National Aeronautics and Space Administration
NASA
NASA Flight Opportunities
NASA's TechLeap Prize: Advancing Space Technologies and Innovative Teams
Sara Jennings, Chief Executive Officer, Orion Labs
Zachary Gaines, Student Lab Director, Cal Poly Pomona
Community of Practice Webinar Series – September 7, 2022
Session will start at 10 a.m. PT – Please mute your microphone and turn off your camera
www.nasa.gov

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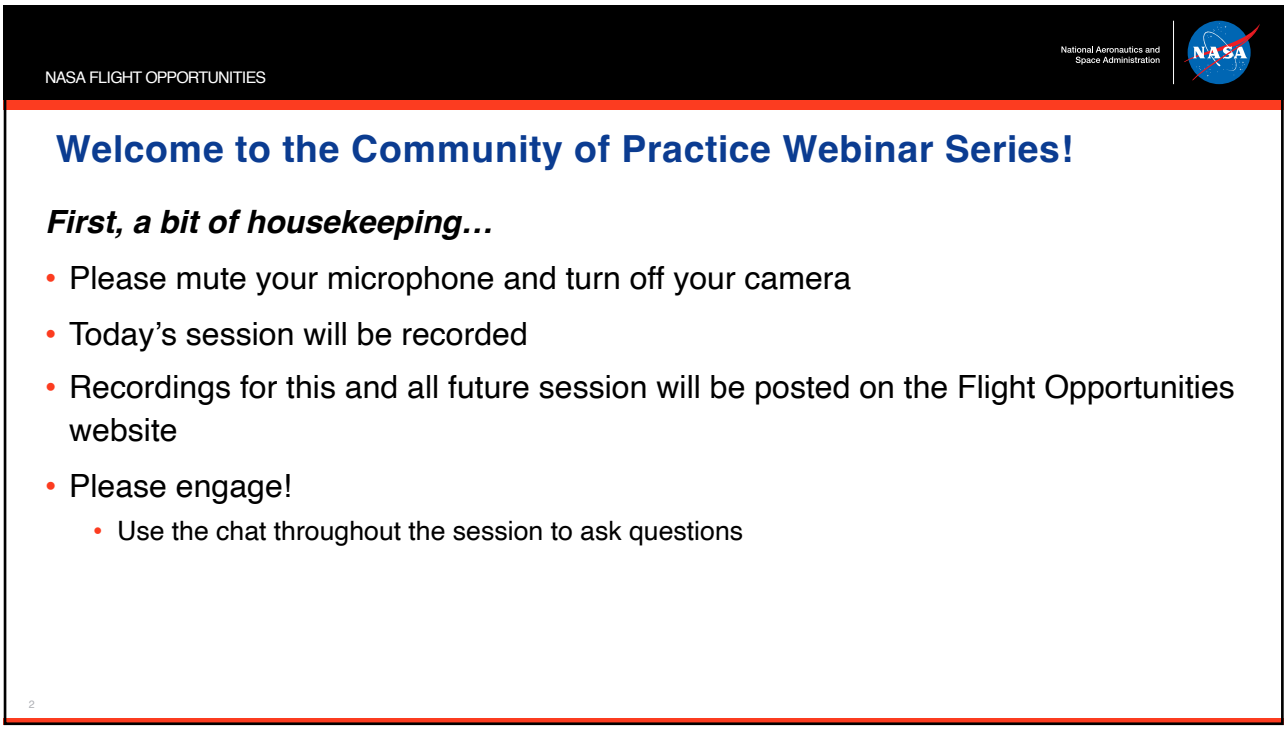
NASA FLIGHT OPPORTUNITIES
National Aeronautics and Space Administration
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Welcome to the Community of Practice Webinar Series!
First, a bit of housekeeping…
• Please mute your microphone and turn off your camera
• Today's session will be recorded
• Recordings for this and all future session will be posted on the Flight Opportunities website
• Please engage!
• Use the chat throughout the session to ask questions
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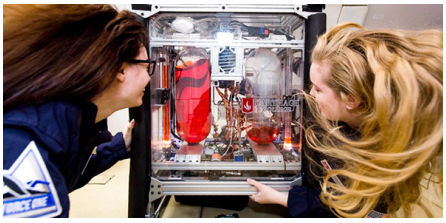
NASA FLIGHT OPPORTUNITIES

National Aeronautics and Space Administration

Flight Opportunities Mission

The Flight Opportunities program facilitates **rapid demonstration** of promising technologies for space exploration, discovery, and the expansion of space commerce through **suborbital testing with industry flight providers**.



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NASA FLIGHT OPPORTUNITIES

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Join us for future Community of Practice webinars!

