

# **Matthew S. Sherwood**

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## **EDUCATION**

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### **Master of Business Administration, Wright State University**

Dayton, Ohio, USA. *December 2022*

### **Doctor of Philosophy, Engineering, Wright State University**

Focus Area: Medical and Biological Systems

Dayton, Ohio, USA. *July 2017*

### **Master of Science, Engineering, Wright State University**

Focus Area: Biomedical Image and Signal Processing

Dayton, Ohio, USA. *December 2013*

### **Bachelor of Science, Biomedical Engineering, Wright State University**

Dayton, Ohio, USA. *June 2011*

## **AWARDS & HONORS**

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- Certificate of Participation, Dean's Leadership Institute, College of Engineering and Computer Science, WSU (2011-2012)
- Graduate Research Fellowship, WSU (2011-2012)
- Graduate Teaching Assistant Scholarship, WSU (2011-2012)
- Research Director's SATE2011 Leadership Team Award, Tec^Edge (2011)

## **PROFESSIONAL EXPERIENCE**

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### **Founding Director, Center of Neuroimaging and Neuro-Evaluation of Cognitive Technologies**

**Wright State University**

Dayton, OH. 03/2022-Present

Roles & Responsibilities:

- Oversee operations of the WSU CoNNECT research MRI facility
- Develop, implement and monitor MRI safety and operation training
- Develop and manage a data management and analysis solution centralized resources
- Cultivate a strong collaborative relationship between WSU and US Air Force

### **Research Associate Professor, Department of Neuroscience, Cell Biology & Physiology**

**Wright State University**

Dayton, OH. 03/2022-Present

Roles & Responsibilities:

- Develop and lead a neuroscience research portfolio
- Supervise Master's and Doctoral students
- Teach undergraduate and graduate courses in neuroscience, physiology and biomedical engineering
- Enhance imaging sections of undergraduate engineering, neuroscience and medical curriculums.
- Publish peer reviewed journal articles, conference presentations and technical reports

**Senior Neuroscientist, Science & Space  
KBR Inc.**

Dayton, OH. 09/2020-04/2022

Roles & Responsibilities:

- Analyze statistics and information from multiple sources to identify trends with maximal insight
- Applies and integrates statistical, mathematical, predictive modeling and business analysis skills to manage and manipulate complex high-volume data from a variety of sources
- Create new data collection and analysis frameworks for structured and unstructured data
- Develop and analyze modeling and measuring techniques using inquisitive creativity along with mathematics, machine learning and statistical/engineering methods

**Adjunct Faculty, Department of Biomedical, Industrial & Human Factors Engineering  
Wright State University**

Dayton, OH. 08/2017-12/2020

**Neuroscience Consultant, Infocitex Corporation**

Dayton, OH. 01/2018-09/2020

Roles & Responsibilities:

- Provide technical guidance in neuroimaging design, analysis, and interpretation in DoD applications
- Develop data management and analysis pipelines
- Manage database for behavioral and imaging data

**Research Engineer II, Department of Biomedical, Industrial & Human Factors Engineering  
Wright State University**

Dayton, OH. 07/2016-09/2020

Roles & Responsibilities:

- Manage a portfolio of multiple DoD-funded projects with total awards exceeding \$2M
- Design, execute, and supervise multiple human-subject experiments including IRB protocol development and submission tracking
- Analyze neuroimaging (PET and MRI) and behavioral data using statistical software including FSL, Freesurfer, SPSS, SPM, and AFNI
- Develop advanced online and offline MRI processing pipelines in MATLAB, C++, and BASH
- Develop and implement the data management plan following contract and HIPAA requirements
- Supervise personnel including graduate and undergraduate students

**Medical Research Engineer, Wright State Research Institute  
Wright State University**

Dayton, OH. 05/2012-06/2016

Roles & Responsibilities:

- Design and executed multiple human-subject experiments involving functional MRI, DTI, and MR spectroscopy
- Develop experimental paradigms for testing inside and outside of an MR environment

## **CLINICAL EXPERIENCE**

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### **Volunteer, Medical Imaging, Dayton Children's Hospital**

Dayton, OH. 05/2014-present

Duties:

- Assist neurosurgeons in developing and analyzing modified MRI protocols
- Assist MR technologists and radiologists in neurofunctional MRI protocols including functional MRI and MR spectroscopy
- Assist in QA/QC evaluations

## **TEACHING EXPERIENCE**

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### **Medical Imaging**

Wright State University

- Undergraduate/Graduate cross-listed course.
- Overview of the various methods used in generating images in medicine.

