# DALTON H. BERMUDEZ

Academic Staff Member at New York University (NYU). Interested in training the next generation of mathematicians, computer scientists, and experimental scientists. Prior to becoming a staff member at NYU, I had vast of research experiences in the fields of Medical Physics, Computational Neuroscience and AI. Through such experiences, I have perceived the essence of mathematical usage in fields such as Medical Imaging, Signal and Image Processing, Neuro-Imaging, Machine Learning, and Deep Learning. Also interested in research dealing with the analysis of neuronal data from people with Neurological/ Neuropsychiatric disorders and research in Educational Neuroscience.

## EDUCATION

**B.E.**   The City College of New York, Biomedical Engineering            Jan 2018
Graduated *Magna Cum Laude*
Minored in Mathematics
Academic Credits Completed for Degree # 146

## CERTIFICATIONS

**Special Education Needs,**                                              Apr. 2018
International Council for Online Education Standards (ICOES).

**Teaching English as a Second Language (TESOL) 120 hours**,             Apr. 2018
International Council for Online Educational Standards (ICOES).

**NYU Child Abuse Awareness and Prevention Training**,                   Dec. 2017
New York University (NYU).

**Good Clinical Practice (GCP)**,                                        Oct. 2017
Collaborative Institute Training Initiative.

**Human Subjects Protection (HSP): Biomedical Research**,                Feb. 2017
Collaborative Institute Training Initiative.

**Responsible Conduct of Research (RCR)**,                              Sept. 2015
Collaborative Institute Training Initiative.

## HONORS AND AWARDS

**Austrian Marshall Plan Scholarship (€ 4,000)**                          2017
Grant to execute the proposed project "Implementation of Machine
Learning Algorithm to Exploit Information from Multimodal fMRI/EEG
Fused Image Data" at Graz Institute of Technology.

**Dean's Lists** 2014 - 2016
Yearly recognition for academic achievement.

**Summer Internship Program in Biomedical Research ($4,000)** 2016
Fellowship to work on the project, "The Quality of CT-based Attenuation
Correction in SPECT/CT clinical images" at the NIH Clinical Center.

**International Research Fellowship at the KTH ($9,500)** 2016
Fellowship to work on a summer research project with professors of
the Royal Institute of Technology (KTH).

**Yale Medical School Bio-Medical Summer Research Fellowship ($4,500)** 2016
Fellowship to conduct undergraduate summer research investigation
at Yale School of Medicine.

**Tau Beta Pi** 2015
Honors for engineering students who have a history of academic
achievement as well as commitment to personal and professional
integrity.

**The National Society of Leadership and Success, Sigma Alpha Pi** 2015
Leadership honor society were affiliates select students of their given
College for membership based on either academic standing or leadership
potential.

**AP Scholars Award** 2013
Honors Awards granted to students who received score of 3 or higher
on three or more Advance Placement (AP) Exams.

**President's Education Award** 2013
Award to recognize students who demonstrate outstanding educational
growth, improvement, commitment to or intellectual development in
their academic subjects.

**New York State Supervisor's Chemistry Award** 2013

**SUPVRS Award for Chemistry** 2013

RESEARCH EXPERIENCE

**Memorial Sloan Kettering Hospital**, New York, NY       Jan 2017 to Apr 2018
**Research Assistant**, Radiology and Medical Physics Departments

- Image registration and segmentation using active learning techniques applied to glioblastoma multiforme (GBM) tumors.

- Develop a graphical user interfaces (GUI) in CERR platform to enable large scale analysis of GBMs.
- Extract Harilick and Gabor features for the segmentation of Flair MRI GBM tumors.
- Conduct Analysis of extracted Radiomic Features through Statistical Models and Predictive Models.
- Develop algorithm for the simulation of MRI motion artifacts.
- Implementation of convolutional neural network (CNN) and Conditional GAN based methods for automatic motion artifact removal.