Watch our website and newsletter for next month's topic

nasa.gov/directorates/spacetech/flightopportunities/newsletter

Future webinars

- Webinars are held 1st Wednesday of each month at 10 a.m. PT
- Topics will be announced in the Flight Opportunities newsletter and website
- Session recordings will be posted on the Flight Opportunities website
- Let us know session topics you would like to see covered

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NASA's TechLeap Prize

NASA TechLeap PRIZE

- Designed to rapidly identify and test solutions to specific NASA technology needs
- Format allows NASA to select winners and flight test their technologies in less than a year
- Open to businesses, universities, entrepreneurs, and other innovators
- Previous awards have been up to $650K to build payloads, plus access to a suborbital flight test
  - 2022: Nighttime Precision Landing Challenge No. 1
  - 2021: Autonomous Observation Challenge No. 1

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Today's Speakers

Sara Jennings
Chief Executive Officer
Orion Labs

Zachary Gaines
Student Lab Director
Cal Poly Pomona

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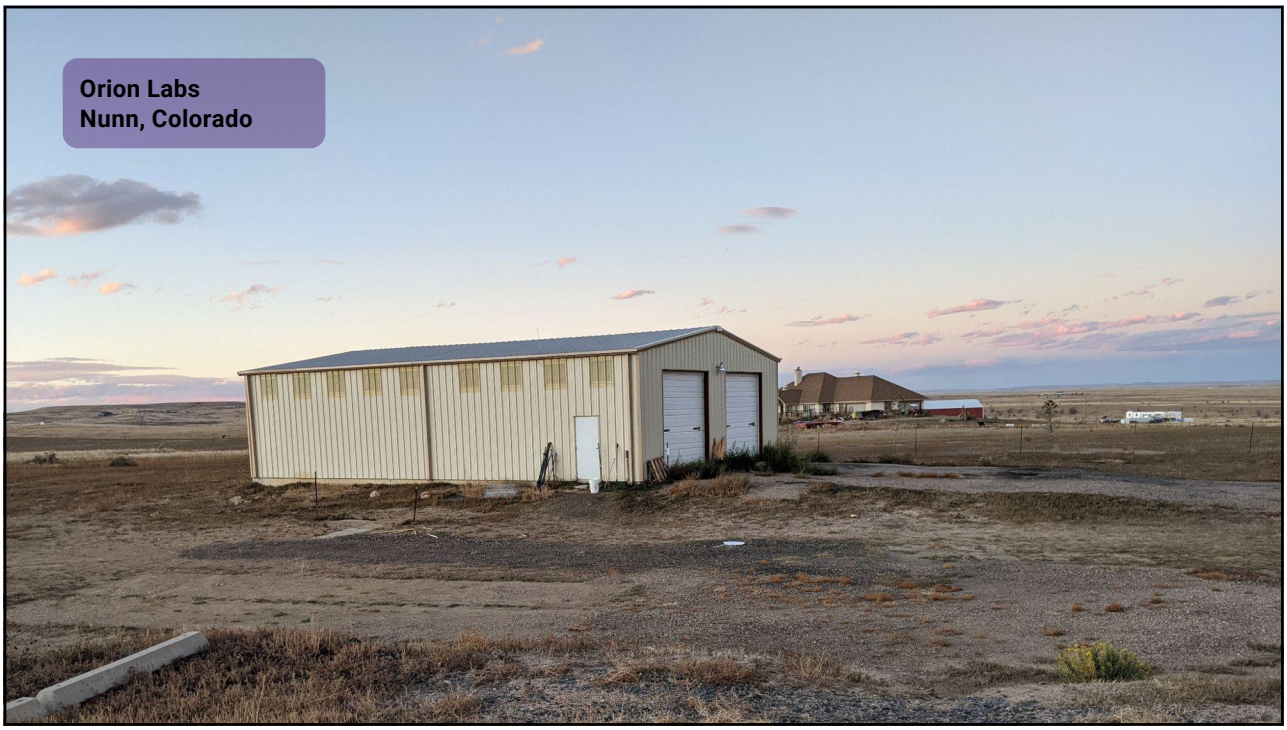

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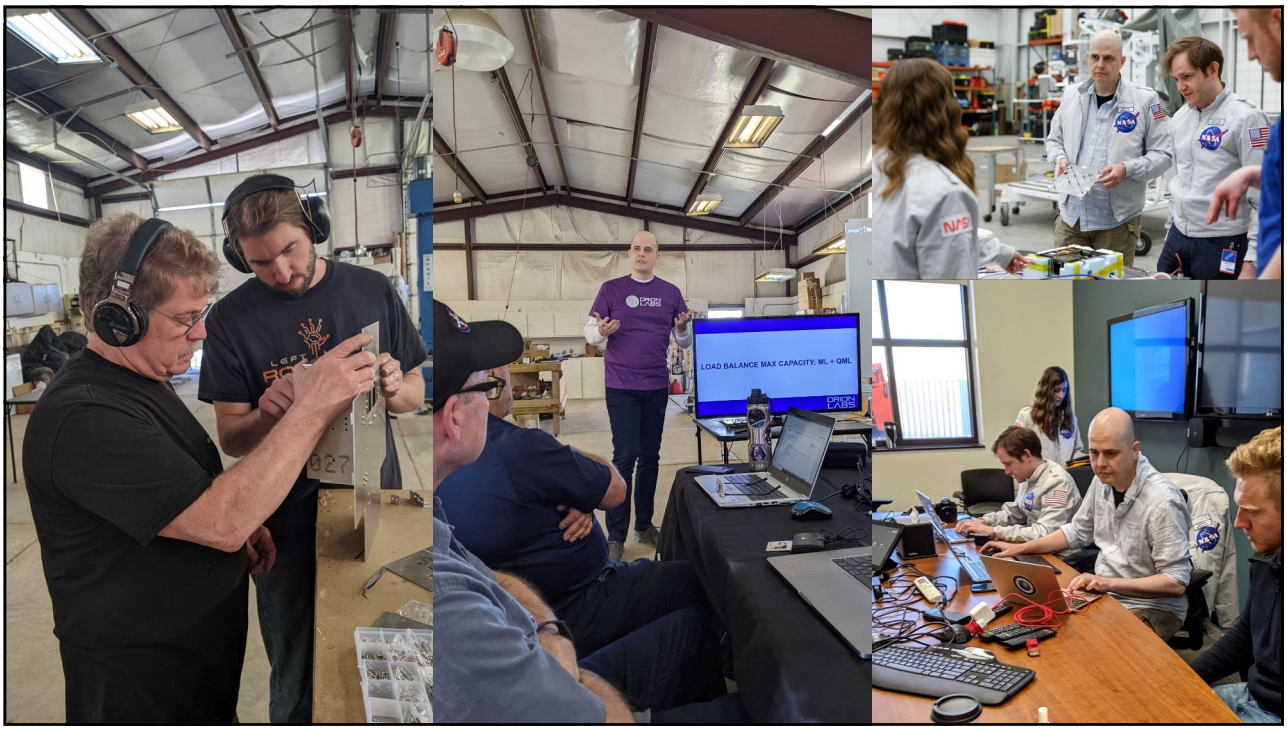

