AMY BROWN

Intro

Headline: **Electrical Engineer, Researcher, and Educator with strong passion about improving image and signal processing within the medical, wellness, and security fields**

Current Position: **Associate Professor at ABC University**
Education: **GHI University**
Country/Region: **USA**
Postal Code: **22102**
City/District: **McLean, Virginia**
Contact info: **amybrown@gmail.com**

About

As a methodical, challenge-driven, and versatile professional, I bring a wealth of research and teaching experience in the field of electrical engineering, with keen focus on discovering and developing novel signal and image processing techniques, tools, and solutions for wellness, diagnostic, and security applications.

Fully committed to contributing in the advancement of signal and image process efficiency within the medical, wellness, and security fields, I have actively participated in numerous MRI studies and heart rate variability analysis; developed software and algorithms for image processing; conceptualized and implemented data-related operational workflows; as well as established university program and curriculum design for courses related to signal and image processing, medical imaging, and electronics. Additionally, I have successfully built accurate models for classification and regression that included algorithm, validation, and performance evaluations, by employing my in-depth knowledge of machine learning techniques.

I have also published numerous scientific papers, contributed in numerous grant-funded research projects, as well as presented in various conferences and meetings. Currently, I am actively involved in key research projects in the areas of image processing, video processing, heart rate variability analysis, and engineering education at ABC University.

Work Experience

Title: **Associate Professor (Tenured), Bioengineering Department & College of Engineering and Computing**
Company: **ABC University, School of Engineering**
Location: **Fairfax, VA**
Start Date: **2016**
End Date: **Present**
Description:
  - Hands-on supervision of the research group in the areas of signal and image processing for medical and security applications
  - Effective facilitation of instruction to three PhD and one MSc students; 17 senior design teams of 64 students; more than 100 undergraduate and high school students on related projects, as well as provision of advice and guidance to students in executing research and preparing research proposals
  - Expertise in conducting research in the following areas:
    o Image Processing: development of novel algorithms for brain lesion tracking in longitudinal MRI datasets; custom segmentation algorithms for medical applications; texture analysis pipelines for diagnostic applications with recent emphasis in osteoporosis, development of optimized image processing pipelines for clinical MRI studies.
    o Video Processing: design of algorithms to extract physiological signals and motion characterization from videos of the phase and different body parts.
    o Heart Rate Variability Analysis: creation and analysis of applicability of entropy-based and general HRV metrics in diagnostic applications and stress and fatigue detection.
    o Engineering Education: research regarding teaching user-centric design and in the development of frameworks for student-led differentiated learning.

Title: **Assistant Professor, Bioengineering Department, Department of Electrical and Computer Engineering**
Company: **ABC University, School of Engineering**
Location: **Fairfax, VA**
Start Date: **2009**
End Date: **2016**
Description:
  - Accuracy in executing research and in-depth studies in the field of engineering education, with a focus on creating adaptable online or hybrid courses for adult learners
  - Integral role as the founding member of the Bioengineering Department in George Mason University, with key contributions to the development of program and curriculum design
  - Successful completion of various research projects focusing on the development of segmentation algorithms for brain MRI images, as well as algorithms to extract vital signs, estimate emotional states from facial videos, and evaluating motion characteristics and heart rate variability
  - Establishment and design of 10 new courses for the fields of signal and image processing, medical imaging, and electronics, including:

- o   ECE 461: Communications Engineering Laboratory
- o   ECE/BENG 499: MRI Applications in Bioengineering
- o   BENG 220: Physical Bases of Engineering Systems
- o   BENG 320: Biomedical Signals and Systems
- o   BENG 437/537: Medical Image Processing
- o   BENG 420: Bioinformatics for Engineers
- o   BENG 799: Advanced Medical Image Processing
- o   BENG 360: Biomedical Imaging
- o   BENG 370: Bioinstrumentation I
- o   BENG 371: Bioinstrumentation I Laboratory
- – Systematic organization of the international student exchange program with University Carlos III in Madrid
- – Obtainment of the OSCAR Award for Mentoring Excellence in 2014