**Graz University of Technology**, Graz, Austria        Jun 2017 to Aug 2017
**Marshall Research Fellow**, Computer Vision and Graphics

- Work in collaboration with the Institute of Neural Engineering at TU Graz.
- Pre-process of simultaneous EEG-FMRI and non-simultaneous EEG data from a healthy volunteer during Motor Imagery paradigm.
- Develop a PYTHON script to perform Generalize Linear Model (GLM) on the simultaneous FMRI dataset.
- Develop a MATLAB script to implement Average Artifact Subtraction technique for the removal of Gradient Artifact (GA) present in simultaneous EEG recording.
- Implement unsupervised Gaussian Mixture Model – Expectation Maximization (GMM-EM) to learn a spatial prior to remove present Pulsatile Artifact (PA) in simultaneous EEG.
- Examine the effects that such artifact removal techniques have on the features of Right hand and feet motor imagery activity through a Predictive Model of SVM.
- Interpret research findings and summarize data into report.

**The City College of New York**, New York, NY        Sept 2016 to Jun 2017
**Design Engineer**, Biomedical Engineering Department

- Develop a creative design for prominent TMS GUI Analyzer software platform.
- Worked directly with City College of New York Department of Biomedical Engineering and Burke Rehabilitation Center to achieve a preliminary TMS GUI Analyzer software platform.
- Worked with a group of Senior Undergraduate Engineers to develop the design of the Analyzer software platform.
- Developed a PYTHON script to implement supervised SVM on TMS data for both healthy and stroke patient.
- Utilized ITK-SNAP to segment out gray matter from white matter and created a 3D rendering of an MRI volume.
- Developed a PYTHON script to overlay the representative Motor Evoked Potential maps on the indicated spatial location in a 2D image of the 3D render MRI volume.

**NIH Clinical Center**, Bethesda, MD        Jun 2016 to Aug 2016
**Research Intern**, Radiology and Nuclear Medicine Departments

- Develop IDL (Interactive Data Language) script to enhance attenuation correction in SPECT/CT images using the Chang Attenuation Correction methods.
- Use GE Xeleris platform to produce Chang Attenuation Corrected images and CT-based Attenuation correction images.
- Conduct a prospective study on the quality of CT based attenuation in SPECT/CT images.
- Examine how different attenuation correction methods improve the contrast of small parathyroid adenoma.
- Utilize UNIX software to obtain patient SPECT images from NIH Radiology med-image server for further processing.

**The City College of New York**, New York, NY                     Jun 2015 to Jun 2016
**Research Assistant**, Wallace H. Coulter Laboratory

- Culture, Split, and Plate Bovine Aortic Endothelial Cells.
- Isolate Lipid Rafts and Collect Precipitation Proteins.
- Western Blotting.

## TUTORING/TEACHING EXPERIENCE

**New York University**, New York, NY                     Dec 2017 to Present
**Academic Staff**, NYU Metro Center

- Instruct/Tutor high school students in courses such as Algebra, Geometry, Trigonometry, Pre-Calculus, Physics, AP Statistics, AP Physics and AP Calculus AB.
- Prepare high school students for their Mathematics Regents, SAT Math, and Advanced Placement Examinations.
- Attend NYU panels to encourage high school students to prepare for College and inform them about what is expected of them as future college students.
- Prepare instruction materials, including making copies, constructing bulletin boards and setting up work areas.
- Tutor/Instruct students in small groups (1-2 students) on weekdays and larger student groups (~ 3-10 students) on Saturdays.

**The City College of New York**, New York, NY                     Nov 2015 to Jan 2016
**College Assistant**, SEEK Department

- Tutor College students in undergraduate level courses in Chemistry and Physics.
- Assist at answering phone calls at the SEEK Student Support Center.

## PUBLICATIONS

Bermudez D., "Teaching Strategy for introducing linear algebra at an early stage of education"
https://www.linkedin.com/pulse/teaching-strategy-introducing-linear-algebra-early-stage-bermudez/

Bermudez D., "Implication of Vector Field Differentiation in the MRI k-space." Manuscript in Preparation.

Bermudez D., "Implementation of Machine Learning Algorithm to Uncover Lurking Features from Non-simultaneous fMRI/EEG Fused data-sets." *ARPHA Journal.* Manuscript # 9128. In Review.

Bermudez D., Veeraraghavan H, Young R., "Application of DeBlur GAN towards the removal of MRI phase-encoding motion artifact." Manuscript in Preparation.

