

## David W. Messinger, Ph.D.

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### EDUCATION

Ph.D., Physics (September 1998), Rensselaer Polytechnic Institute, Troy, NY  
Thesis Title: "New Methods for Studying Interstellar Continuum and Spectral Polarization"  
Thesis Advisor: W.G. Roberge, Ph.D.  
B.S., Physics, Graduate with Distinction (May 1991), Clarkson University, Potsdam, NY

### PROFESSIONAL SUMMARY

**Chester F. Carlson Center for Imaging Science,  
Rochester Institute of Technology, Rochester, NY**

**Professor (2015 - Present),**

**Xerox Chair (2015 - Present),**

**Director, Chester F. Carlson Center for Imaging Science (2015 - Present)**

My research investigates the general problem of developing methods to extract quantitative information from spectral, airborne and space-based imagery. Specific efforts include the detection of man made phenomena in large area imagery and application of advanced mathematical techniques to spectral image processing. Other research interests include the use of physics-based signatures to augment methods of hyperspectral image exploitation and the use of remote sensing techniques for multi-disciplinary research such as archeology, disaster management, and analysis of cultural heritage artifacts.

The Chester F. Carlson Center for Imaging Science (CIS) is an interdisciplinary academic unit within the College of Science at RIT offering degrees in Imaging Science at the BS, MS, and Ph.D. levels. The pedagogical and research focus of CIS is the "imaging chain," ranging from basic energy-matter interaction phenomenology, to sensors, imaging systems, and processing of image data to provide information. The Center typically supports approximately 50 undergraduate students and over 100 graduate students with 19 full time faculty with their primary appointment in CIS and an additional 30 affiliated faculty across the RIT community. Additionally, the Center is home to over 20 research and administrative staff. The Center is a strong, interdisciplinary research organization operating with an annual research revenue of approximately \$5.5M spread across imaging communities such as consumer electronics, government agencies, the aerospace industry, and other manufacturing communities.

**Associate Professor and Interim Director (2014 - 2015),**

**Associate Research Professor (2010 - 2014),**

**Assistant Research Professor (2007 - 2010),**

**Director, Digital Imaging and Remote Sensing Laboratory, (2007 - 2014)**

As Director of the Digital Imaging and Remote Sensing (DIRS) Laboratory, I oversaw and coordinated the research efforts of ten faculty in CIS, 15 full time research staff, and over 40 undergraduate and graduate students. While I managed the Laboratory it operated with annual research revenue of approximately \$3-4M.

**Research Scientist (2002 - 2007),  
Digital Imaging and Remote Sensing Laboratory**

I performed research into spectral image processing techniques supporting research programs within the Digital Imaging and Remote Sensing Laboratory. This work was partially funded through an Intelligence Community Postdoctoral Research Fellowship. My research focused on the detection and characterization of gaseous effluent plumes in thermal hyperspectral imagery, as well as the development of physics-based algorithms for target detection in reflective hyperspectral imagery.

**Northrop Grumman  
Aerospace Engineer (2000 - 2002)**  
Exton, PA

I designed and implemented innovative algorithms to track clusters of ballistic objects during midcourse flight in the SBIRS-Low Program. I developed a medium-fidelity, pixel-level, infrared sensor and signal processing simulation to evaluate system requirements and algorithms as well as provided in-house infrared phenomenological expertise.

**XonTech, Inc.  
Analyst (1998 - 2000) Special Studies Division,**  
Van Nuys, CA

My work with the Internal Research and Development group required the development of algorithms to determine sea-surface characteristics such as ocean wave spectra from data acquired with the NASA-JPL AVIRIS sensor. I implemented physical and statistical models of infrared and hyperspectral data as well as used signal and image processing techniques to further these efforts.

**CURRENT RESEARCH INTERESTS**

- Investigation of physical and geophysical processes through analysis of remotely sensed data
- Analysis of cultural heritage artifacts through imaging technologies
- Multispectral & hyperspectral image exploitation
  - Spectral feature extraction
  - Large area image search
  - Target detection using physics-based signatures
  - Spectral image characterization
  - Application of advanced mathematical tools to spectral imagery

**ADMINISTRATIVE EXPERIENCE****Director, Chester F. Carlson Center for Imaging Science (2014 - Present):**

I am responsible for the overall operation and leadership of the Center for Imaging Science, including oversight of faculty, research staff, administrative staff and the Center's budget. I am responsible for coordinating both the academic and research programs within the Center and serve as the Ph.D. Program Director, representing CIS at College and Institute level graduate education discussions. Additionally, I serve on the Executive Council of the College of Science, the Institute level Ph.D. Program Directors' Committee, and various other College and Institute level committees as needed.