Title: **Researcher Fellow, Neuroimmunology Branch**
Company: **DEF Company**
Location: **Bethesda, MD**
Start Date: **2006**
End Date: **2009**
Description:
- – Expert employment of appropriate and target-specific approach in designing and streamlining MRI protocols for neurological studies with concentration on Multiple Sclerosis
- – Active engagement with in-depth analysis on magnetic resonance imaging (MRI) and positron emission tomography (PET) data extracted from clinical studies
- – Development of image processing pipelines and novel algorithms for monitoring brain lesion evolution

Title: **Visiting Fellow, Advanced MRI Laboratory**
Company: **DEF Company**
Location: **Bethesda, MD**
Start Date: **2003**
End Date: **2006**
Description:
- – Completion of MRI physicist training, which entailed formulating two novel MRI pulse sequences and associated image processing techniques

Education

School: **GHI University, Thessaloniki, Greece**
Degree: **Doctor of Philosophy**
Field of Study: **Electrical Engineering**

School: **GHI University, Thessaloniki, Greece**
Degree: **Master of Science**
Field of Study: **Electrical Engineering**

Volunteer Experience

Organization: **Various**
Role: **Graduate Student Advisor**
- – Complexity and Non-Stationarity in Short-term Nonlinear Time Series: New Methods for Cardiological Diagnostics, Dr. Rafal Ladysz
- – Visible Spectrum Based Non-contact detection and characterization of Blood Wave Signal Dynamics and Applications in Stress Detection, Dr. Balvinder Kaur
- – Longitudinal Lesion Tracking in Magnetic Resonance Images, Dr. Vikas Kotari
- – Early Detection of Alzheimer's Disease using Texture Analysis of Magnetic Resonance Images, Debosmita Biswas

Organization: **Various**
Role: **Project Advisor**
- – T1 Measurement Optimization in MRI, Michael Kane, Devraj Desgupta, James White, and Steven D. Ball
- – Response Measuring System for Sports Training, Alejandro Valvidia, Dennis Bustillo, Mariela Vidal, and Noor Al-Alami
- – Radio Coverage Measurement System, Sara S. Ataya, Long Yang, Aye Soe, and Bao Nguyen
- – Signature Verification System, Bassam Durrassi, Zainab Hameda Benchekroun, Tarek Lahlou, and Dane Larsen
- – Autonomous Gardening System, Peter Chen, Steven Annessa, Sunni Joshi, and Maitram T. Nguyen
- – Low-cost Telemedicine Station, Sheryll Alegrado, Wesley Chin, and Weiming Sun
- – Automatic Signature Verification System, Deanna Jefferson, Mariet Kurtz, and Brian Silverio
- – Contactless Pulse Transit Time Measurement and its Potential Application in Measuring Blood Pressure, Martin Cissel, Misha Vaidya, and Nhien Tran
- – Navigation System for Blind People, Marissa Arager, Jennifer Le, and Daniel Nguyen
- – Remote Detection of Blood Pressure Employing Differential Pulse Transit Time, Chris Rios, Lauren Hirt, Vy Tran, Shaun Meyer, and Kaitlyn Scott

- Development of Prosthetic Arm for Playing the Violin, Racha Salha, Yasser Alhindi, Mona Elkholy, Ella Novoselsky, and Abdelrahma Gouda
- Developing a Better Framework for MRI Imaging Processing, A. Charmsaz, N. Jaghoori, Suneksha KC, A. Medina, and Y. Timilsina
- Wearable Brain Fatigue Detector, S. Abollahi, M. Aljaroof, M. Altalha, M. Fatani, and S. Saeed
- Camera-based Facial Feature Extraction of Mental Status, Z. Asif, M. Kilroy, J. Gao, and U. Sheikh
- GAIT: A Wearable Device for GAIT Analysis, Svetlana Hogan, Norah Alotaibi, Zain Haq, and Dane Anderson
- GAIT II: A Wearable Device for GAIT Analysis, Winifred Allotey
- Video-based Detection of Epileptic Seizures, David Fernandez Pardo, Lamis Ibrahim, Sepehr Shadian

Skills

Medical Imaging
Data Analysis – Machine Learning
Project Planning and Development
Signal and Image Processing
Multidisciplinary Team Leadership
Engineering Course Development and Delivery
Programming
C++
Python
MATLAB
R
Keras
TensorFlow
PyTorch
Microsoft Office
Pandas
OpenCV
FSL Suite
ImageJ

