

- Research assistant participating the 2017 MIT Summer Research Program in the MIT Aerospace department
- Created and tested a benchtop validation system for computer simulated human-spacesuit interactions
- Worked and synchronized Vicon Motion Capture, Novel force sensors, and inertial measurement units

Microgravity PCM Flow Boiling and Cooling Las Cruces, NM October 2014- May 2017
Undergraduate Research NMSU Research Advisor: Dr. Krishna Kota

- Research assistant with professor in creation and redesigning of flow cooling system that works in microgravity
- Used NX10 to design and conduct FEA, AutoCAD to create to manufacturing blueprints and instructions
- Soldered electrical components that include a battery, data acquisition device, micro-pump and heater

PROJECT EXPERIENCE

Indigenous Food Sovereignty Cambridge, MA May 2023- Present

- Working with the MIT Native American & indigenous Association to develop a food security and sovereignty
- Co-leading partnerships with the MIT Indigenous Planning Course and the non-profit Grinding Stone Collective
- Planning an open food bank for the MIT community and an open food garden of local plants and medicines

Anti-Colonialism in Space Virtual Seminars Cambridge, MA March 2021- Present

- Organizing MIT Sponsored virtual seminars centering around anti-colonial theory and praxis in space exploration
- Developed seminar series framework to engage multiple viewpoints and facilitate discussion around them
- Organized and opened first spring seminar centering around Indigenous perspectives in space

Science Policy: Navajo Technical University Cambridge, MA January 2021-February 2021

- Assessed the capabilities of Navajo Technical University as an innovation center developed for tribal sovereignty
- Created literature review and history of NTU in the past and current tribal colleges and university movement
- Developed policy suggestions to further develop NTU as a system to advance Navajo sovereignty.

Designing the Space Shuttle: Future Paths Cambridge, MA September 2020- December 2021

- Conducted review of the Space Shuttle's life support systems and discussed current and future innovations
- Received Instruction and feedback from NASA astronauts with Space Shuttle flight experience
- Created literature review in current space habitat and launch module life support systems

PROJECT EXPERIENCE cont.

Dynamic Simulation of Foot-Ground Contact Cambridge, MA February 2019-May 2019

- Used MATLAB, Motion Genesis, and OpenSim to develop method of resolving full human ground reaction forces
- Created novel method of adding dynamic constraint at foot-ground contact to simulate full human gait GRF
- Developed method to resolve incomplete GRF with simple simulated 3D walker through Motion Genesis

BeaverCube Thermal Analysis Cambridge, MA August 2018-December 2018

- Led graduate student team that performed thermal analysis of shape memory alloy 3U cube-sat
- Developed MATLAB code for low Earth orbit and radiation effects on multiple material cube-sat
- Presented thermal PDR and CDR to collaborators at MIT Lincoln Labs

NMSU Design Build Fly: Project Manager Las Cruces, NM August 2017-May 2018

- Lead collaborator in team of 25 students that developed and tested competition drone for competition
- Assisted and led conceptualization, building, and testing of all aspects of two novel drone aircraft
- Communicated engineering objectives and utilized pilot experience to lead drone design

NMSU IREC: Payload Lead Engineer Las Cruces, NM August 2017-May 2018

- Led team of student engineers in creating and implementing 8.8 lb. payload for rocket in Spaceport America Cup
- Developed novel apogee deployable payload designed as a GPS targeted controlled descent vehicle
- Led in recovery of payload and monitoring of flight telemetry at international competition

FieldMak Capstone Las Cruces, NM August 2017-May 2018

- Lead collaborator in senior capstone project between NMSU Mechanical Engineering and AEGorsuch Designs
- Created wire diagrams and improved electronic components of ruggedized modular microbiology assay kit
- Integrated modularized spectrophotometer and Loop-mediated isothermal amplification for field use

TEACHING EXPERIENCE

MIT's Indigenous History Course Co-Instructor Cambridge, MA September 2022- May 2023

