

Cooper P. McCann

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Education:

❖ Montana State University – Bozeman, MT (2004)

- Bachelor of Science (B.S.) in Physics & minor in Mathematics (2004)
- Master of Science (M.S.) in Physics (2015)
- Doctor of Philosophy (Ph.D.) in Physics. (2017)
- Thesis title: Mesoscale, Radiometrically Referenced, Multi-Temporal Hyperspectral Data for CO₂ Leak Detection by Locating Spatial Variation of Biophysically Relevant Parameters

Work Experience and Professional Positions:

❖ Montana State University– Bozeman, MT

(July 2025 – Current)

- Precision Ag Bootcamp and Technology Manager focusing on integrating Lutz and Bart Farms into MSU's precision agriculture curriculum, offering students practical experience in farm management and technology including coordinating student projects, enhancing the curriculum, organizing events like the annual field day, overseeing farm technology, and promoting the program.
- Data Processing for Covino Lab focusing on remote sensing of fire and disturbance in Arctic-boreal systems and beyond and developing new remote sensing techniques for assessing vegetation trajectory post-disturbance.

❖ NWB Sensors Inc. – Bozeman, MT

(June 2017 – January 2025)

- Senior Engineer Co-authored multiple SBIR grants and reports dealing with: Potato Virus detection in seed potatoes using hyperspectral technology, snowpack monitoring using GPS signals, machine vision for weed detection during harvest, and using machine learning to predict weather parameters.
 - Interacted with farmers to facilitate reliable data collection for agriculture field mapping research. Including training on system use and troubleshooting of collection issues.
 - Designed from scratch the data collection hardware enclosures. Enclosures were fully 3D printable for rapid prototyping, ease of assembly and were robust enough to survive real world use.
 - Worked on thermal camera-based cloud detection. Designed and assembled the mechanical enclosure for harsh weather deployment and assembled and tested full systems.
 - Worked on GPS-based snowpack characterization algorithms as an inexpensive means of improving worldwide snow information.

The most exciting phrase to hear in science, the one that heralds new discoveries, is not 'Eureka!' (I found it!) but 'That's funny ...'
- Isaac Asimov

Anybody who has been seriously engaged in scientific work of any kind realizes that over the entrance to the gates of the temple of science are written the words: Ye must have faith. It is a quality which the scientist cannot dispense with.
- Max Planck

- Chief Science Officer working with AI and Machine Learning for practical applications.
 - Working on anomaly detection in real-world crop imagery, across multiple species, such as weeds, lodged crops, etc. to enable precision crop management. Work was done using Convolutional Neural Networks and other Machine Learning/Neural Network techniques.
 - Developed radiometrically accurate cloud prediction algorithms and image denoising networks using Convolution Neural Networks.
 - Predicted sky radiance and other weather parameters from ground level measurements using Machine Learning with worldwide accuracy better than pre-existing local specific models.

◆ **Ignite Learning Collective– Bozeman, MT**
(September 2022 – Current)

- Support Staff working on the behind the scenes helping to run a small but growing hybrid school. Duties include IT support, curriculum development (including lesson planning, engineering and science practical perspectives, supply ordering), setup/teardown, theatre lighting/sound, and other miscellaneous support.
- President of the Executive Board oversight of the Executive Director in charge of running a non-profit school that focuses on homeschool families. Primary duties included overseeing board meetings, creating policy, etc.

◆ **Gallatin Valley Christian Homeschool Sports Assn.– Bozeman, MT**
(May 2024 – Current)

- President of the Executive Board (elected position) working on the necessary tasks of running a non-profit sports organization that focuses on homeschool families. Primary duties included overseeing board meetings, hiring coaches, creating policy, fundraising efforts, etc.

◆ **Repasky Lab at Montana State University – Bozeman, MT**
(December 2014 – June 2017)

- Graduate Research Assistant working on hyperspectral imaging for plant stress detection as a means of CO₂ detection for carbon sequestration site monitoring. Semi-Automated data processing on large datasets and novel means of unsupervised anomaly detection were the primary goals of the project.

◆ **Physics Department at Montana State University – Bozeman, MT**
(September 2012 – May 2015)

- Graduate Teaching Assistant serving as laboratory instructor and grader for introductory physics classes that focused on electromagnetism, thermodynamics, atomic/particle physics, and relativity.