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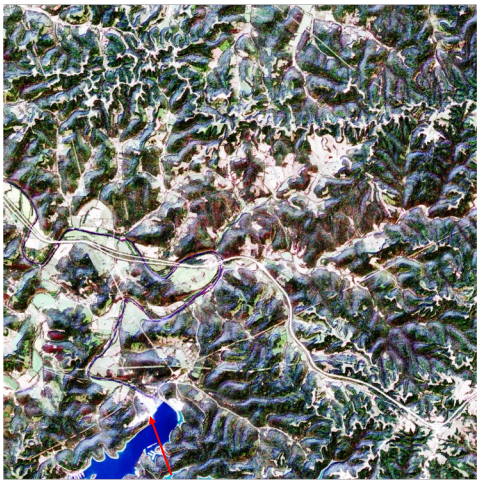
EO1 - DAM DETECTION



I AM HERE

https://sedac.ciesin.columbia.edu/data/set/grand-v1-dams-rev01

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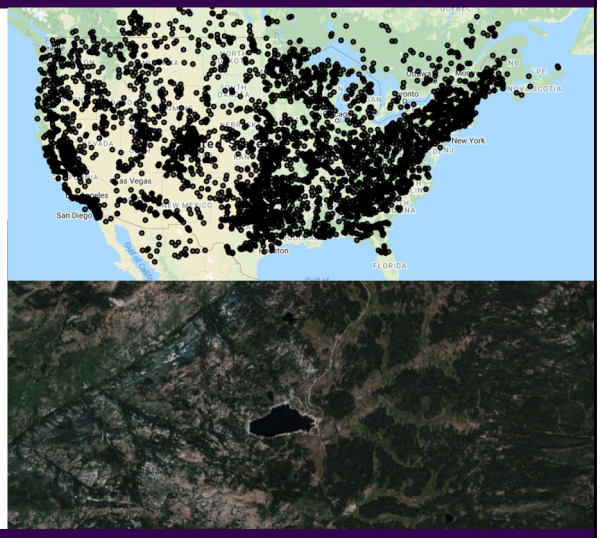
CAMERA SIMULATOR - DATASETS

- Existing data of 40,000 dams around the world, ~5000 in the US.
- Use of **Sentinel** & **Landsat** data and Google Earth engine so generate image datasets for training, testing and validation of ML and QML
- Global multispectral coverage at 10 m/px

Google Earth Engine



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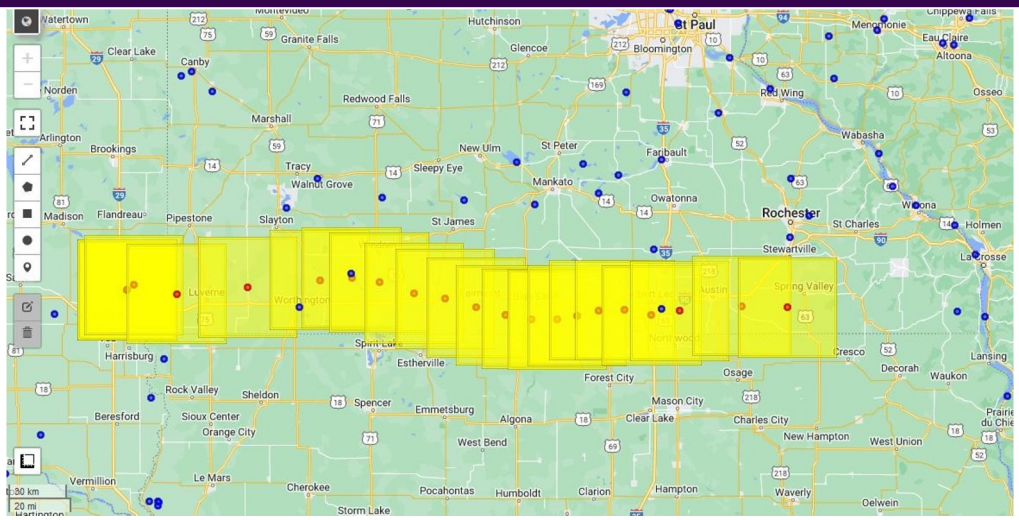
Flight SIMULATOR