Projects

Project Name: **UVA/Army/VMEC Night Vision Proposal <Funding for Senior Designs>**
Start Date: **Sep 2016**
End Date: **Mar 2018**
Description
- Role: Principal Investigator
- Funding Source: Night Vision Laboratory (University of Virginia)
- Funded Grant Amount: $20,000
- Overview/Objective: Development of video analytics algorithms for fatigue detection

Project Name: **Information Processing and Fusion: Change Point Detection for Video-Based Stressor Identificatio**
Start Date: **May 2016**
End Date: **Feb 2017**
Description
- Role: Principal Investigator
- Funding Source: Army Research Office
- Funded Grant Amount: $48,940
- Overview/Objective: Development of blind deconvolution algorithms for improved estimation of heart rate variability from videos of the face.

Project Name: **Research Initiation Grant: Student-directed differentiated learning in college-level engineering education**
Start Date: **Sep 2014**
End Date: **Aug 2017**
Description
- Role: Principal Investigator
- Role(s) of Other Collaborator(s): Co-Private Investigator
- Funding Source: National Science Foundation
- Funded Grant Amount: $149,952
- Overview/Objective: Design of tiered assignment and instruction systems directed at adult learners, aiming to utilize asynchronous learning techniques to supplement face-to-face learning at a college setting; investigation of student decision mechanisms in a self-directed tiered educational paradigm.

Project Name: **GARDE: EQuaLS: Enhancing Quality of Life of Students through senior designs**
Start Date: **Jan 2012**
End Date: **Dec 2017**
Description
- Role: Co-Principal Investigator
- Funding Source: National Science Foundation
- Funded Grant Amount: $125.000
- Overview/Objective: Design of personalized assistive technology devices for people with disabilities; investigation of optimal ways to teach senior engineering students user-centric design and support through the student team / client interaction.

Project Name: **Detection of ApoE-related white matter degeneration using Tissue Specific Imaging**
Start Date: **Jul 2010**
End Date: **Jun 2011**
Description

- Role: Principal Investigator
- Funding Source: Virginia Center of Aging
- Funded Grant Amount: $37,433
- Overview/Objective: Investigation of differences in white matter integrity between healthy volunteers that are carriers and non-carriers of the ApoE4 gene based on MRI images of the brain.

Publications

Title: **Lesions by tissue specific imaging characterize multiple sclerosis patients with more advanced disease**
Publisher: **Multiple Sclerosis Journal, 17(12), 1424-1431**
Publication Date: **2011**
Author: **Bagnato, F., Ikonomidou, V. N., van Gelderen, P., Auh, S., Hanafy, J., Cantor, F. K., Ohayon, J., Richert, N. and Duyn, J.**
Publication URL: https://doi.org/10.1177/1352458511414601

Title: **Clinical and imaging metrics for monitoring disease progression in patients with multiple sclerosis**
Publisher: **Expert review of neurotherapeutics, 6(4), 599-612**
Publication Date: **2006**
Author: **Bagnato, F., Ohayon, J. M., Ehrmantraut, M., Chiu, A. W., Riva, M., and Ikonomidou, V. N.**
Publication URL: https://doi.org/10.1586/14737175.6.4.599

Title: **T1 cortical hypointensities and their association with cognitive disability in multiple sclerosis**
Publisher: **Multiple Sclerosis Journal, 16(10), 1203-1212**
Publication Date: **2010**
Author: **Bagnato, F., Salman, Z., Kane, R., Auh, S., Cantor, F. K., Ehrmantraut, M., Gallo, A., Ikonomidou, V. N., Ohayon, J., Pellicano, C., Stern, S. K. and McFarland, H. F.**
Publication URL: https://doi.org/10.1177/1352458510377223

Title: **Quality and quantity of diffuse and focal white matter disease and cognitive disability of patients with multiple sclerosis**
Publisher: **Journal of Neuroimaging, 21(2), e57-e63**
Publication Date: **2011**
Author: **Bomboi, G., Ikonomidou, V. N., Pellegrini, S., Stern, S. K., Gallo, A., Auh, S., Evangelou, I. E., Agarwal. J., Pellicano, C., Ohayon, J. M., Cantor, F. K., Ehrmantraut, M., McFarland, H. F., Kane, R. L., and Bagnato, F.**
Publication URL: https://doi.org/10.1111/j.1552-6569.2010.00488.x