*I believe in intuition
and inspiration.
Imagination is more
important than
knowledge. For
knowledge is limited,
whereas imagination
embraces the entire
world, stimulating
progress, giving birth
to evolution. It is,
strictly speaking, a
real factor in scientific
research.
- Albert Einstein*

- ◆ **Spectrum Lab at Montana State University – Bozeman, MT**
(January 2012 – December 2014)
 - Graduate Research Assistant working on modeling holographic crystal gratings for novel RF signal identification in a cryogenically cooled Spatial-Spectral (S2) material.
- ◆ **Boise Technology Inc. – Nampa, ID**
(March 2010 – November 2011)
 - Staff Scientist focusing on automated data collection, computer processing, and interpretation of Vibrational Sum Frequency Generation (VSFG) spectra of polymer surfaces and interfacial species.
- ◆ **Physics Department at Boise State University – Boise, ID**
(October 2010 – July 2011)
 - Laboratory Instructor serving as classroom instructor for introductory physics classes focusing on classical mechanics and electromagnetism.
- ◆ **AdvR Inc. – Bozeman, MT**
(June 2004 – May 2009)
 - Staff Engineer responsible for polishing, dicing/slicing, and cataloging Nonlinear Optical (NLO) materials, lithography on NLO materials, and helping to streamline the processing of NLO materials. Providing support to the electro-optic packaging team including machining, design, and electrical work.
 - Chem. Lab Director/Chemical Safety Officer responsible for stocking chemicals and consumables, maintaining chemical safety information, advising workers on proper procedures in the lab, and maintaining a clean and safe work environment.
- ◆ **Ye Group at University of Colorado – Boulder, CO**
(June 2003 – August 2003)
 - REU Participant in charge of constructing electronics, machining, and assembling hardware necessary to start a second lab for the study of cold molecules. This involved machining, populating electronic boards, purchasing and novel use of preexisting equipment for non-intended purposes.
- ◆ **Cone Lab at Montana State University – Bozeman, MT**
(June 2002 – May 2004)
 - Undergraduate Research Assistant working on Yb:YAG spectroscopy and characterization of vibration in optical cryostats. Optical cryostats like any mechanical system are coupled to the outside environment. We were able to characterize their coupling to the normal modes of the lab.

Specific Skills:

- ❖ Advanced data analysis and code development using Python, MATLAB, Excel, Origin, LabVIEW, and other custom analysis programs
- ❖ Opto-Mechanical design experience utilizing the SolidWorks and Fusion360 for both additive and subtractive machining
- ❖ Experience with Zemax OpticStudio and Synopsys Code V
- ❖ Precision lathe and mill machining experience
- ❖ 3D Printing for product prototyping, FDM and Resin-Based systems
- ❖ Set-up, alignment, and troubleshooting of precision optical experiments

Papers/Patents/Posters/Talks:

❖ Papers

- **McCann, C.**, Repasky, K. S., Lawrence, R., & Powell, S. (2017). Multi-temporal mesoscale hyperspectral data of mixed agricultural and grassland regions for anomaly detection. *ISPRS Journal of Photogrammetry and Remote Sensing*, 131, 121-133.
- Morin, M., Lawrence, R., Repasky, K. S., Sterling, T., **McCann, C.**, & Powell, S. (2017). Agreement analysis and spatial sensitivity of multispectral and hyperspectral sensors in detecting vegetation stress at management scales. *Journal of Applied Remote Sensing*, 11(4), 046025.
- **McCann, C.**, Repasky, K., Morin, M., Lawrence, R., & Powell, S. (2017). Novel Histogram Based Unsupervised Classification Technique to Determine Natural Classes from Biophysically Relevant Fit Parameters to Hyperspectral Data. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 10(9), 4138-4148. doi:10.1109/jstars.2017.2701360
- **McCann, C.**, Repasky, K. S., Morin, M., Lawrence, R. L., & Powell, S. (2017). Using Landsat Surface Reflectance Data as a Reference Target for Multiswath Hyperspectral Data Collected Over Mixed Agricultural Rangeland Areas. *IEEE Transactions on Geoscience and Remote Sensing*, 55(9), 5002-5014.
- Tia Sharpe, T., **McCann, C.**, Harrington, C., Barber, Z. W., Mohan, R. K., & Babbitt, W. R. (2014, June). Ultra-wideband cueing receiver based on spatial-spectral holographic rainbow spectrometer. In *CLEO: Applications and Technology* (pp. AW3H-1). Optical Society of America.

❖ Patent

- Method of Determining Snowpack Parameters Using Global Navigation Satellite System Receivers by Nathan Joel Pust, Austin William Beard, Paul Winston Nugent, **Cooper P. McCann**. Patent No. US011092716B1 Issued August 17, 2021.