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Quantum ML Pipeline

Dam Detected With ML → Quantum Machine Learning Confirms Detection ← Quantum Simulator Onboard + IBM Quantum Computer (7Qbits) On the Ground

Quantum Machine Learning Confirms Detection → Downlinks Confirmed A reduced Data Need - Automatic image transfer to Server On the Ground

Additional Success:
Can we **TRAIN** QML on our edge computing device during flight by utilizing a real IBM quantum computer on the ground?

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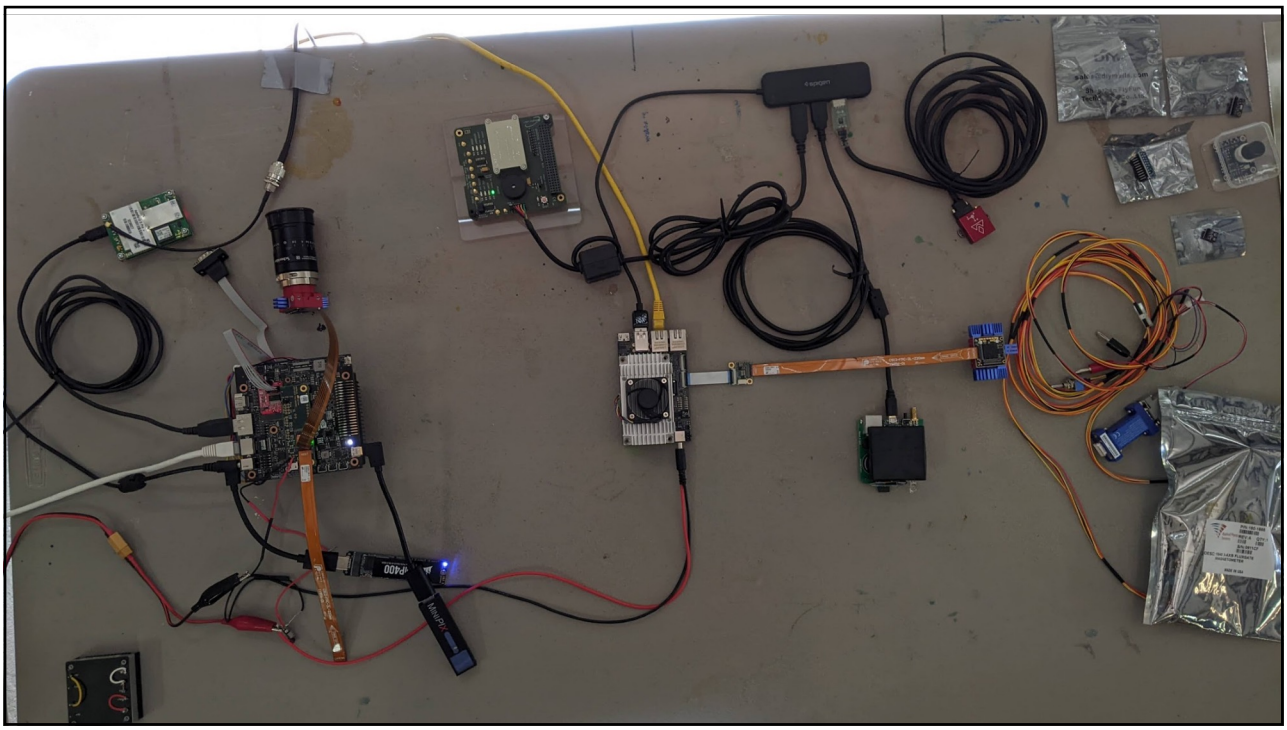

