William Kay Bidle

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EDUCATION

Stony Brook University — **Stony Brook, NY**
GPA: 3.87; M.S. in Quantum Physics — *08/2021 – 12/2022*

Rutgers University – School of Arts and Sciences Honors Program — **New Brunswick, NJ**
GPA: 3.84; B.S. in Physics, Minor in Mathematics — *09/2017 – 05/2021*

Academic Achievements:

- Honors in Physics (2021)
- Rutgers Dean's List (2017 – 2021)
- Rutgers School of Arts and Sciences Honors Program (2017 – 2021)
- Richard J. Plano Summer Research Award (2020)
- SAS Excellence Award, Class of 1925 Scholarship (2018, 2019, 2020, 2021)

PROFESSIONAL EXPERIENCE

Stony Brook Quantum Information Science Group — **Stony Brook, NY**
Graduate Researcher — *08/2021 – 01/2023*

- Successfully implemented a vectorized maximum likelihood estimator in Python from scratch to perform high level data analysis, providing a 1000% speed up from previous implementations
- Designed and developed software written in Python to both simulate expected results as well as perform real-time data analysis of large datasets
- Exposure to optical components and electronics (e.g., fiber optics, piezo-electric transducers, acousto-optic modulators, electro-optical modulators, digitizers)

Brookhaven National Laboratory — **Stony Brook, NY**
Graduate Researcher — *08/2021 – 01/2023*

- Performing experimental research towards high-efficiency quantum transduction between superconducting circuits and room-temperature atomic quantum memories
- Design of Python software to directly communicate with experimental equipment
- Design and development of a compact, rack-mounted laser system towards laser cooling of rubidium in a magneto-optical trap

Rutgers Computational Physics — **New Brunswick, NJ**
Undergraduate Researcher — *10/2020 – 08/2021*

- Used machine learning and computational inference towards the discovery of free-form natural laws and equations from both simulated and experimentally gathered data
- Performed Bayesian inference using relevance vector machine (RVM) regression techniques
- Data acquisition performed with motion tracking cameras and software (Camera SDK) and data analysis performed in Python with heavy use of the NumPy, SymPy, Pandas, and scikit-learn packages

SRI International — **Princeton, NJ**
Research Intern — *07/2020 – 08/2021*

- Performed high level industry computational research and development
- Extensive data analysis of laboratory data in Python using libraries such as NumPy and SciPy
- Constructed programs in Python to model in-lab results
- Performed precision-based measurements using optical equipment and semiconductor devices (e.g., diode lasers, half/quarter wave-plates, polarizing beam splitters, optical isolators, fiber optics)

Rutgers High Energy Experiment — **New Brunswick, NJ**
Undergraduate Researcher — *03/2019 – 08/2021*

- Created a permutation invariant deep learning neural network architecture through Python's TensorFlow to discriminate the outcomes of high energy proton-proton collision with 95% accuracy from both real

and simulated Monte Carlo data
- Used the model to analyze large-scale data from the Large Hadron Collider (LHC)

Rutgers Physics Lecture Hall **New Brunswick, NJ**
Lab Assistant *09/2018 – 05/2020*
- Set up, build, fix, and design physics demonstrations for public and university lectures
- Broad understanding of physics related topics and demos (Mechanics, Electricity and Magnetism, Waves and Oscillations, Optics, Modern Physics, Astrophysics and Cosmology)
- Delegate tasks and facilitate office workflow
- Interact with professors and administration at the university

Rutgers Physical Oceanography Research Group **New Brunswick, NJ**
Undergraduate Researcher *06/2018 – 08/2018*
- Modeled the evolutionary behavior of large particle systems in the ocean using MATLAB
- Performed lab experiments to model the effect of sheering stress on cell growth
- Random walk theory, turbulent and laminar flow, and statistical analysis