**Member of the New York State Finger Lakes Regional Economic Development Council, Optics, Photonics, and Imaging Working Group (2014 - 2018):**

The working group provides guidance to the regional economic development council on issues related

to the Optics, Photonics, and Imaging (OPI) industrial base in Rochester and the Finger Lakes Region.

**Director, Digital Imaging and Remote Sensing Laboratory (2008 - 2014):**

I was responsible for coordinating and overseeing the research programs for those affiliated to the laboratory, managing several funded research programs, conducting annual staff performance evaluations, development of the annual report, and laboratory business development efforts. The laboratory included ten faculty, ~15 full time research staff, and >40 students at the BS, MS, and Ph.D. levels. Other responsibilities included proposal writing to support the faculty, staff, and students, interfacing with research sponsors and RIT administrators, as well as strategic planning for the laboratory and management of discretionary funds.

**Interim Director, Digital Imaging and Remote Sensing Laboratory (2007 - 2008):**

I was responsible for coordinating and overseeing the research programs for those affiliated to the laboratory while the Director was on sabbatical. This included six faculty, ~10 full time research staff, and ~30 graduate students at the MS and Ph.D. levels.

**DIRS Algorithm and Phenomenology Group Leader (2004 - 2008):**

I was responsible for the management of two full-time staff scientists and their affiliated graduate and undergraduate students. This involved personnel and budgetary management as well as contributing to the planning and proposal process for the DIRS Laboratory.

**Member of the RIT Libraries Advisory Board, 2018 - present**

**Judge, RIT Outstanding MS and Ph.D. Dissertation Award, 2017 - present**

**Member of the RIT Research Computing Advisory Board, 2016 - present**

**Member of the RIT Intersession Task Force, 2015**

**Member of the RIT College of Science Women in Science (WiSe) Advisory Board, 2011 - 2013**

**Member of the RIT College of Science Strategic Planning Core Committee, 2010-2012**

**Member of the RIT Steering Committee for the RIT - North Carolina A&T Partnership, 2011**

**Member of the Advisory Board for the Biannual Publication, *Research at RIT*, 2008 - 2012**

**Member of the Search Committee: School of Mathematical Science Faculty Search, RIT, 2012-2013**

**Member of the Search Committee: Director of the Nanopower Research Laboratory, RIT, 2011-2012**

**Member of the Search Committee: Director of the Center for Imaging Science, RIT, 2003**

**Member of the Search Committee: Remote Sensing Faculty, Center for Imaging Science, RIT, 2003**

**Member of the Graduate Student Committee: Rensselaer Polytechnic Institute Physics Dept., 1994 - 1996**

## CONFERENCE COMMITTEES

**Member of the Organizing Committee: R-CHIVE Conference, 2017 - present**

**Member of the Organizing Committee: Light and Sound Interactive, 2017**

**Member of the Organizing Committee: Dept. of Energy Conference on Data Analysis (CoDA), 2013 - present**

**Co-Chair of the SPIE Conference: Algorithms, Technologies, and Applications for Multispectral and Hyperspectral Imaging, 2015 - present**

**Member of the Technical Program Committee: SPIE Conference on Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery, 2009 - 2015**

**Co-Chair of the Special Joint Session: Remote Sensing and Natural Disasters 2012: SPIE Remote Sensing Europe, Edinburgh, Scotland**

**Member of the Local Organizing Committee: Polarimetry of the Interstellar Medium, Troy, NY, June 1995**

## FUNDING HISTORY

### *Total Awarded as Principal Investigator: ≈ \$8,000,000*

LPA Associates, "Hyperspectral Exploitation Tool Development", **PI**, 2004 - 2005, \$9,216

Kodak - RIT CIS Innovative Collaborative Research Opportunity, "Visualization of High-Dimensional Remote Sensing Data Products", Co-I, 2005, \$5,000