### **Introduction to Computation for BME**

Wright State University

- Digital computer applications in biomedical related fields
- Use of MATLAB to solve biomedical problems and display the results

### **Computational Neuroergonomics and Healthcare Applications**

Wright State University

- Principles and application of computational methods and technologies to neuroergonomics and neuroengineering
- Analysis of applications related to brain-system interface and augmented sensory perception

### **Fundamentals of BIE Engineering**

Wright State University

- Introduction to the disciplines of Biomedical, Industrial & Systems and Human Factors Engineering
- Provides an overview of how engineers design, develop, implement, and improve integrated systems that include people, materials, information, equipment, and energy

## **RESEARCH GRANTS**

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1. US Air Force, Air Force Research Laboratory (Subcontract, UES), fMRI Scanning to Examine the Neural Effects of Transcutaneous Vagus Nerve Stimulation on Learning, **Site Principal Investigator**, Funded Amount - \$305,690, Oct 2022 – Oct 2023
2. US Air Force, Air Force Research Laboratory (Subcontract, KBR), Cognitive and Neurology Research II, **Site Principal Investigator**, Funded Amount - \$442,493, Sept 2022 – Dec 2023
3. US Air Force, Air Force Research Laboratory (Subcontract, KBR), Cognitive and Neurology Research I, **Site Principal Investigator**, Funded Amount - \$101,099, Sept 2022 – Feb 2023
4. US Air Force, Air Force Research Laboratory, Airmen Readiness & Medical Readiness, Contract FA8650-21-C-6277, **Investigator**, Funded Amount - \$4,649,078, Sept 2021 – Dec 2024

5. US Air Force, Air Force Office of Scientific Research, To Establish a Joint DOD and WSU Center of Neuroimaging and Neuro-Evaluation of Cognitive Technologies, Contract FA9550-20-1-0239, **Principal Investigator**, Funded Amount - \$1,100,000, Aug 2020 – Aug 2021
6. State of Ohio, Ohio Department of Higher Education, To Establish a Joint DOD and WSU Center of Neuroimaging and Neuro-Evaluation of Cognitive Technologies, Proposal #1676, **Principal Investigator**, Funded Amount - \$200,000, Aug 2020 – Aug 2021
7. US Navy, Naval Medical Research Unit, Cerebral Hemodynamics of Hypoxia and Fatigue, Contract N62645-18-C-4017, **Principal Investigator**, Funded Amount - \$500,797, Sep 2018 – Sep 2020
8. US Air Force, 59<sup>th</sup> Medical Wing, Alternate Tinnitus Management Techniques Developed Using Blood-Oxygen-Level-Dependent MRI with Neurofeedback, Contract FA8650-16-2-6702, **Principal Investigator**, Funded Amount - \$1,759,612, May 2016 – May 2020
9. US Air Force, Air Force Research Laboratory (Subcontract, Infoscitex Corp.), Cognitive Performance Research, Contract FA8650-14-D-6500, **Principal Investigator**, Funded Amount - \$34,700, Apr 2016 – Mar 2019
10. US Navy, Office of Naval Research, Lapses of Attention Predicted in Semi-Structured Ecological Settings, Contract N000-14-16-1-2047, **Investigator**, Funded Amount - \$743,862, Nov 2015 – Dec 2018
11. US Navy, Naval Medical Research Unit, Hemodynamic Response to Hypoxia, Contract N62645-16-P-2020, **Principal Investigator**, Funded Amount - \$109,000, Apr 2016 – Apr 2018.
12. US Air Force, Human Systems Technologies for Future Air Force Challenges, Neuroscience and Medical Imaging, Contract FA8650-11-C-6157, **Investigator**, Funded Amount - \$5,000,000, Dec 2010 – Dec 2015
13. US Navy, Office of Naval Research (Subcontract, Utopia Compression), A Neuroimaging Augmented Meta-Cognition Model to Predict the Decision-Making Capabilities of Warfighters, **Investigator**, Funded Amount - \$36,445.89, Sept 2013 – Sept 2015
14. Defense Advanced Research Projects Agency, Mirror Image Detector for Analyzing Surprise, Contract FA8650-11-C-6157, **Investigator**, Funded Amount - \$250,000, Sept 2012 – Feb 2014.