TEACHING

Stony Brook Department of Physics and Astronomy **Stony Brook, NY**
Teaching Assistant *08/2022 – Present*
- Graduate teaching assistant for Physics 445/515, Methods of Experimental Research
- Assisted students with data analysis and programming
- Oversaw labs throughout the week on a variety of high-level physics topics in the fields of High Energy, Nuclear, as well Atomic, Molecular, and Optical Physics
- In-depth knowledge of experiments involving Optical Pumping, Saturation Spectroscopy, Entanglement and Bell's Inequality, Single-Qubit Quantum Computing, the Hall Effect, and Compton Scattering

Stony Brook Department of Physics and Astronomy **Stony Brook, NY**
Teaching Assistant *08/2021 – 12/2021*
- Graduate teaching assistant for the Physics 300 undergraduate course, Waves and Optics
- Oversaw weekly labs on a variety of topics related to wave phenomenology (e.g., damped and driven oscillations, optical interference and diffraction, etc.)
- Graded weekly deliverables, as well as lab reports and exams, and programming assignements

Rutgers Department of Mathematics **New Brunswick, NJ**
Grader *06/2019 – 08/2019*
- Grader for a Summer section of Multivariable Calculus

PROGRAMMING EXPERIENCE

- Languages: Fluent in Python (5+ years of high level experience), familiar with MATLAB, Java, R, C++, LabVIEW, and Git
- Strong command with NumPy, SciPy, SymPy, Matplotlib, TensorFlow, Keras, Pandas, scikit-learn (sklearn), Sqlite3
- Strong experience with data handling (SQL and SQL databases), modeling, and machine learning
- Exposure to both supervised and unsupervised machine learning methods: K-Nearest Neighbors, Linear and Logistic Regression, Convolutional Neural Networks, Deep Sets Neural Networks, Decision Trees, Support Vector Machines
- GitHub: https://github.com/WilliamBidle

RELEVANT COURSEWORK

Artificial Intelligence, Data Science, Computational Methods (Graduate Level), Introduction to Quantum Computing, Computer Based Modeling, Multivariable Calculus, Differential Equations, Partial Differential Equations, Linear Algebra, Scientific and Technical Writing, Mathematical Physics (Graduate Level), Statistics, Public Speaking

PERSONAL PROJECTS

Baby TensorFlow
- Built a public machine learning framework in Python modeled after the popular library TensorFlow
- Can be used for a wide variety of machine learning applications such as classification, image recoloration, and regression

Picture Recoloration V2

- Built a Convolutional Neural Network with TensorFlow to recolor black and white images of faces from CelebA-HQ dataset
- Tested the performance of the model as a function of missing information by removing some image pixels as well as introducing random noise to the images to mimic real world scenarios

Quantum Teleportation

- Interactive walkthrough to some of the concepts and applications involved in the quantum teleportation algorithm
- Utilized IBM's Qiskit software to build and run the quantum circuits on both their classical and quantum computers

Maze Runner AI

- Applied a hill-climbing algorithm to find local minimum in randomly generated maze with obstacles
- Tested the efficiency of the model as a function of path length and maze complexity
- Created several agents in python that can find the most optimal path through a grid of obstacles using known algorithms and heuristics, such as Depth-First Search, Breadth-First Search, and A*
- Additionally tested the model on an evolving maze that adds and removes obstacles over time

Minesweeper AI

- Built an AI that utilized reinforcement learning to both generate and play the classic minesweeper game
- Relied on inference and probability to make the best possible move
- Performed analyses of the algorithm's performance as a function of mine density

Picture Recoloration

- Recolor black and white images through both supervised and unsupervised learning methods
- Created an unsupervised learning model through K-Nearest Neighbor clustering of image pixels
- Created a basic supervised model from scratch (without packages such as Tensorflow) that utilized gradient descent to adjust the weights of the system

OTHER

Technical Skills:

- Machine shop certified: Mill, Lathe, Bandsaw, and other equipment
- Wiring, soldering, and experience with circuitry
- Mechanical experience building and fixing lab equipment/electronics