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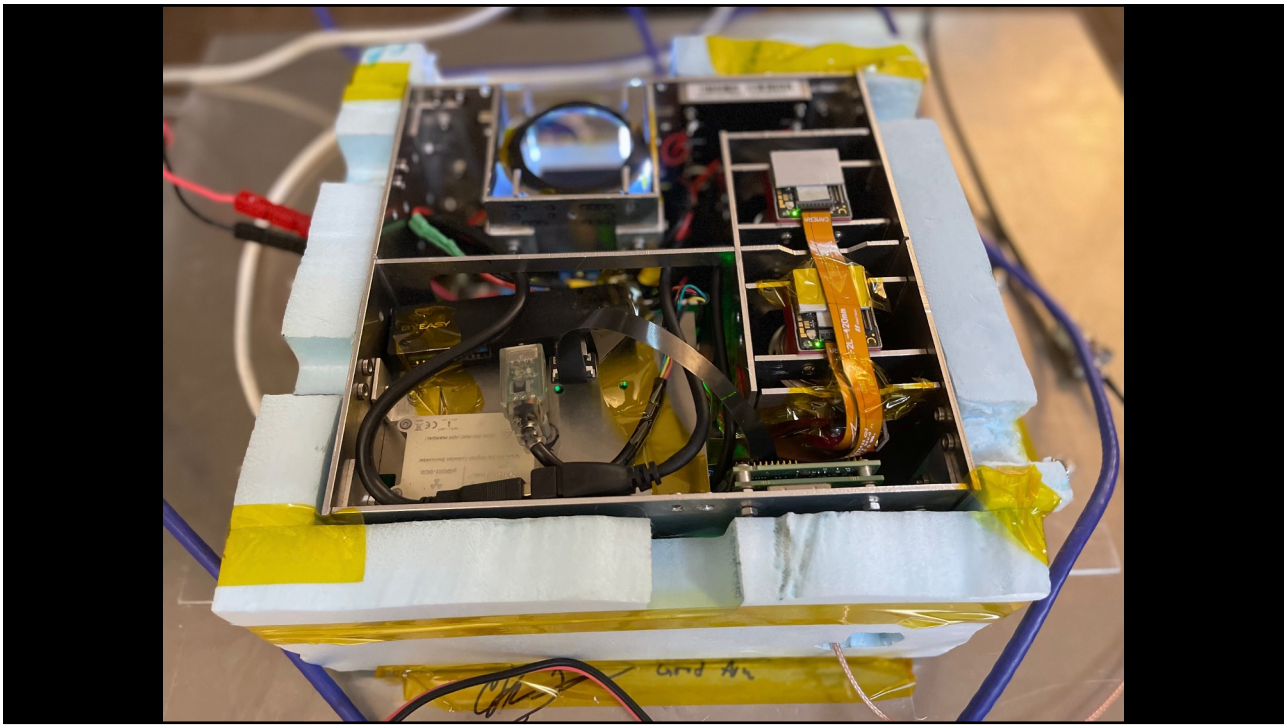

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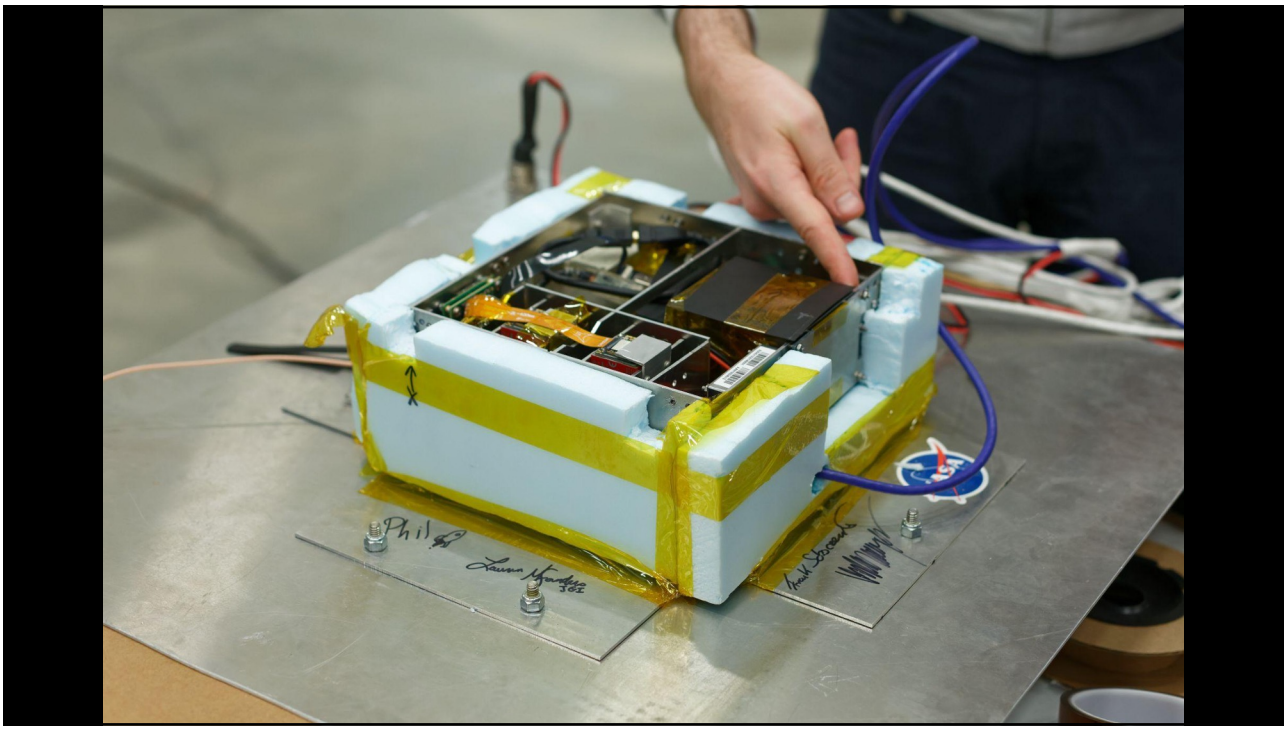