## **PROFESSIONAL SOCIETY SERVICE AND ACTIVITIES**

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### Member:

Radiological Society of North America, 2022 – present  
 Aerospace Medical Association, 2022 – present  
 Biomedical Engineering Society, 2019 – 2020  
 Society for Neuroscience, 2014 – 2018

### Panel Member:

Blasted-Induced Tinnitus, 2018 Military Health Systems Research Symposium

### Review Editor for:

Frontiers in Environmental, Aviation and Space Physiology

### Scientific Reviewer for:

Frontiers in Behavioral Neuroscience  
 Frontiers in Human Neuroscience  
 Frontiers in Physiology  
 Frontiers in Neuroscience  
 eNeuro  
 PLOS One  
 European Journal of Neuroscience  
 Biomedical Engineering Online  
 International Journal of Clinical Biostatistics and Biometrics  
 American Journal of Alzheimer's Disease & Other Dementias  
 Journal of Affective Disorders  
 Neuromodulation: Technology at the Neural Interface

Reviewer for Technical Conferences:

12<sup>th</sup> IFAC/IFIP/IFORS/IEA Symposium on Analysis, Design, and Evaluation of Human-Machine Systems

Co-Chair for Technical Conferences:

12<sup>th</sup> IFAC/IFIP/IFORS/IEA Symposium on Analysis, Design, and Evaluation of Human-Machine Systems

## **PATENTS**

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1. Michael P. Weisend, **Matthew S. Sherwood**, Megan, K. Howes. "Electrode interfaces and electrode assemblies for performing transcranial direct current stimulation." United States Patent and Trademark Office US 10,369,351 B2; 6 August 2019.

## **REFEREED JOURNAL ARTICLES**

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1. **Matthew S. Sherwood**, Lindsey McIntire, Aaron T. Madaris, Kamin Kim, Charan Ranganath, R. Andy McKinley (2021). "Intensity-Dependent Changes in Quantified Resting Cerebral Perfusion with Multiple Sessions of Transcranial DC Stimulation." *Frontiers in Human Neuroscience* 15(679977). doi: 10.3389/fnhum.2021.679977.
2. Kamin Kim, **Matthew S. Sherwood**, Lindsey K. McIntire, R. Andy McKinley, Charan Ranganath (2021). "Transcranial Direct Current Stimulation Modulates Connectivity of Left Dorsolateral Prefrontal Cortex with Distributed Cortical Networks." *Journal of Cognitive Neuroscience* 33(7), 1381–1395. doi: 10.1162/jocn\_a\_01725
3. **Matthew S. Sherwood**, Jason G. Parker, Emily E. Diller, Subhashini Ganapathy, Kevin B. Bennett, Carlos R. Esquivel, Jeremy T. Nelson (2019). "Self-Directed Down-Regulation of Auditory Cortex Activity Mediated by Real-Time fMRI Neurofeedback Augments Attentional Processes, Resting Cerebral Perfusion, and Auditory Activation." *NeuroImage* 195, 475-489. doi: 10.1016/j.neuroimage.2019.03.078.
4. **Matthew S. Sherwood**, Aaron T. Madaris, Casserly R. Mullenger, R. Andy McKinley (2018). "Repetitive Transcranial Electrical Stimulation Induces Quantified Changes in Resting Cerebral Perfusion Measured from Arterial Spin Labeling." *Neural Plasticity* 2018(5769861), 1-12. doi: 10.1155/2018/5769861.
5. **Matthew S. Sherwood**, Jason G. Parker, Emily E. Diller, Subhashini Ganapathy, Kevin Bennett, Jeremy T. Nelson (2018). "Volitional Down-Regulation of the Primary Auditory Cortex Via Directed Attention Mediated by Real-Time fMRI Neurofeedback." *AIMS Neuroscience* 5(3), 179-199. doi: 10.3934/Neuroscience.2018.3.179.
6. Nathaniel R. Bridges, R. Andrew McKinley, Danielle Boeke, **Matthew S. Sherwood**, Jason G. Parker, Lindsey K. McIntire, Justin M. Nelson, Catherine Fletchall, Natasha Alexander, Amanda N. McConnell, Chuck Goodyear, Jeremy T. Nelson (2018). "Single Session Low Frequency Left Dorsolateral Prefrontal Transcranial Magnetic Stimulation Changes Neurometabolite Relationships in Healthy Humans." *Frontiers in Human Neuroscience* 12(77). doi: 10.3389/fnhum.2018.00077.
7. **Matthew S. Sherwood**, Emily E. Diller, Elizabeth Ey, Subhashini Ganapathy, Jeremy T. Nelson, Jason G. Parker (2017). "A Protocol for the Administration of Real-Time fMRI Neurofeedback Training." *Journal of Visualized Experiments* 126(e55543), doi: 10.3791/55543.
8. **Matthew S. Sherwood**, Michael P. Weisend, Jessica H. Kane, Jason G. Parker (2016). "Combining Real-Time fMRI Neurofeedback Training of the DLPFC with N-Back Practice Results in Neuroplastic Effects Confined to the Neurofeedback Target Region." *Frontiers in Behavioral Neuroscience* 10(138), 1-9, doi: 10.3389/fnbeh.2016.00138.
9. **Matthew S. Sherwood**, Jessica H. Kane, Michael P. Weisend, and Jason G. Parker (2016). "Enhanced control of dorsolateral prefrontal cortex neurophysiology with real-time functional magnetic resonance imaging (rt-fMRI) neurofeedback training and working memory practice." *Neuroimage* 124, 214-223, doi: 10.1016/j.neuroimage.2015.08.074.