- Created syllabus and course content to redefine MIT course on Indigenous-MIT relations throughout history
- Centered course on Indigenous Research Methodologies and Methods and centering Indigenous voices
- Co-led course comprised of staff, faculty, undergraduate and graduate MIT students

Advisor for MIT Undergraduate Research Cambridge, MA September 2022- May 2023

- Formal advising for MIT undergraduate researchers in the MIT Aeronautics and Astronautics Human Systems Lab
- Mentored and advised two Indigenous scholars interested in the field of bioastronautics

Tipis and Telescopes Calgary, AB October 2022

- Invited speaker and educator to Indigenous led gathering celebrating Indigenous Star Knowledge
- Led Informal and interactive educational activities with Indigenous youth (3^{rd}-8^{th} grade)
- Created and led educational activities centering Indigenous knowledge in space science

Indigenous-NASA Outreach Mishkosiminiziibiing (Big Grassy River), Ontario April 2022

- Participated in Indigenous led and NASA sponsored education and outreach activities for Indigenous youth
- Co-led Informal and interactive educational activities with Indigenous youth (3^{rd}-5^{th} grade) and community
- Participated in co-creation of education activities centering Indigenous knowledge in space science

MIT's Indigenous History Course Presenter Cambridge, MA February 2021- May 2021

- Led and taught MIT undergraduate engineering students in developing their historical research and writing skills
- Used student leadership experience to direct students and staff in understanding MIT's contemporary history
- Led oral history project, interviewing MIT Indigenous alumni about their life and education experiences

MIT Engineering Course Grader Cambridge, MA August 2019- December 2019

- Graded for MIT 16.400/16.453 Human Factors Engineering undergraduate and graduate engineering course
- Graded problem sets, essays and exams for class of 70 students from engineering and business programs

NMSU Student Engineering Mentor Las Cruces, NM August 2016- May 2018

- Taught and mentored undergraduate Engineering-100 class of 30 students of varying engineering backgrounds
- Facilitated a lab with 15 students for ENGR-100 that covered MATLAB programming and electrical components

PUBLICATIONS

Harvey, A., McGaa, N., Newman, D. (2023, July). Improving harness–based partial gravity simulators by implementing engineering systems modeling. 52nd International Conference on Environmental Systems, Calgary, Alberta.

Harvey, A., Tavares, F., Lambardo, S., Reynold-Cuellar, P. (2022). Developing an Anti-Colonial Practice: Moving from Conversation to Structural and Institutional Change within the Space Community. IAF Space Education and Outreach Symposium. 73rd International Astronautical Congress, Dubai, United Arab Emirates.

Porter, A. P., Arquilla, K., McGaa, N., **Harvey, A**., Bellisle, R., Newman, D., Stankovic, A., & Porter, A. (2022, July). Variable Stiffness Soft Knee Exoskeleton for Advanced Space Suits and Planetary Exploration: Energetics Evaluation. 51st International Conference on Environmental Systems, St. Paul, Minnesota.

Bellisle, R., Ortiz, C., Porter, A., **Harvey, A.**, Arquilla, K., Bjune, C., Waldie, J., & Newman, D. (2022). The Mk-7 Gravity Loading Countermeasure Skinsuit: Evaluation and Preliminary Results. 2022 IEEE Aerospace Conference (AERO), 1–11.

Prendergast, S., et al. (2022). AEROS: Oceanographic Hyperspectral Imaging and Argos-Tracking Cubesat. 29th IAA Symposium on Small Satellite Missions. 73rd International Astronautical Congress, Dubai, United Arab Emirates.

Tavares, F., **Harvey, A.,** Lambardo, S., Reynold-Cuellar, P., Newman, D., & Wood, D. (2021). Centering Indigenous Voices and Resisting Colonialism in Space Exploration and Policy. IAF Space Education and Outreach Symposium. 72nd International Astronautical Congress, Dubai, United Arab Emirates.