Pacific Northwest National Laboratory, "Characterization of LWIR Imagery", **PI**, 2006, \$12,055

Army Research Laboratory, "Persistent Surveillance Research", **PI**, 2006 - 2007, \$46,452

VirtualScopics, through the Naval Research Laboratory, "Hyperspectral Algorithm Development", **PI**, 2007 - 2008, \$100,000

Pacific Northwest National Laboratory, "Bayesian Model Averaging for Species Identification in Gaseous Plumes", **PI**, 2007 - 2008, \$100,000

NGA University Research Initiative (NURI), "Dynamic Analysis of Spectral Imagery for Improved Exploitation", **PI**, 2007 - 2013, \$750,000

NASA, "Hyper- and Multi-spectral Satellite Imagery and the Ecology of State Formation and Complex Societies", Co-I, 2008 - 2010, \$80,485

Impact Technologies, Phase 1 SBIR, "Automated 3d Terrain Mission Profile Generation", **PI**, 2008, \$10,000

Black River Systems Corporation, "Multi-Sensor Exploitation for Space Situational Awareness", **PI**, 2008-2010, \$124,286

Sandia National Laboratory, "Clutter Scene Generation in DIRSIG", **PI**, 2008, \$24,585

NGA University Research Initiative (NURI), "Spatial / Spectral Large Area Search Tool Development", **PI**, 2009 - 2013, \$750,000

Department of Energy Nonproliferation Research and Development for Proliferation Detection, "Enhanced Radiometric Scene Simulation Through Incorporation of Process Models", **PI**, 2010 - 2013, \$894,000

ITT Geospatial Systems, "Hyperspectral Algorithm Development", **PI**, 2010, \$68,000

National Reconnaissance Office, "Information Theoretic Approach to Image Utility", **PI**, 2011-2012, \$199,958

Goodrich Corp., "Multi-Modal Remote Sensing Data Collection", **PI**, 2012, \$20,000

NGA University Research Initiative (NURI), "Hierarchical Representation of Remotely Sensed Imagery", Co-I, 2012 - 2014, \$225,441

NGA University Research Initiative (NURI), "Spatiotemporal Segmentation of Full Motion Airborne Video Imagery", Co-I, 2012 - 2014, \$225,441

Lawrence Livermore National Laboratory LDRD, "Small Sat Imaging and Modeling Simulation Support", **PI**, 2013-2014, \$50,000

Kodak Alaris, "Determination of the Attributes of Aesthetically Pleasing Images and Methods to Improve Consumer Images to Make Them More Aesthetically Pleasing", **PI**, 2015-2017, \$128,764 (funding from both Kodak Alaris and the New York State CEIS Center for Advanced Technology)

MITRE Corporation, "Methods for the Spectral / Temporal Analysis of Airline Jet Engine Plumes", **PI**, 2015 - 2016, \$75,000

Department of Energy Nonproliferation Research and Development for Proliferation Detection, "Integrated Tool for Fused Data Simulation of EO Remote Sensing Imagery and Nuclear Radiation Propagation Phenomenology", **PI**, 2014 - 2017, \$749,798

RIT Internal, Signature Interdisciplinary Research Initiative, "Unmanned Aerial Systems for Imaging", **PI**, 2016 - 2021, \$1,000,000

US Government Department of Defense, "LASS Research in Sensor and System Modeling", **PI**, 2017-2022,

\$1,383,948

New York State, Empire State Development Consolidated Funding Agreement, "RIT-CIS UAS SWIR Spectrometer Instrument Acquisition", PI, 2017, \$188,000

Kress Foundation, "Support for the 2018 R-CHVIE Conference", PI, 2018, \$3,000

RIT College of Science Dean's Research Initiation Grant, "Algorithm Development for the Automatic Characterization of Pigments in Illuminated Manuscripts and Paintings: A Collaboration with the National Gallery of Art", PI, 2019, \$15,000

NGA University Research Initiative (NURI), "Radiometrically Accurate Spatial Resolution Enhancement of Spectral Imagery", PI, 2019 - 2024, \$938,641

National Endowment for the Humanities (NEH), Research and Development Grant, "Low-Cost End-to-End Spectral Imaging System for Historical Document Discovery", PI, 2020-2023, \$350,000