Title: **A case study on the effect of neutralizing antibodies to interferon beta 1b in multiple sclerosis patients followed for 3 years with monthly imaging**
Publisher: **Clinical & Experimental Immunology, 150(1), 61-67**
Publication Date: **2007**
Author: **Chiu, A. W., Ehrmantraut, M., Richert, N. D., Ikonomidou, V. N., Pellegrini, S., McFarland, H. F., Frank, J. A., and Bagnato, F.**
Publication URL: https://doi.org/10.1111/j.1365-2249.2007.03467.x

Title: **Mapping resting-state functional connectivity using perfusion MRI**
Publisher: **Neuroimage, 40(4), 1595-1605**
Publication Date: **2008**
Author: **Chuang, K. H., Van Gelderen, P., Merkle, H., Bodurka, J., Ikonomidou, V. N., Koretsky, A. P., Duyn, J. H., and Talagala, S. L.**
Publication URL: https://doi.org/10.1016/j.neuroimage.2008.01.006

Title: **Accelerated parallel imaging for functional imaging of the human brain**
Publisher: **NMR in Biomedicine: An International Journal Devoted to the Development and Application of Magnetic Resonance In vivo, 19(3), 342-351**
Publication Date: **2006**
Author: **de Zwart, J. A., van Gelderen, P., Golay, X., Ikonomidou, V. N., and Duyn, J. H.**
Publication URL: https://doi.org/10.1002/nbm.1043

Title: **An adaptive filter for suppression of cardiac and respiratory noise in MRI time series data**
Publisher: **Neuroimage, 33(4), 1072-1081**
Publication Date: **2006**
Author: **Deckers, R. H., van Gelderen, P., Ries, M., Barret, O., Duyn, J. H., Ikonomidou, V. N., Fukunaga, M., Glover, G. H., and de Zwart, J. A.**
Publication URL: https://doi.org/10.1016/j.neuroimage.2006.08.006

Title: **Large-amplitude, spatially correlated fluctuations in BOLD fMRI signals during extended rest and early sleep stages**
Publisher: **Magnetic resonance imaging, 24(8), 979-992**
Publication Date: **2006**
Author: **Fukunaga, M., Horovitz, S. G., van Gelderen, P., de Zwart, J. A., Jansma, J. M., Ikonomidou, V. N., Chu, R., Deckers, R. H. R., Leopold, D. A., and Duyn, J. H.**
Publication URL: https://doi.org/10.1016/j.mri.2006.04.018

Title: **Impact of chemotherapy for childhood leukemia on brain morphology and function**
Publisher: **PloS one, 8(11), e78599**
Publication Date: **2013**
Author: **Genschaft, M., Huebner, T., Plessow, F., Ikonomidou, V. N., Abolmaali, N., Krone, F., Hoffmann, A., Holfeld, E., Vorwerk, P., Kramm, C., Gruhn, B., Koustenis, E., Hernaiz-Driever, P., Mandal, R., Suttorp, M., Hummel, T., Ikonomidou, C., Kirschbaum, C., and Smolka, M. N.**
Publication URL: https://doi.org/10.1371/journal.pone.0078599

Title: **Improved Shinnar–Le Roux algorithm**
Publisher: **Journal of Magnetic Resonance, 143(1), 30-34**
Publication Date: **2000**
Author: **Ikonomidou, V. N and Sergiadis, G. D.**
Publication URL: https://doi.org/10.1006/jmre.1999.1965

Title: **An overview of interfering emissions for DCS-1800**
Publisher: **The Radio Science Bulletin, 297, 11-16**
Publication Date: **2001**
Author: **Ikonomidou, V. N. and Sergiadis, G. D.**

Title: **A rotational approach to localized SPAMM 1−1 Tagging**
Publisher: **Journal of Magnetic Resonance, 157(2), 218-222**
Publication Date: **2002**
Author: **Ikonomidou, V. N. and Sergiadis, G. D.**
Publication URL: https://doi.org/10.1006/jmre.2002.2591