10. Jason G. Parker, Benjamin Speidel, **Matthew S. Sherwood** (2015). “Automated and non-biased regional quantification of functional neuroimaging data.” *Medical Physics* 42(2), 892-899, doi: 10.1118/1.4906130.
11. Phani Kidambi, **Matthew S. Sherwood**, and Jason G. Parker (2014). “Human cognitive performance: Sensing, assessment, and augmentation techniques.” *European Journal of Automated Systems* 48(4-6), 397-420.

## **PUBLISHED CONFERENCE PROCEEDINGS**

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1. R. Andy McKinley, **Matthew Sherwood**, Casserly Mullenger, Lindsey McIntire (2019). “The effects of chronic tDCS on functional brain activity and sustained attention performance.” *Brain Stimulation*. 12(2): 536, doi: 10.1016/j.brs.2018.12.766.
2. Nilesh U. Powar, Tamera R. Schneider, Julie A. Skipper, Douglas T. Petkie, Vijayan K. Asari, Rebecca R. Riffle, **Matthew S. Sherwood**, Carl B. Cross (2017). “Thermal facial signatures for state assessment during deception.” *Electronic Imaging*. 2017(13): 95-104, doi: 10.2352/ISSN.2470-1173.2017.13.IPAS-207.
3. Ion Juvina, Priya Ganapathy, **Matt Sherwood**, Mohd Saif Usmani, Gautam Kunapuli, Tejaswi Tamminedi, Nasser Kashou (2015). “Neurocognitive correlates of learning in a visual object recognition task.” In: Dylan D. Schmorow and Cali M. Fidopiastis (eds.), *Foundations of Augmented Cognition*. Springer International Publishing, pp. 256-267.
4. Priya Ganapathy, Ion Juvina, Tejaswi Tamminedi, Gautam Kunapuli, **Matt Sherwood**, Mohd Saif Usmani (2015). “Development of a smart tutor for a visual-aircraft recognition task.” In: Dylan D. Schmorow and Cali M. Fidopiastis (eds.), *Foundations of Augmented Cognition*. Springer International Publishing, pp. 583-594.
5. Jason Parker, **Matthew Sherwood**, Jessica Kane (2013). “A real-time functional magnetic resonance imaging (fMRI) neurofeedback system.” 12<sup>th</sup> IFAC, IFIP, IFORS, IEA Symposium on Analysis, Design, and Evaluation of Human-Machine Systems. 12(1): 341-348.
6. Phani Kidambi, **Matthew Sherwood**, Jason Parker, Ralph De Velvis (2013). “Benchmarking medical image databases.” 12<sup>th</sup> IFAC, IFIP, IFORS, IEA Symposium on Analysis, Design, and Evaluation of Human-Machine Systems. 12(1): 240-243.