## HONORS AND AFFILIATIONS

Senior Member of SPIE

Member of the American Association for the Advancement of Science (AAAS)

Member of IEEE, Geoscience and Remote Sensing Society (GRSS)

Member of the US Geospatial-Intelligence Foundation (USGIF)

Member of the USGIF Academic Advisory Board, June 2013 - present

Member of the USGIF Certification Governance Board, January 2015 - present

Academic Advisor to the US Department of Homeland Security Remote Sensing Advisory Board, 2010-2012

Intelligence Community Postdoctoral Research Fellow, 2003 - 2005

"Top Research Presentation at NGA Academic Research Program Symposium and Workshops", USGIF, September 2010, research to be presented as invited talk at GEOINT 2010

"Best Research Demonstration", NGA Academic Research Program Symposium and Workshops, September 2010

Department of Education Fellowship, Rensselaer Polytechnic Institute, Jan. 1997 - Aug. 1997

Graduate with Distinction, Clarkson University, May 1991

## EDITORIAL & REVIEW SERVICE

Associate Editor for Special Issue of Remote Sensing, Spectral Unmixing, 2018

Associate Editor for Spectral and Polarimetric Imaging, Optical Engineering, 2013 - present

Journal & Proposal Reviewer for:

- Journal of Electronic Imaging
- IEEE Transactions on Geoscience and Remote Sensing
- IEEE Transactions on Aerospace and Electronic Systems
- Optical Engineering
- Measurement
- Science Advances

- NASA Postdoctoral Program (NPP)
- U.S. Army Corps of Engineers, Engineering Research and Development Center (ERDC)
- University of Houston DHS Center of Excellence, Borders, Trade, and Immigration Institute, 2017
- M. J. Murdock Charitable Trust

Reviewer for SPIE Press

Service on Department of Energy Program Review Panels:

- Infrared Signatures Program, Pacific Northwest National Laboratory, March, 2005
- Spectral Signatures Program, Pacific Northwest National Laboratory, March, 2005
- Alternative SNM Signatures, Pacific Northwest National Laboratory, March, 2008
- Hyperspectral Observation of Solid Signatures, Los Alamos National Laboratory, December, 2010
- Geospatial Sensor Processing Operational Concept, Los Alamos National Laboratory, July, 2012
- Benchmark Imagery, Lawrence Livermore National Laboratory, February, 2012
- Full Spectrum Exploitation, Los Alamos National Laboratory, April, 2013
- Compressive Sensing, Lawrence Livermore National Laboratory, June, 2013
- GeoVisipedia, Lawrence Livermore National Laboratory, May, 2018
- Arms Control Modeling, Sandia National Laboratory, September 2018
- Experimental and Computational Investigation of Uranium Particle Formation and Dynamic Behavior, Oak Ridge National Laboratory, May 2019

Invited Guest Commentator, MITRE Corp. Board of Trustees, Technology Subcommittee Meeting, March 2015

Service on various program review boards for the US Defense / Intelligence Community

## TEACHING EXPERIENCE

*Graduate Level Remote Sensing: Systems, Sensors, and Radiometric Image Analysis:* This course introduces the governing equations for radiance reaching aerial or satellite based imaging systems. The course also covers the properties of these imaging systems with an emphasis on their use as quantitative scientific instruments. It also includes a treatment of methods to invert the remotely sensed image data to measurements of the Earth's surface (e.g. reflectance and temperature) through various means of inverting the governing radiometric equation.

*Cultural Heritage Imaging:* Team taught a special topics, general education course in the relevant technologies used in Cultural Heritage Imaging systems. The course is targeted at non-science majors in the Museum Studies and Digital Humanities BS programs.

*Physics II:* Head instructor for class of 65 students. Duties included course development, lecturing, homework set assignment, solution, and grading, as well as exam writing and grading.

*Astrophysics II:* Teaching assistant for graduate/undergraduate course. Duties included guest lecturing, homework and exam grading, and providing office hours.

*Physics I & II Recitation:* Instructor for three recitations of up to 30 students each per semester. Duties included problem solving, homework and exam grading, and providing office hours.