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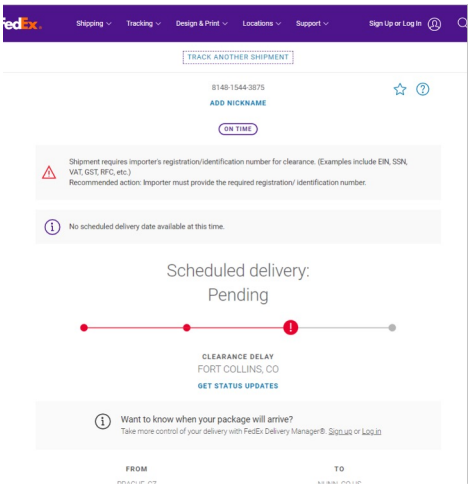
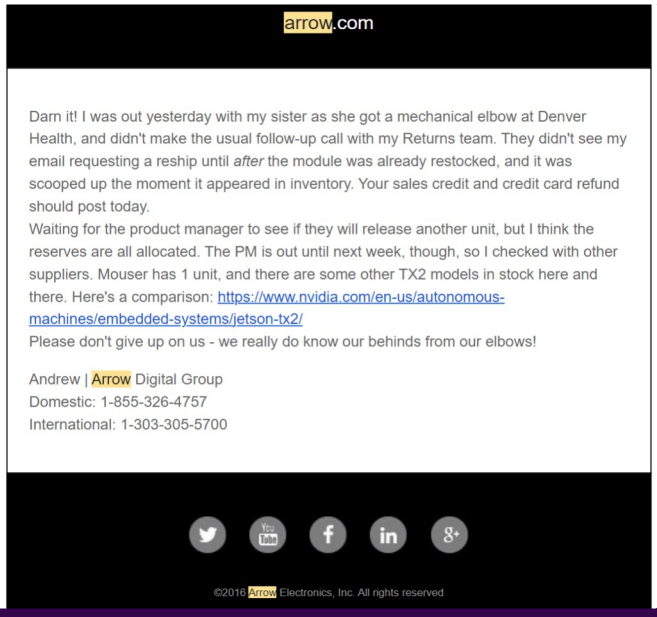
Procurement





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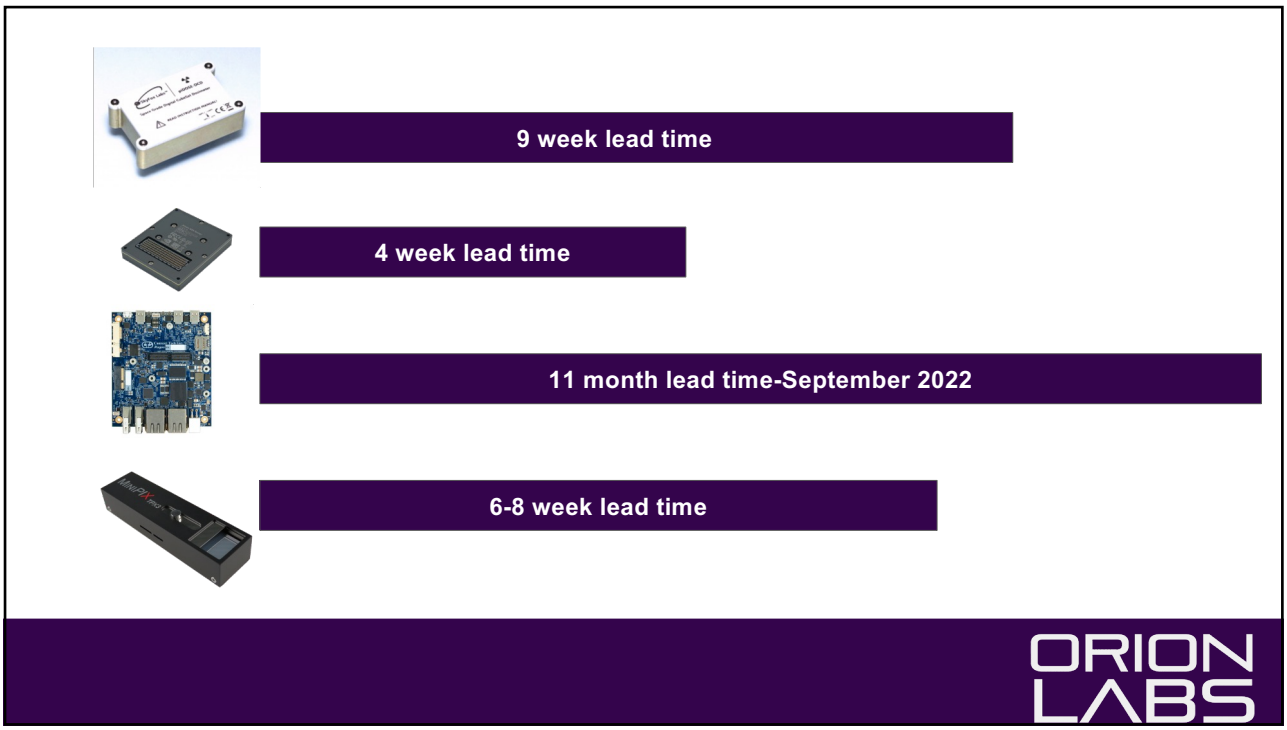