## **PRESENTATIONS, SYMPOSIA, AND INVITED ADDRESSES**

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1. **Matthew S. Sherwood**, Bianca Cerqueira, Paul Sherman (May 2022). Voxel-based assessment of hypobaric hypoxia-induced changes on quantified cerebral perfusion from arterial spin labeling MRI. *Paper presented at the 92nd Annual Meeting of the Aerospace Medical Association*, Reno, NV.
2. R. Andy McKinley, **Matthew S. Sherwood**, Casserly Mullenger, Lindsey McIntire (February 2019). The effects of chronic tDCS on functional brain activity and sustained attention performance. *Poster presented at the 3<sup>rd</sup> International Brain Stimulation Conference*, Vancouver, Canada.
3. **Matthew S. Sherwood**, Emily E. Diller, Subhashini Ganapathy, Kevin B. Bennett, Carlos R. Esquivel, Jeremy T. Nelson, Jason G. Parker (November 2018). Cerebral perfusion is altered by real-time fMRI neurofeedback-directed self-regulation of the primary auditory cortex. *Paper presented at the 104<sup>th</sup> Scientific Assembly and Annual Meeting of the Radiological Society of North America*, Chicago, IL.
4. **Matthew S. Sherwood**, Aaron T. Madaris, Casserly Mullenger, R. Andy McKinley (November 2018). Repetitive transcranial electrical stimulation produces enhanced resting cerebral perfusion in the locus coeruleus. *Paper presented at the 104<sup>th</sup> Scientific Assembly and Annual Meeting of the Radiological Society of North America*, Chicago, IL.
5. **Matthew S. Sherwood**, Emily E. Diller, Subhashini Ganapathy, Kevin B. Bennett, Jeremy T. Nelson, Jason G. Parker (August 2018). Alternative tinnitus management techniques developed from volitional control over the activity of the auditory cortex. *Paper presented at the 2018 Military Health Systems Research Symposium*, Kissimmee, FL.

6. Stephanie Warner, **Matthew Sherwood**, Todd Seech, Jeffrey Phillips, Matthew Funke, F. Eric Robinson, Carissa Mallonee, Aaron Madaris (August 2018). Hemodynamic Response to Hypoxia. *Poster presented at the 2018 Military Health Systems Research Symposium*, Kissimmee, FL.
7. **Matthew S. Sherwood**, Emily E. Diller, Subhashini Ganapathy, Jeremy T. Nelson, Jason G. Parker (November 2017). Self-regulation of the primary auditory cortex activity via directed attention mediated by real-time fMRI neurofeedback. *Paper presented at the 103<sup>rd</sup> Scientific Assembly and Annual Meeting of the Radiological Society of North America*, Chicago, IL.
8. Emily E. Diller, Robert Lober, **Matthew S. Sherwood**, Jason G. Parker (November 2017). Evaluating glioma grading accuracy of multiparametric nosologic imaging algorithm. *Poster presented at the 103<sup>rd</sup> Scientific Assembly and Annual Meeting of the Radiological Society of North America*, Chicago, IL.
9. **Matthew S. Sherwood**, Emily E. Diller, Subhashini Ganapathy, Kevin B. Bennett, Jeremy T. Nelson, Jason G. Parker (November 2017). Self-regulation of primary auditory cortex activity via directed attention mediated by real-time fMRI neurofeedback is related to attentional control processes. *Poster presented at the Annual Meeting of the Society for Neuroscience*, Washington DC.
10. Nilesh U. Powar, Tamera R. Schneider, Julie A. Skipper, Douglas T. Petkie, Vijayan K. Asari, Rebecca R. Riffle, **Matthew S. Sherwood**, Carl B. Cross (January 2017). Thermal facial signatures for state assessment during deception. *Paper presented at IS&T International Conference on Electronic Imaging: Image Processing: Algorithms and Systems Conference*, Burlingame, California.
11. Mohd S. Usmani, Ion Juvina, **Matt Sherwood**, Priya Ganapathy, Gautam Kunapuli, Tejaswi Tamminedi, Nasser Kashou (June 2016). Visual task learning of familiar vs. non-familiar objects: An fMRI study. *Poster presented at the 22<sup>nd</sup> Annual Meeting of the Organization for Human Brain Mapping*, Geneva, Switzerland.
12. Jessica H. Kane, **Matthew S. Sherwood**, Michael P. Weisend (March 2015). Comparison of conductive materials for the application of tDCS. *Poster presented at the 1<sup>st</sup> International Brain Stimulation Conference*, Singapore.
13. **Matthew S. Sherwood**, Jessica H. Kane, Michael P. Weisend, Jason G. Parker (November, 2014). Conscious control over the BOLD effect in the left prefrontal cortex (LPFC) is linked with working memory. *Poster presented at the Annual Meeting of the Society for Neuroscience*, Washington DC.
14. Jason G. Parker, Benjamin Speidel, **Matthew S. Sherwood** (November 2014). Automated and non-biased regional quantification of functional neuroimaging data. *Paper presented at the Annual Meeting of the Society for Neuroscience*, Washington DC.
15. Jessica H. Kane, **Matthew S. Sherwood**, Michael P. Weisend, Jason G. Parker (November 2014). Alternatives to water for the conduction of current during transcranial direct current stimulation. *Paper presented at the Annual Meeting of the Society for Neuroscience*, Washington DC.