## STUDENT RESEARCH PROJECTS ADVISED

### High School Students

- [6] Hudson Pavia, "Improvements to the MISHA Cultural Heritage Imaging System", summer 2018
- [5] Emerald Rafferty, "Improvements to the MISHA Cultural Heritage Imaging System", summer 2018
- [4] Paige Phillips, "Hyperspectral image processing of the Selden Map of China", summer 2017
- [3] Emily Polo-Rankin, "Hyperspectral image processing of the Selden Map of China", summer 2017
- [2] Madeline Loui, "Hyperspectral image processing of the Gough Map of Great Britain", summer 2016
- [1] Allyse Toporek, "Hyperspectral image processing of the Gough Map of Great Britain", summer 2016

### Summer REU Students

- [1] Margaret Anderson, California Institute of Technology, "Correlations between medieval parchment reflectance signature and approximate age", summer 2019

## THESES ADVISED

### External Examiner

- [4] Merav Huber-Lerner, Ph.D., Communication Systems Engineering, Ben-Gurion University of the Negev, 2016, advisers: Stanley Rotman, Ph.D. & Ofer Hader, Ph.D., "Compression and Band Selection of Hyperspectral Images Containing a Sub-Pixel Target"
- [3] Fan Li, Ph.D., Systems Design Engineering, University of Waterloo, 2015, adviser: David Clausi, Ph.D., "Automated Remote Sensing Image Interpretation with Limited Labeled Training Data"
- [2] Pedram Ghamisi, Ph.D., Electrical and Computer Engineering, University of Iceland, 2015, adviser: Jón Atli Benediktsson, Ph.D., "Spectral and Spatial Classification of Hyperspectral Data"
- [1] Gavin Holgate, MSc, Computational & Applied Mathematics, University of the Witwatersrand, South Africa, 2015, adviser: Michael Sears, Ph.D., "On the Estimation and Removal of Noise in Hyperspectral Images"

### Senior Thesis Project

- [6] Tyler Kuhns, Imaging Science, Rochester Institute of Technology, 2018, "Spectral Phenomenology of Parchments and Inks in Support of Cultural Heritage Imaging System Design"
- [5] Leah Bartnik, Imaging Science, Rochester Institute of Technology, 2017, "Unmanned Aerial Imaging System Design for Archeological Studies"
- [4] Chris Lapszynski, Imaging Science, Rochester Institute of Technology, 2013, "Incorporating Spatial Information in Graph Models of Spectral Imagery"
- [3] Joshua Zollweg, Imaging Science, Rochester Institute of Technology, 2010, "Point Density and Shift-Outlier Change Detection"
- [2] Sarah Paul, Imaging Science, Rochester Institute of Technology, 2007, "Investigation of Visiball Glasses Claims"
- [1] Rachael Gold, Imaging Science, Rochester Institute of Technology, 2005, "Performance Analysis of the Invariant Algorithm for Target Detection in Hyperspectral Imagery"

**Masters of Science**

- [10] Emily Berkson, Imaging Science, Rochester Institute of Technology, 2016, "A Proposed Imaging System to Spatially and Temporally Monitor Unburned Hydrocarbons in Jet Engine Exhaust"
- [9] Michael Harris, Imaging Science, Rochester Institute of Technology, 2014, "Material Property Extraction from High-resolution RGB Oblique Imagery"
- [8] Christian Lewis, Imaging Science, Rochester Institute of Technology, 2014, "The Development of a Performance Assessment Methodology for Activity Based Intelligence: A Study of Spatial, Temporal, and Multimodal Considerations"
- [7] Jordyn Stoddard, Imaging Science, Rochester Institute of Technology, 2014, "Toward Image-Based Three-Dimensional Reconstruction from Cubesats: A Study of the Impacts of Spatial Resolution and SNR on Point Cloud Quality"
- [6] Maria Busuiocanu, Imaging Science, Rochester Institute of Technology, 2013, "Utility of Compressive Sensing for Remote Sensing Applications"
- [5] Joshua Zollweg, Imaging Science, Rochester Institute of Technology, 2012, "Using GIS Databases for Simulated Nightlight Imagery"
- [4] Sam Brisebois, Imaging Science, Rochester Institute of Technology, 2011, "The Hyper-Log-Chromaticity Space for Illuminant Invariance"
- [3] Alfredo Lugo, Imaging Science, Rochester Institute of Technology, 2010, "Analysis of Multitemporal, Low Spatial Resolution, Multispectral Imagery"
- [2] Justin Kwong, Imaging Science, Rochester Institute of Technology, 2009, "Hyper- and Multispectral Satellite Imagery and the Ecology of State Formation and Complex Societies"
- [1] Josef Bishoff, Imaging Science, Rochester Institute of Technology, 2008, "Target Detection Using Oblique Angle Hyperspectral Imagery"