Title: **Multirate SPAMM tagging**
Publisher: **IEEE transactions on biomedical engineering, 50(9), 1045-1051**
Publication Date: **2003**
Author: **Ikonomidou, V. N. and Sergiadis, G. D.**
Publication URL: 10.1109/TBME.2003.814524

Title: **Evolution of tumefactive lesions in multiple sclerosis: A 12-year study with serial imaging in a single patient**
Publisher: **Multiple Sclerosis Journal, 19(11), 1539-1543**
Publication Date: **2013**
Author: **Ikonomidou, V. N., Richert, N. D., Vortmeyer, A., Tovar-Moll, F., Bielekova, B., Cook, N. E., Duyn, J. H. and Bagnato, F**.
Publication URL: https://doi.org/10.1177/1352458513498124

Title: **Optimizing brain tissue contrast with EPI: a simulated annealing approach**
Publisher: **Magnetic Resonance in Medicine: An Official Journal of the International Society for Magnetic Resonance in Medicine, 54(2), 373-385**
Publication Date: **2005**
Author: **Ikonomidou, V. N., van Gelderen, P., De Zwart, J. A., Fukunaga, M., and Duyn, J. H.**
Publication URL: https://doi.org/10.1002/mrm.20561

Title: **How the serotonin transporter 5-HTTLPR polymorphism influences amygdala function: the roles of in vivo serotonin transporter expression and amygdala structure**
Publisher: **Translational Psychiatry, 1(8), e37-e37**
Publication Date: **2011**
Author: **Kobiella, A., Reimold, M., Ulshöfer, D. E., Ikonomidou, V. N., Vollmert, C., Vollstädt-Klein, S., Rietschel, M., Reischl, G., Heinz, A. and Smolka, M. N.**
Publication URL: https://doi.org/10.1038/tp.2011.29

Title: **Validating nonlinear registration to improve subtraction images for lesion detection and quantification in multiple sclerosis**
Publisher: **Journal of Neuroimaging, 28(1), 70-78**
Publication Date: **2018**
Author: **Kotari, V., Salha, R., Wang, D., Wood, E., Salvetti, M., Ristori, G., Tang, L., Bagnato, F., and Ikonomidou, V. N.**
Publication URL: https://doi.org/10.1111/jon.12479

Title: **Generalized min-max bound-based MRI pulse sequence design framework for wide-range T1 relaxometry: A case study on the tissue specific imaging sequence**
Publisher: **PloS one, 12(2), e0172573**
Publication Date: **2017**
Author: **Liu, Y., Buck, J. R., and Ikonomidou, V. N.**
Publication URL: https://doi.org/10.1371/journal.pone.0172573

Title: **Translocator protein PET imaging for glial activation in multiple sclerosis**
Publisher: **Journal of neuroimmune pharmacology, 6(3), 354-361**
Publication Date: **2011**
Author: **Oh, U., Fujita, M., Ikonomidou, V. N., Evangelou, I. E., Matsuura, E., Harberts, E., Ohayon, J., Pike, V. W., Zhang, Y., Zoghbi, S. S., Innis, R. B., and Jacobson, S.**
Publication URL: https://doi.org/10.1007/s11481-010-9243-6

Title: **Relationship of cortical atrophy to fatigue in patients with multiple sclerosis**
Publisher: **Archives of neurology, 67(4), 447-453**
Publication Date: **2010**
Author: **Pellicano, C., Gallo, A., Li, X., Ikonomidou, V. N., Evangelou, I. E., Ohayon, J. M., Stern, S. K., Ehrmantraut, M., Cantor, F., McFarland, H. F., and Bagnato, F.**
Publication URL: https://doi.org/10.1001/archneurol.2010.48

Title: **Cognitive impairment and its relation to imaging measures in multiple sclerosis: a study using a computerized battery**
Publisher: **Journal of Neuroimaging, 23(3), 445-452**
Publication Date: **2013**
Author: **Pellicano, C., Kane, R. L., Gallo, A., Xiaobai, L., Stern, S. K., Ikonomidou, V. N., Evangelou, J. E., Ohayon, J. M., Ehrmantraut, M., Cantor, F. K., and Bagnato, F.**
Publication URL: https://doi.org/10.1111/j.1552-6569.2011.00687.x