Science is fun. Science is curiosity. We all have natural curiosity. Science is a process of investigating. It's posing questions and coming up with a method. It's delving in.
- **Sally Ride**

*Science, my lad, is
made up of mistakes,
but they are mistakes
which it is useful to
make, because they
lead little by little to
the truth.*

- Jules Verne

◆ Posters

- Dustin Perry, Shannon Arnold, Emily Sewell, Michael Walach, Kayce Williams, Paul Nugent, **Cooper McCann**, & Brett Griesbaum of Montana State University – “The TEACH Trailer A Mobile Model for Agricultural Education, Research, and Outreach ” in *2026 Western Region AAAE POSTER Session* in Honolulu, HI.
- Paul W. Nugent, **Cooper P. McCann**, Austin W. Beard of NWB Sensors, Inc – “Witchcraft, Wizardry, and Water: The Intersection of Physics, Electrical Engineering, and Snow Monitoring” in 2019 at the *76th Eastern Snow Conference* in Fairlee, VT.
- **Cooper McCann**, Kevin S. Repasky, Mikindra Morin, Rick Lawrence, and Scott Powell – “Semi-automated creation and classification of high-resolution multi-swath hyperspectral data using Landsat 8 surface reflectance data as a calibration target and a novel histogram based unsupervised classification technique to determine natural classes from biophysically relevant fit parameters” at *2016 AGU Fall Meeting* in San Francisco, CA.
- **Cooper McCann**, Kevin S. Repasky, Mikindra Morin, Rick Lawrence, and Scott Powell – “Creating Large-Area, High-Resolution Hyperspectral Images for Carbon Sequestration Monitoring” at *2015 Optical Science & Engineering Conference* in Bozeman, MT.
- **Cooper McCann**, Mikindra Morin, Kevin Repasky, and Rick Lawrence, Scott Powell – “Creating Large-Area, High-Resolution Hyperspectral Images for Carbon Sequestration Monitoring” at *2015 Optical Science & Engineering Conference* in Bozeman, MT.
- Randy Babbitt, Zeb W. Barber, Jason Dahl, Cal Harrington, **Cooper McCann**, Krishna Rupavatharam, Tia Sharpe, and Josh Thornton – “Rainbow Spectrometer” at *2013 Optical Science & Engineering Conference* in Bozeman, MT.
- Paul H. Davis, Becky L. Muñoz, **Cooper P. McCann**, Ken A. Cornell, Lawrence F. Scatena, and Michael W. Hill – “Molecular-level Surface Perspective of Protective Materials: Adsorption of Chemical Warfare Agent Simulants at Polymer Surfaces” at *2011 Chemical and Biological Defense Science and Technology Conference* in Las Vegas, NV.
- Paul H. Davis, Becky L. Muñoz, **Cooper P. McCann**, Daniel R. B. Sluss, Lawrence F. Scatena, and Michael W. Hill – “VSFG Spectroscopy of Chemical Weapons Simulant Adsorption/Desorption at Barrier Material Surfaces” at *58th Annual (2010) Western Spectroscopy Association Conference* in Pacific Grove, CA.

◆ Talks

- “Mesoscale, radiometrically referenced, multi-temporal hyperspectral data for CO₂ leak detection by locating spatial variation of biophysically relevant parameters” as part of Dissertation Defense at *Montana State University* in Bozeman, MT.
- “Hyperspectral Processing - Using Landsat surface reflectance data as a calibration target for multi-swath hyperspectral data and a novel histogram based unsupervised classification technique using

biophysically relevant fit parameters” at 2016 *Optical Science & Engineering Conference* in Bozeman, MT.

- “Anisotropy in the Speed of Light (Aether Theory) as Famously Tested by the Michelson-Morley Experiment” in fulfillment of Oral Comprehensive Exam at *Montana State University* in Bozeman, MT.
- “Surface Behavior of Polymer Thin Film Coatings: Vibrational Sum Frequency Generation (VSFG) studies of polymer surface structure and its response to environmental conditions” at *58th Annual (2010) Western Spectroscopy Association Conference* in Pacific Grove, CA.
- “A Brief History of Cold Molecules” at 2003 *Optical Science & Engineering Conference* in Bozeman, MT.
- “Interferometric Characterization of Sample Vibration in Optical Cryostats” at 2002 *Optical Science & Engineering Conference* in Bozeman, MT.

References:

❖	Dr. Paul Nugent	(406) 579-4644	paul.nugent@montana.edu
❖	Dr. Kevin Repasky	(406) 994-6082	repasky@montana.edu
❖	Dr. Paul Davis	(650) 799-0548	pauldavis2@boisestate.edu