**Ph.D.**

- [21] Rey Nann Ducay, Imaging Science, Rochester Institute of Technology
- [20] Sihan Huang, Imaging Science, Rochester Institute of Technology
- [19] Morteza Maali Amir, Imaging Science, Rochester Institute of Technology
- [18] Anna Starynska, Imaging Science, Rochester Institute of Technology
- [17] Michal Kucer, Imaging Science, Rochester Institute of Technology, expected 2020, "Assessment of Image Aesthetics"
- [16] Di Bai, Imaging Science, Rochester Institute of Technology, 2019, "A Hyperspectral Image Classification Approach to Pigment Mapping of Historical Artifacts Using Deep Learning Methods"
- [15] Tyler Peery, Imaging Science, Rochester Institute of Technology, 2019, "System Design Considerations for a Low-Intensity Hyperspectral Imager of Sensitive Cultural Heritage Manuscripts"
- [14] Jie Yang, Imaging Science, Rochester Institute of Technology, 2019, "Crime Scene Evidence Detection System Using Spectral Imaging"
- [13] Timothy Gibbs, Imaging Science, Rochester Institute of Technology, 2017, "Physical Property Extraction from Powder Contaminated Surfaces from Longwave Hyperspectral Imagery"
- [12] Lei Fan, Imaging Science, Rochester Institute of Technology, 2017, "Graph Based Data Modeling and Analysis in Image Derived Data Fusion"



- [11] Leidy Dorado-Muñoz, Imaging Science, Rochester Institute of Technology, 2016, "Spectral Target Detection using Schrödinger Eigenmaps"
- [10] Amanda Ziemann, Imaging Science, Rochester Institute of Technology, 2015, "A Manifold Learning Approach to Target Detection in High Resolution Hyperspectral Imagery"
- [9] Jiangqin Sun, Imaging Science, Rochester Institute of Technology, 2014, "Temporal Signature Modeling and Analysis"
- [8] Shea Hagstrom, Imaging Science, Rochester Institute of Technology, 2014, "Voxel-Based LIDAR Analysis and Applications"
- [7] James Albano, Imaging Science, Rochester Institute of Technology, 2013, "The Commute Time Distance Transformation and Applications to Spectral Image Processing"
- [6] Weihua Sun, Imaging Science, Rochester Institute of Technology, 2013, "Urban Feature Extraction from High Resolution Multispectral Satellite Imagery"
- [5] Kelly Canham, Imaging Science, Rochester Institute of Technology, 2012, "Feature Extraction from Hyperspectral Imagery in Support of Cultural Archeology in Oaxaca, Mexico"
- [4] Ryan Mercovich, Imaging Science, Rochester Institute of Technology, 2011, "Anomalous Change Detection in High Resolution, Multitemporal, Multispectral Imagery"
- [3] Aaron Weiner, Imaging Science, Rochester Institute of Technology, 2010, "A Systems Level Characterization of a Mobile Trace Fugitive Gas Detection Method Using Agile Fourier Transform Infrared Spectrometry"
- [2] Ariel Schlamm, Imaging Science, Rochester Institute of Technology, 2010, "Detection of Man-Made Material in Large Area Search Using Hyperspectral Imagery"
- [1] Shawn Higbee, Imaging Science, Rochester Institute of Technology, 2009, "Gas Plume Constituent Species Identification Using Bayesian Analysis with LWIR Hyperspectral Imagery"