Title: **Tissue-specific imaging is a robust methodology to differentiate in vivo T1 black holes with advanced multiple sclerosis–induced damage**
Publisher: **American journal of neuroradiology, 30(7), 1394-1401**
Publication Date: **2009**
Author: **Riva, M., Ikonomidou, V. N., Ostuni, J. J., Van Gelderen, P., Auh, S., Ohayon, J. M., Tovar-Moll, F., Richert, N. D., Duyn, J. H., and Bagnato, F.**
Publication URL: https://doi.org/10.3174/ajnr.A1573

Title: **Heterogeneity of multiple sclerosis white matter lesions detected with T2*-weighted imaging at 7.0 Tesla**
Publisher: **Journal of Neuroimaging, 25(5), 799-806**
Publication Date: **2015**
Author: **Yao, B., Ikonomidou, V. N., Cantor, F. K., Ohayon, J. M., Duyn, J., and Bagnato, F.**
Publication URL: https://doi.org/10.1111/jon.12193

Title: **Heart rate variability (HRV): an indicator of stress**
Publisher: **Proc. SPIE 9118, Independent Component Analyses, Compressive Sampling, Wavelets, Neural Net, Biosystems, and Nanoengineering XII, 91180V**
Publication Date: **2014**
Author: **Kaur, B., Durek, J. J., O'Kane, B. L., Tran, N., Moses, S., Luthra, M., and Ikonomidou, V. N.**
Publication URL: https://doi.org/10.1117/12.2051148

Title: **Hyperspectral waveband group optimization for time-resolved human sensing**
Publisher: **Independent Component Analyses, Compressive Sampling, Wavelets, Neural Net, Biosystems, and Nanoengineering XI, 8750**
Publication Date: **2013**

Author: **Kaur, B., Hodgkin, V. A., Nelson, J. K., Ikonomidou, V. N., and Hutchinson, J. A.**
Publication URL:https://doi.org/10.1117/12.2018334

Title: **Visible spectrum-based non-contact HRV and dPTT for stress detection**
Publisher: **SPIE Commercial+ Scientific Sensing and Imaging, 10221**
Publication Date: **2017**
Author: **Kaur, B., Hutchinson, J. A., and Ikonomidou, V. N.**
Publication URL: https://doi.org/10.1117/12.2261085

Title: **Remote stress detection using a visible spectrum camera**
Publisher: **Independent Component Analyses, Compressive Sampling, Large Data Analyses (LDA), Neural Networks, Biosystems, and Nanoengineering XIII, 9496, 949602**
Publication Date: **2015**
Author: **Kaur, B., Moses, S., Luthra, M., and Ikonomidou, V. N.**
Publication URL: https://doi.org/10.1117/12.2177159

Title: **Remotely detected differential pulse transit time as a stress indicator**
Publisher: **SPIE 9496, Independent Component Analyses, Compressive Sampling, Wavelets, Neural Net, Biosystems, and Nanoengineering XIII, 9496**
Publication Date: **2015**
Author: **Kaur, B., Tarbox, E., Cissel, M., Moses, S., Luthra, M., Vaidya, M., Tran, N., and Ikonomidou**, V. N.
Publication URL: https://doi.org/10.1117/12.2177886

Title: **Motion correction for improved estimation of heart rate using a visual spectrum camera**
Publisher: **SPIE Commercial+ Scientific Sensing and Imaging, 1021607**
Publication Date: **2017**
Author: **Tarbox, E. A., Rios, C., Kaur, B., Meyer, S., Hirt, L., Tran, V., Scott, K., and Ikonomidou, V. N.**
Publication URL: https://doi.org/10.1117/12.2262932

Organizations

Name: **Institute of Electrical and Electronics Engineers (IEEE)**
Position Held: **Member**

Name: **Biomedical Engineering Society (BMES)**
Position Held: **Member**

Languages

English – Native or bilingual proficiency
Greek – Native or bilingual proficiency
German – Native or bilingual proficiency
French - Professional working proficiency
Spanish - Professional working proficiency