

Sean McGuire

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<https://mcguires5.github.io/SeanMcGuire/> • McGuires5

Previous Employment and Research

II-VI Advanced Materials

Pine Brook, NJ

Engineering Assistant

June 2014–August 2019

- Wrote macros in excel to generate data sheets from an SQL database these data sheets are sent directly to customers
- Wrote JMP Scripts (Statistical Package) to automatically generate SPC charts for many processes throughout the facility
- Developed a novel technique employing software to find micropipe defects in SiC substrates
 - Software was written in Matlab to analyze images producing location and density data for micropipe defects
 - The Matlab script generates maps of the wafers showing the defect densities across the wafer
 - Assisted in writing the standard operating procedure for the process and moved system to production
 - **This process reduces labor time by over 90% and saves 1 wafer per crystal**
 - **Presented this process at the ICSCRM (International Conference for Silicone Carbide and Related Materials) 2017 conference and have authored a paper which was published in the ICSCRM journal**
- Retrofitted equipment to work dynamically with a SQL database and integrated system into production
 - Wrote a procedure for the process
 - Traveled to Mississippi to configure the system and trained operators and engineers in operation and maintenance procedures
- Automated Mapping of material defects using Convolutional Neural Networks
 - Designed Convolutional Neural Network to identify defects in Silicone Carbide wafers
 - Network achieved over 85% detection accuracy

Rowan University

Glassboro, NJ

Undergraduate Researcher-Signal Processing and Pattern Recognition Laboratory (SPPRL)

January 2018–May 2019

Digital Clock Drawing Test for Differential Diagnosis of Mild Cognitive Impairment and Alzheimer's Disease

- Feature selection techniques (wrapper, embedded, and information theory) were used to select the most relevant features (time taken to draw the number 6, size of the circle, angle of the clock hands, etc.) to distinguish between SCI (Subtle Cognitive Impairment), MCI (Mild Cognitive Impairment) Mixed, MCI Amnestic, and Alzheimer's classes
- Using the selected features machine learning classifiers were built to suggest a diagnosis under binary conditions (SCI or Alzheimer's, SCI or MCI Mixed, etc.)
- Binary classifiers (Shallow Artificial Neural Networks) resulted in 80-95% accuracies over 10-fold cross-validation

Expectation Violation in Nonstationary Learning

- Designed a system capable of dynamically modeling data in a nonstationary setting
- This system flags divergence from determined model which can be used to detect adversarial attacks in nonstationary environments

Education

Rowan University

Glassboro, NJ

Undergraduate: Electrical and Computer Engineering (GPA: 3.586)

2015–2019

Awards: II-VI Foundation Scholarship (2015 2016 2017 2018), Dean's List (Fall 2015 2016 2018 2019, Spring 2016 2017 2018 2019), Magna Cum Laude

Rowan University

Glassboro, NJ

Graduate: Electrical and Computer Engineering (GPA: 3.950), Anticipated Graduation Summer 2020 Pending Thesis

2019–2020

Technical and Personal skills

- **Machine Learning Framework:** PyTorch, Keras, Tensorflow
- **Programming Languages:** Python, Matlab, C, C++, C#, Verilog, Visual Basic, Java
- **Industry Software Skills:** JMP, Microsoft SQL Database, Minitab, Git, L^AT_EX, Microsoft Office Suite, Diptrace, Spice, Modelsim, Solidworks, ANSYS
- **Other Engineering Skills:** Scrum/agile development, Embedded Design, Processor Architecture, Image Processing, Machine Learning Algorithms (KNN, Bayes, MLP, SVM, Linear/Logistic Regression), Deep Learning Architectures (Feed Forward Neural Networks, Recurrent Neural Networks, Convolutional Neural Networks, Long Short Term Memory Networks), Feature Selection Algorithms (Information Theory, Wrapper, Embedded), Reinforcement Learning Algorithms (Q-Learning, Actor-Critic, DQN, Policy Iteration, Value Iteration)

Organizations and Volunteer Experiences

- Captain Intramural Bowling Team 2015–2018
- Vice President of Rowan Quidditch Team 2017
- IEEE Student Branch Member 2015–2019
- IEEE Student Activities Conference Physics Competition Chair 2017
- IEEE Prof Hacks Committee Lead 2017

Publications

R. Binaco, N. Calzaretto, J. Epifano, S. McGuire, M. Umer, S. Emrani, V. Wasserman, D. J. Libon, and R. Polikar, "Machine Learning Analysis of Digital Clock Drawing Test Performance for Differential Classification of Mild Cognitive Impairment Subtypes Versus Alzheimer's Disease," *Journal of the International Neuropsychological Society*, pp. 1–11, 2020.
<https://doi.org/10.1017/S1355617720000144>

S. McGuire et al., "Automated Mapping of Micropipes in SiC Wafers Using Polarized-Light Microscope", *Materials Science Forum*, Vol. 924, pp. 527-530, 2018
<https://doi.org/10.4028/www.scientific.net/MSF.924.527>

All term papers and code can be found at <https://mcguires5.github.io/SeanMcGuire/>