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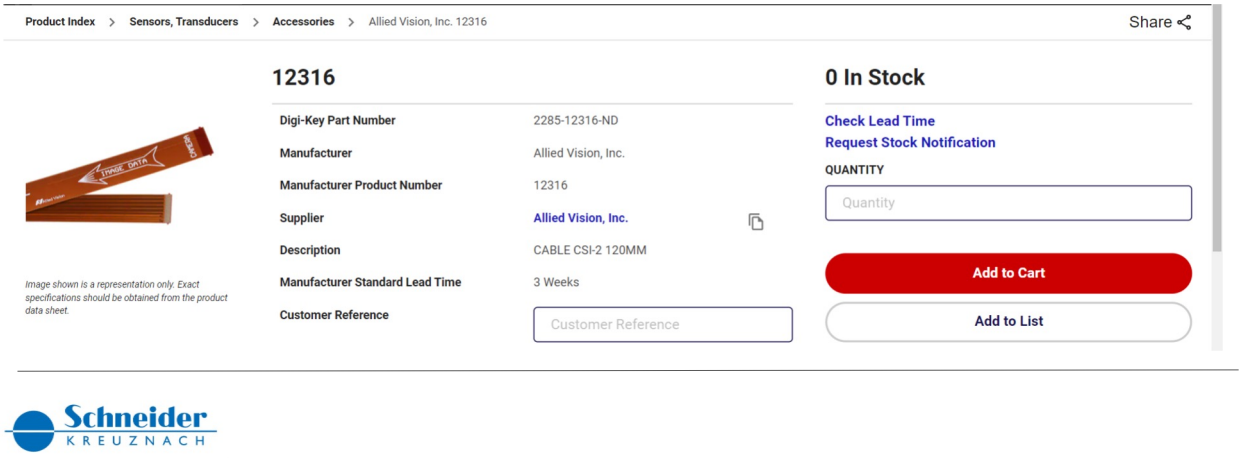
Out of Stock



Schneider KREUZNACH

Lens: " Hi Sara, This was supposed to be here 1/24 and I have not received it."

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Zachary Gaines | September 2022
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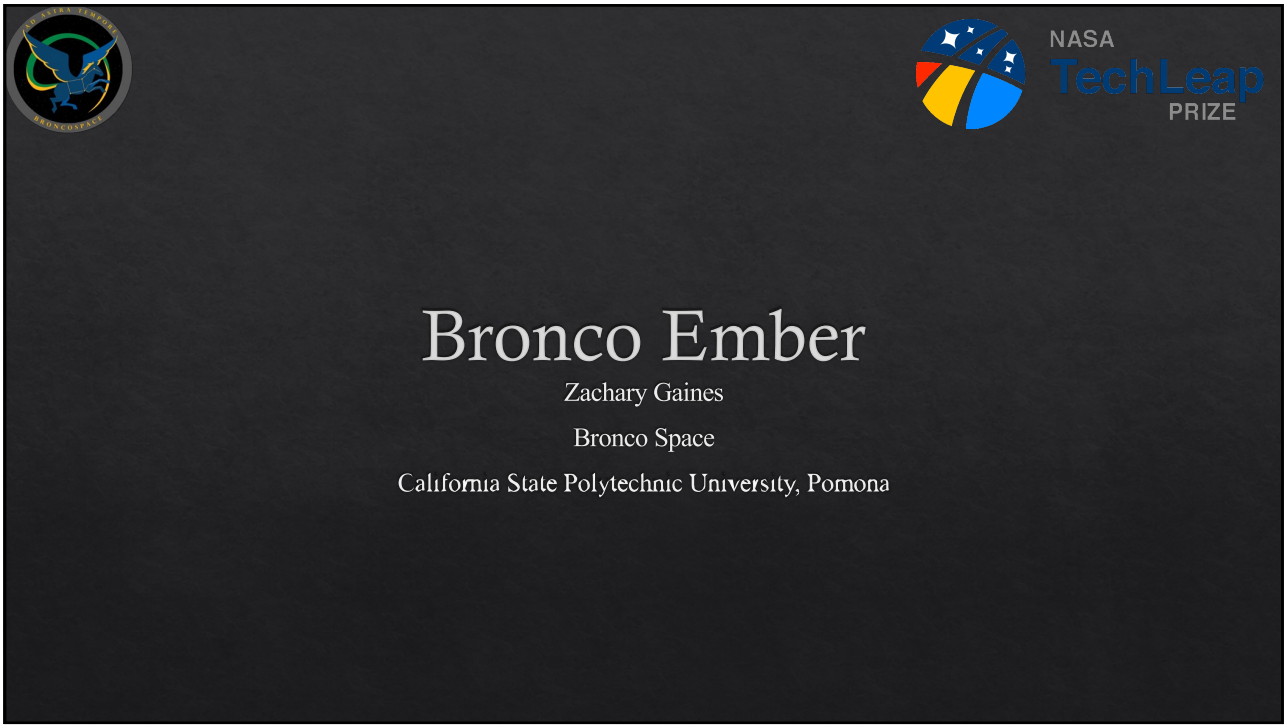
NASA
TechLeap
PRIZE
Bronco Ember
Zachary Gaines
Bronco Space
California State Polytechnic University, Pomona

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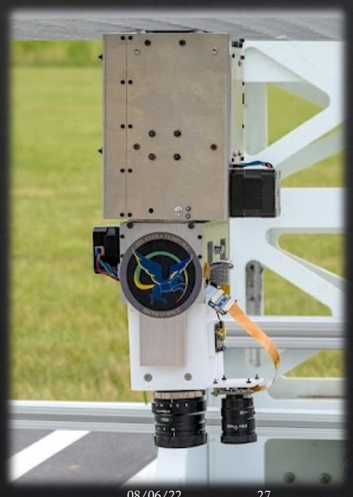
Overview