Florent T., Bermudez D., Veeraraghavan H., Young R., "Complementary value of radiomics features and genetic biomarkers in high grade glioblastoma." Manuscript in Preparation.

Cabrera Bermudez D., Steyrl D., Müller G., Pock T., "Implementation of Machine Learning Algorithm to Exploit Information from Multimodel fMRI/EEG Fused Image Data."
*Marshall Plan Scholarship, pp. 1-82* (2017)
www.marshallplan.at/s/Bermudez-Dalton_760.pdf

Bermudez D., Maass-Moreno R, Cahid Civelek A., "Effectiveness of CT-based Attenuation Correction in SPECT/CT Compared to Chang Attenuation Correction." Abstract for the Society of Nuclear Medicine and Molecular Imaging Annual Meeting, Manuscript in Preparation.

## PRESENTATIONS AND INVITED LECTURES

*PowerPoint:*

**The efficiency of Machine Learning-based Tumor Segmentation algorithm of Flair MRI Images of glioblastoma patients.** *CUNY College of Staten Island*, LSAMP presentation, 2016.

*Poster:*

**The Quality of CT-based Attenuation Correction in SPECT/CT clinical images**
National Institute of Health (NIH), Natcher Conference Center (Bldg. 45), Poster Day Conference, 2016.
https://www.training.nih.gov/assets/2016_Summer_Poster_Day_Program.pdf

**Colonization of Membrane Rafts, Glycocalyx Components, and Nitric Oxide Production**,
The City College of New York, Global CUNY conference, 2015.
https://globalcuny.org/abstract-2015/#Dalton

2019, "Matlab Script: Implementation of Support Vector Machine to Classify impaired from non-impaired paw in Parkinson's rodent model." In Progress.

2018, Develop open source PYTHON base algorithm to assist in the examination of the coupled effects of the frequency-phase encoding on the MRI space domain. In Progress.

2018, Develop open source PYTHON Pipeline based algorithm to assist in the analysis and visualization of Motor Evoked Potential (MEP) map distribution acquired from Transcranial Magnetic Stimulation (TMS). The code is freely available in:
https://github.com/DBermudez0/MEP-map-with-MRI

2018, Develop PYTHON based algorithm to assist in the simulation of the phase-encoding based motion artifacts encounter in MRI data. The code is freely available in:
https://github.com/DBermudez0/Artifact_Simulation/tree/DBermudez0-patch-1

## PROFESSIONAL TRAINING

**Louis Stokes Alliances for Minority Participation Program**
The City College of New York, New York, NY, 2015-2017
Description: A year around program that funds research conducted by underrepresented undergraduates in the STEM fields.

**Rodent Experimental Training**
The City College of New York, New York, NY, 2015
Description: Brief introduction on the standard ways to conduct experiments using animal models. Introduction to the different techniques to hold a rodent, while administrating a dose.

**The National Youth Leadership Form of Medicine**
Babson College, Wellesley, MA, Jun 2013 – Aug 2013
- Tufts University School of Medicine
  1. Understand and practice how to check vital signs.
  2. See the Tufts morgue for a short anatomy class.
- Rhode Island Simulation Center
  1. Comprehend how doctors use simulations to practice prior to treating actual patients.
  2. Assist actual doctors in their clinical simulation.

**Metro Center Upward Bound Program**
New York University (NYU), New York, NY, Jan. 2010 – May 2013
Description: A year around supplementary educational program that provides academic support, career and college planning services to underrepresented youth.

## PROFESSIONAL AFFILIATIONS

NYU 1199/Upward Bound Program, 2017-Present
Academic Staff Member.

## LANGUAGES

**English**: Advanced      **German:** Basic

**Spanish**: Advanced      **Mandarin:** Basic

## COMPUTER SKILLS

**Programming**: MATLAB, PYTHON, IDL, C++.

**Applications**: Image/Signal Processing, Machine Learning, Numerical Simulations, Computational Neuroscience, Deep Learning, Neural Networks, Arduino, Web Development.

**Platforms**: Mac OS, LINUX, UNIX, MS-DOS, HTML-CSS, Virtual Machines, Xeleris, GitHub, FSL, and EEGLAB.