## INVITED PRESENTATIONS

- [31] NGA Research Webinar Series, "Radiometrically Accurate Spatial Resolution Enhancement of Spectral Imagery for Improved Exploitation", June 2020
- [30] US Geospatial-Intelligence Foundation (USGIF) GEOINTegration Summit, Panelist for "Academia's Role in Tradecraft", Herndon, VA, September 2019
- [29] 3rd International Conference on Natural Sciences and Technology in Manuscript Analysis, "Hyperspectral Imaging of Historical Artifacts: A Novel Imaging Approach for the Study of Materials and Methods", Centre for the Study of Manuscript Cultures, University of Hamburg, June 2018
- [28] Big Data in Cultural Heritage Incubator, OSA Incubator Program, "Hyperspectral Imaging of Historical Artifacts: A Novel Imaging Approach for the Study of Materials and Methods", Optical Society of America, Washington, DC, May, 2018
- [27] ESRI Imagery Education Summit, "UAS Imaging for Precision Agriculture", Redlands, CA, November 2017
- [26] Rochester Rotary, "Unmanned Aerial Imaging Systems for Precision Agriculture and Property Inspection", Rochester, NY, November 2016
- [25] Telops Workshop on Hyperspectral Imaging, "Known Signature Detection in Hyperspectral Imagery Using Non-Parametric Data Models", Washington, DC, September 2016

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- [24] University of Oxford, SEAHA Special Seminar in Multispectral and Hyperspectral Imaging, "Statistical Methods for Spectral Image Processing: Where the Magic (Sometimes) Happens", Presented jointly with Dr. Roger Easton, Oxford, UK, June 2016
  - [23] University of Waterloo, Systems Design Engineering Department, "Known Signature Detection in Hyperspectral Imagery Using Non-Parametric Data Models", Waterloo, ON, July 2015
  - [22] GEOINT 2015, Invited Panelist, "NGA Collegiate Research and Education", Washington, DC, June 2015
  - [21] Joint Statistical Meeting, Special Session on Far-Away Image Analysis, "Data-driven approaches to detection in complex spectral imagery", Boston, MA, July 2014
  - [20] Rochester Science Cafe Series, "Hyperspectral Imaging: Observing the World in Hundreds of Colors", Rochester, NY, February 2014
  - [19] University of Maryland, Norbert Weiner Center, February Fourier Talks, "A graphical operator framework for signature detection in hyperspectral imagery", College Park, MD, February 2014
  - [18] Latin American Remote Sensing conference, "Detection in Spectral Imagery Using Graphical Data Models", Santiago, Chile, October 2013
  - [17] Geospatial InfoFusion III Panel Discussion, "Synergistic Data Fusion through Multi-Sensing Enablement", SPIE Defense & Security Sensing, Baltimore, MD, May 2013
  - [16] Department of Energy Conference on Data Analysis, Invited Speaker, "Graph Theory Approaches to Spectral Image Analysis", Santa Fe, NM, February 2012
  - [15] GEOINT 2011, Invited Panelist, "Science & Technology Workshop: Multi-INT Fusion", October 2011
  - [14] Applied Imagery and Pattern Recognition (AIPR) Workshop 2011, Invited Speaker, "Imaging for Decision Making: Lessons Learned in Remote Sensing for Disaster Relief Efforts", October 2011
  - [13] Imaging Spectrometry XVI, Keynote Speaker, "Production of imagery-derived maps to aid the Japanese earthquake / tsunami relief effort", August 2011
  - [12] Optical Society of America, Rochester Chapter, Invited Speaker, "Advances in Hyperspectral Image Processing and an Overview of the RIT Support to the Haiti Relief Effort", February 2011
  - [11] Cornell University, Society of Physics Students, Invited Speaker, "Using Airborne or Space-based Imagery to Search Large Areas, Without Knowing What You're Looking For", February, 2011
  - [10] GEOINT 2010, Invited academic speaker, New Orleans, "Spatial / Spectral Large Area Search Tool Development", November 2010
  - [9] University of Buffalo, Department of Mechanical and Aerospace Engineering, Invited Colloquium Speaker, "Novel Approaches to Hyperspectral Image Analysis: Beyond Statistics and Linear Geometry", November 2009
  - [8] NSG RDT&E Forum 2.0, Member of Panel on Academic Collaboration with the Intelligence Community and the NSG, April 2009
  - [7] Physics Department, SUNY Brockport, Departmental Colloquium, "Spectral Remote Sensing: What is the dimension of my image, how do I calculate it, and why do I care?", March 2009
  - [6] Information Institute 2008, Workshop on Image and Video Processing, Air Force Research Laboratory, Rome NY, "Advanced Mathematical Approaches to Spectral Image Processing", June 2008
  - [5] Telops Workshop on Hyperspectral Remote Sensing, "Topological Approaches to Exploitation of Hyperspectral Imagery: Beyond Statistics and Linear Geometry", October 2007

