# Patrick M. Timons

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Objective: An ambitious undergraduate at the Massachusetts Institute of Technology, specializing in Natural Language Processing and excelling in problem-solving through hands-on research with Large Language Models, Variational Autoencoders, and user interfaces. Seeking a summer 2024 internship opportunity to contribute meaningfully to the evolving fields of AI and machine learning, utilizing a strong foundation in technology and innovation to drive forward advancements in these dynamic sectors.

## Education

**Artificial Intelligence And Decision Making — *Bachelor of Science*** Aug 2021 - May 2025
Massachusetts Institute of Technology GPA: 4.7/5.0
Second Major: Mathematics
Relevant Coursework: Quantitative Methods for Natural Language Processing (NLP), Deep Learning, Intro to Linguistics, Representation, Inference, and Reasoning in AI, Fundamentals of Computer Programming, Intro to Algorithms, ML for Computational Biology (listener), Intro to Machine Learning, Probability and Random Variables, Linear Algebra and Optimization, Mathematics for Computer Science, Intro to Deep Learning, Low-Level Programming and Assembly, Microeconomics
Planned Spring 2024: Design and Analysis of Algorithms, Language and its Structure: Semantics and Pragmatics, Real Analysis, Fundamentals of Statistics, Managerial Finance

## Technical Projects

**Improving Deep Learning Based Molecular Fingerprints Through Informed Resampling** — Oct 2023 - Dec 2023
- Worked in small team to research improvements to pretraining methods for transformer-based molecular encoders
- Created custom RoBERTa model through the use of transformers and bert-loves-chemistry (ChemBERTa) software packages with 9.1 percent improvement in Spearman's rank correlation coefficient on downstream tasks compared to the base model
- Coauthored 5-page ACL-submission-style write-up about our project and results

**Recovering Latent Variables with Variational Autoencoders despite Training Bias** — Nov 2023 - Dec 2023
- Researched how beta-regularization robustifies VAEs to training bias when attempting to recover latent variables
- Trained models with PyTorch Lightning and used scientific computing libraries to generate training data and visualize results

**Attentional Search** — Jun 2023 - Jul 2023
- Created search engine that uses attention mechanisms in transformer-based encoders to visualize search results
- Designed and implemented pipeline to retrieve and visualize data and created web interface with Dash

## Work Experience

**Media Lab's Human Dynamics Group — *Machine Learning Researcher*** Sep 2023 - present
- Using compute cluster to fine-tune Large Language Models on a variety of datasets to benchmark open versus closed data

**Laboratory for Information and Decision Systems — *Research Assistant*** Aug 2022 - Feb 2023
- Spearheaded data collection initiate for fuel emission modeling project
- Generated simulated drive cycle data through use of MOVES
- Worked tightly with pandas and SQL to deposit data in MySQL database

**Baraja — *Research and Development Intern*** Jun 2022 - Aug 2022
- Programmed Raspberry Pi prototype using Python and initiated product testing
- Refactoring DSP chain to enable partner perception company to optimize module of interest
- Facilitated technical collaboration with third party point cloud segmentation company

## Extracurricular Activities and Honors

**MIT Men's Lacrosse — *Team Member*** Aug 2021 - present
- Voted Most Improved for 2023 season, NEWMAC All-Academic Award (2023), 2022 NEWMAC Champion.

**AI@MIT — *Club Member*** Sep 2022 - May 2023
- Worked in a team of 3 to build a document summarizer and present at the AIM Labs Demo Day.

**Global Teaching Labs — *Teacher*** - planned Jan 2024
- Teaching Applied Mathematics to advanced high school students in Cremona, Italy

## Skills

**Programming** (Python, C, Julia), **Libraries** (PyTorch, Pytorch Lightning, Numpy, Pandas, SciKit Learn, Transformers, Transformers Reinforcement Library, Matplotlib, Plotly, Dash), **Natural Language Processing**, **Machine Learning** (Data Visualization, Data Structures, High Performance Computing, Slurm Workload Manager, Data Structures, Data Visualization, Web Scraping), **Source and Version Control** (Git, Github), Object-Oriented-Programming, Researching Skills, Technical Writing, **Mathematical Reasoning** (Linear Algebra, Probability)