GREG FURLICH

Remote Sensing Research Scientist

g.furlich@gmail.com 952.836.7589 Boulder, CO
gregfurlich.com linkedin.com/in/greg-furlich github.com/gfurlich

Research scientist with 8 years experience in remote sensing research. Expertise in signal and image processing; algorithm development for a variety of sensor types (EOIR, Radar, Lidar, and SAR); data fusion for object detection, tracking, and state estimation; and machine learning with images. A recognized technical talent who leads innovative research and technical development which has resulted in intellectual property.

EDUCATION

Doctorate of Philosophy, *Physics* 2014 - 2020
Master of Science, *Physics* 2014 - 2018
University of Utah, Salt Lake City, UT

Bachelor of Science, *Physics* 2010 - 2014
Michigan Technological University, Houghton, MI *Magna Cum Laude*

Minors: Mathematical Sciences and German

RESEARCH EXPERIENCE

Senior Research Scientist Jan 2021 - Present
Lockheed Martin Space Systems,
Advanced Programs and Exploitations (APEX)

- Develop innovative algorithms which improved the efficiency and accuracy in signal and image processing for a variety of sensor types (EOIR, Radar, Lidar, and SAR). Develop data fusion algorithm for object detection, object tracking, and object state estimation.
- Design novel machine learning networks for super resolution, image-to-image translation, and style transfer with Generative Adversarial Networks (GANs), image segmentation with UNETs and FCNs, and object classification with Convolution Neural Networks (CNNs).
- Improve methods for synthetic radiometric scene generation to enhance fidelity of an optical payload simulation.
- Selected as a Recognized Technical Talent for technical contributions within first year.
- Generated intellectual property which provides technical advantage for many applications and was therefore awarded and protected as a trade secret.

Graduate Research Assistant in Cosmic Rays 2014 - 2020
Telescope Array (TA) Cosmic Ray Observatory, Institute of High Energy Astrophysics,
Department of Physics and Astronomy, University of Utah

Thesis : Observation of the GZK Suppression with the Telescope Array Fluorescence Telescopes and Deployment of the Telescope Array Expansion

- Established statistical evidence for spectral breaks in the cosmic ray energy spectrum through analysis of 10 years of UV fluorescence event data.
- Improved weather classification accuracy and locality by producing false color videos of the detectors' field of view and classifying these videos with a novel Recurrent Convolution Neural Network (RCNN) model.

Research Assistant in Cosmic Rays 2013 - 2014
Department of Physics, Michigan Technological University

Senior Research Project: Preliminary Search for Exotic Events in the Auger Cosmic Ray Observatory Surface Detector Data

Research Assistant in Nanofabrication 2011 - 2012
Department of Physics, Michigan Technological University

SELECTED PUBLICATIONS AND PROCEEDINGS

SubPixel Localization of Objects Using Multiple Spectral Bands, M. Gupta, J. Chan, M. Krouss, G. Furlich, P. Martens, M. Chan, M. L. Comer, E. J. Delp, IEEE Aerospace Conference, 2022, *accepted*

Recent measurement of the Telescope Array energy spectrum and observation of the shoulder feature in the Northern Hemisphere, D. Ivanov, D. Bergman, G. Furlich, R. Gonzalez, G. Thomson and Y. Tsunesada, Proceedings of Science 395 (ICRC2021), 341, 37th International Cosmic Ray Conference, Berlin, Germany, July 2021

Telescope Array 10-Year Monocular Spectrum, Douglas Bergman, Greg Furlich, Proceedings of Science 395 (ICRC2021), 339, 37th International Cosmic Ray Conference, Berlin, Germany, July 2021

Observation of the GZK Suppression with the Telescope Array Fluorescence Telescopes and Deployment of the Telescope Array Expansion, Greg Furlich, Thesis, University of Utah, April 2020

Telescope Array FD Weather Classification using Machine Learning, Greg Furlich, Proceedings of Science (ICRC2019), 261, 36th International Cosmic Ray Conference, Madison, WI, July 2019

Towards a Telescope Array 10 Year FD Monocular Energy Spectrum, Greg Furlich, Douglas Bergman, Proceedings of Science (ICRC 2019), 260, 36th International Cosmic Ray Conference, Madison, WI, July 2019

AWARDS

Recognized Technical Talent, Lockheed Martin	Selected 2021
Departmental Scholar, Department of Physics, Michigan Technological University	2013
Sigma Pi Sigma, Physics Honor Society	Inducted 2013
Michigan Space Grant Consortium Recipient	2012

KEY SKILLS

Remote Sensing: Electro-Optical and Infrared (EOIR) | Multispectral | Radar | Lidar | Synthetic Aperture Radar (SAR) | Geostationary Operational Environmental Satellite (GOES) | Sentinel | Landsat | Shuttle Radar Topography Mission (SRTM) | Multilateration (TDOA/FDOA)

Programming Languages: Python (Keras, TensorFlow, Numpy, Scipy, Pandas, Pyroot) | MATLAB | C | C++ | CERN ROOT

Development Environments: Jupyter Notebooks | Linux Virtual Machines (VMs) | High Performance Computing (HPC) | Graphical Processing Unit (GPU) | Kubeflow

Miscellaneous: Strong analytic and problem solving experience, exceptional verbal and written communication skills, and collaborative finesse.

LEADERSHIP, MENTORING, AND VOLUNTEERING

Research Mentor, Lockheed Martin

Sub-pixel localization and multispectral signal processing, Purdue University PhD Candidate	2021 - Present
Machine learning cloud segmentation in satellite imagery, United States Military Academy West Point Cadet	2021 - Present

Academic Senate, University of Utah

Member, Graduate Assembly Ad Hoc Committee	2019

College of Science, University of Utah

Member, College of Science Council	2017 - 2018
Member, College of Science College Student Council	2017 - 2018

Department of Physics and Astronomy, University of Utah

Chair, Graduate Student Advisory Council	2017 - 2018
Member, Graduate Student Advisory Council	2015 - 2019

Science Outreach

Volunteer, Physics Open House, Weber State University	2017, 2018, 2019
Volunteer, Science Day, University of Utah	2017, 2019
Volunteer and Speaker, Great Basin Astronomy Festival, Great Basin NP	2018