- [4] School of Mathematical Sciences, RIT, Departmental Colloquium, "Characterization of High-Dimensional Spectral Image Data", December 2006
- [3] International Geoscience and Remote Sensing Symposium 2006, "Improving Background Multivariate Normality and Target Detection Performance Using Spatial and Spectral Segmentation", August 2006
- [2] International Symposium on Spectral Sensing Research 2006, "Detection of Gaseous Effluents from Airborne LWIR Hyperspectral Imagery Using Physics-Based Signature Predictions", May 2006
- [1] Kodak Research Laboratories Colloquium, "Exploitation Algorithms for Hyperspectral Imagery", March 2004

## SELECTED PUBLICATIONS

ORCID ID: 0000-0002-2273-9194

\* indicates student author

### Patents

- [1] "An Iterative Method for Salient Foreground Detection and Multi-Object Segmentation", M. Kucer\*, N. Cahill, **D.W. Messinger**, & A. Loui, Patent Application number 15/847,050, December, 2017

### Book Contributions

- [2] "Fundamentals of Polarimetric Remote Sensing", John R. Schott, SPIE, April 2009
- [1] "Spectral Sensing Research for Water Monitoring Applications and Frontier Science and Technology for Chemical, Biological, and Radiological Defense", eds. D. Woolard & J. Jensen, *Detection of Gaseous Effluents from Airborne LWIR Hyperspectral Imagery Using Physics-Based Signature Predictions*, **D.W. Messinger**, C. Salvaggio, N.M. Sinisgalli\*, World Scientific, March 2009

### Refereed Articles

*currently under review*

- [52] "Revealing a History: Palimpsest Text Separation with Generative Networks", A. Starynska\*, Y. Kong, & **D.W. Messinger**, submitted to IEEE Transactions on Image Processing, May 2020

*accepted for publication*

- [51] "Image Quality in Cultural Heritage", T.R. Peery\*, R.L. Easton, & **D.W. Messinger**, accepted for publication in Manuscript Cultures, December 2018

2020

- [50] "Towards automatic classification of diffuse reflectance image cubes from paintings collected with hyperspectral cameras", T. Kleynhans\*, J. Delaney, & **D. W. Messinger**, MicroChemical Journal, 157, doi: 10.1016/j.microc.2020.104934, May 2020

- [49] "Spatial Resolution as a Trade Space for Low-Light Imaging of Sensitive Cultural Heritage Documents", T. Peery\* & **D.W. Messinger**, *Journal of Cultural Heritage*, doi: 10.1016/j.culher.2020.02.014, April 2020  
 .....  
 2019
- [48] "A Hyperspectral Image Spectral Unmixing and Classification Approach to Pigment Mapping in Historical Artifacts", D. Bai\*, **D.W. Messinger**, & D. Howell, *Journal of the American Institute of Conservation (JAIC)*, doi: 10.1080/01971360.2019.1574436, March 2019  
 .....  
 2018
- [47] "Leveraging Expert Feature Knowledge for Predicting Image Aesthetics", M. Kucer\*, A. Loui, & **D.W. Messinger**, *IEEE Trans. on Image Processing*, 27(10) October 2018, doi: 10.1109/TIP.2018.2845100
- [46] "Aesthetic Inference for Smart Mobile Devices", M. Kucer\* & **D.W. Messinger**, *IEEE Western Conference on Applications in Computer Vision (WACV) 2018*, doi: 10.1109/WACV.2018.00196
- [45] "Integrating Spatial and Spectral Information for Enhancing Spatial Features in the Gough Map of Great Britain", L. Dorado-Muñoz\*, **D.W. Messinger**, & D. Bove, *Journal of Cultural Heritage* (2018), vol 34, p. 159 - 165, doi: 10.1016/j.culher.2018.04.011
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