Bronco Ember A Nascent Wildfire Detection System

- Edge Computing Capabilities
- Multi-Spectral Imaging
- Targeting 85% Success Rate In Being Able To Detect Wildfires
- Fire Spread Prediction
- Supported Through The NASA TechLeap Autonomous Observation Challenge No. 1

Components

- 2 DOF gimbal
- InGaAs SWIR camera
- NVIDIA Jetson Xavier NX
- Artificial Intelligence Software



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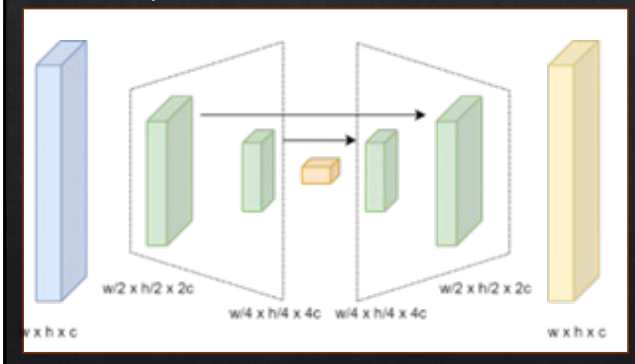
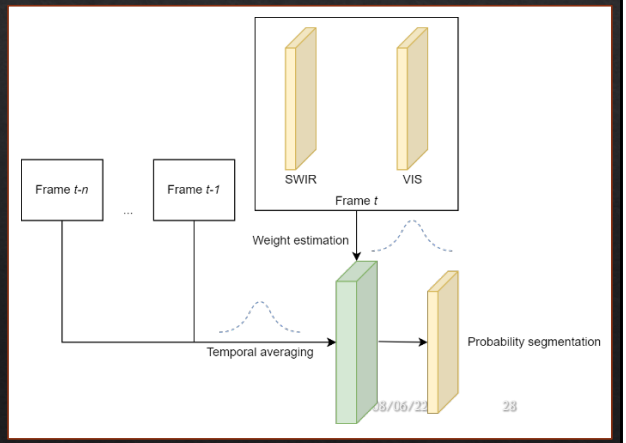
AI Software

Segmentation and Localization Networks

- CNN-Style Processing
- Bayesian Neural network





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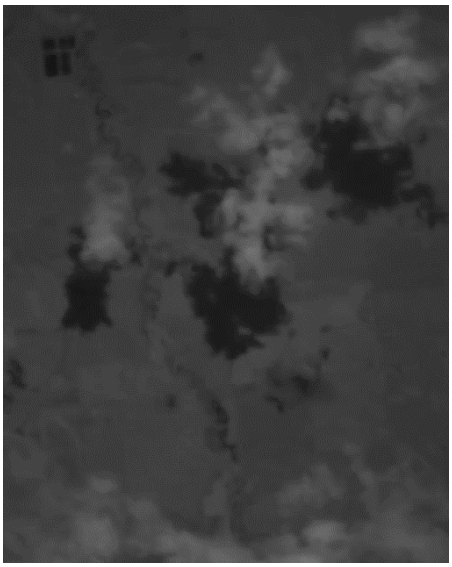
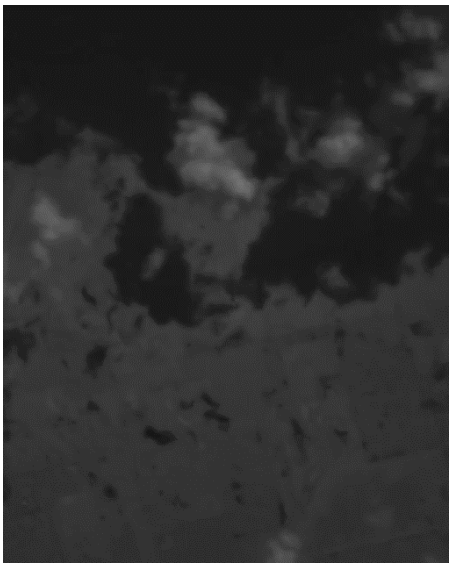
SWIR Imagery





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Original Lab Space

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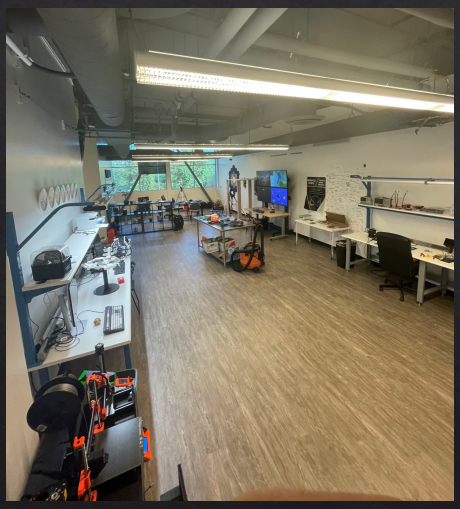
Bronco Space-ICON



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