Invited Peer Reviewer for Acta Astronautica 2023.

INVITED TALKS AND LECTURES

- International Astronomical Union Astronomy and Satellite Constellations Invited Speaker, October 2023
- Intertribal Space Conference, November, 2022
- MIT Course, Renaissance to Revolution: Europe, 1300-1800, November, 2022
- Colorado University – Boulder, Bioastronautics seminar, October, 2022
- Panel Black and Indigenous in Aerospace Panel, Center for Air and Space Law, May, 2022
- Inter Astra, March, 2022
- Guest lecturer in Aerospace Biomedical and Life Support Engineering (16.423), November, 2021
- Panel, MIT IHQ, What does and Innovator Look Like, November, 2022
- MIT Faculty Presentation on MIT's Indigenous History, April, 2022
- Panel "A United Vision for Space Panel SGAC Space Generation Fusion Forum August, 2021
- EAPS Seminar on Racism, Colonialism, and Extraction in the Geosciences, March, 2022
- Xploration Station TV Interview and Spotlight, February, 2022
- New School Policy and Design for Outer Space, November, 2021
- Bunker Hill Community College, Indigenous People in STEM, October, 2021
- Colloquium in USF Physics and Astronomy, September, 2021
- 3000 Years Among Microbes Art Exhibition interview, May, 2021

SKILLS AND ENDORSEMENTS

Private Pilot License: 51 hours of total flight experience
Peacemaking Circles Stanford/NARF Certificate
Single Engine Aircraft Maintenance
FAA PAR test certification
2022 MIT IRB Human Subject Research Certification
2021-2022 MIT ODGE Ambassador Training
Enrolled Member of Navajo Nation
CPR Certified

ACTIVITIES AND INVOLVEMENT

- MIT First Nations Launch Team — September 2022-Present
- MIT Indigenous Peoples' International Leadership Council GSC Fellow — June 2022- Present
- Space For Humanity: Inclusion Council — March 2022- Present
- MIT Solve Indigenous Communities Fellowship Leadership Team — March 2022- Present
- MIT EMT EMS — January 2022- Present
- National Space Society Member — May 2021- Present
- MIT Ad Hoc Committee on Graduate Advising and Mentoring — May 2021- May 2022
- Moon, Space Ethics, and Indigenous Perspectives Working Group — March 2021- Present
- TPR MBA STARS Club Space Innovation Challenge: 2nd Place — November 2021
- President/Founder MIT Native American Student Association — March 2020- Present
- Whittier Sunrise Rotary Club — March 2020- Present
- MIT OME Laureates and Leaders Program Mentor — March 2020- Present
- MIT Ashdown Graduate Housing Coffee Hour Officer — January 2020- Present
- MIT Students for the Exploration and Development of Space — November 2019- Present
- MIT Summer Research Program Application Reviewer — November 2019-Present
- MIT Indigenous Peoples Advocacy Committee — October 2019- Present
- MIT American Indian Science and Engineering Society Graduate Representative — August 2019-Present
- MIT Office of Graduate Education Diversity Ambassador — June 2019-Present
- MIT Graduate Students of Color Advisory Council — April 2019-Present

RELEVANT COURSEWORK – MASSACHUSETTS INSTITUTE OF TECHNOLOGY 2018-PRESENT

- Human Systems Engineering – 16.453
- Satellite Engineering – 16.851
- Neural Control of Movement – 2.183
- Aerospace Biomedical and Life Support Engineering – 16.423
- Space Enabled Designs to Advance Justice – MAS.858
- Space Policy – 16.981
- Computational Molecular Biology - 18.418
- Engineering the Space Shuttle – 16.893
- Computational Science and Engineering – 18.0851
- Science and Technology and Policy Boot Camp – 17.925
- Space Technology for the Development Leader – MAS.859
- The Indigenous History of MIT – 21H.283
- Zero Gravity Flight Course – MAS.838