Mithun Manivannan

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Summary of Qualifications

- End-to-end data science workflows in **Python/R/SQL**, reproducible EDA and feature engineering in **Jupyter**/R Markdown with **Git**.
- Applied ML with **scikit-learn**, **XGBoost/LightGBM**, **PyTorch/TensorFlow**—classification, regression, clustering; cross-validation, hyperparameter search, and interpretable outputs via **SHAP**/permutation tests.
- Statistical analysis using **GLMs**, experimental design/A/B tests, and forecasting with **statsmodels**/**Prophet**
- Data products on **PostgreSQL/BigQuery** with ETL in **Airflow/dbt**, containerized via **Docker** on **GCP/AWS**; results surfaced in **Tableau/Power BI** or **Streamlit/Dash**

Education

M.Sc. Data Science, Analytics & Artificial Intelligence *Sep 2025–2027*

Carleton University Ottawa, ON

Supervisor: Dr. Utkarsh Dang

Thesis: *Quality of Life and Weight Trajectory Analysis in Duchenne Muscular Dystrophy Clinical Trials*

B.Sc. Double Major (Mathematical Data Science & Kinesiology) *Sep 2020–Apr 2025*

McMaster University, Hamilton, ON *cGPA: 10.85/12.0*

Research Experience

Dang Lab *Sep 2025–Present*

Research Assistant, Dept. of Mathematics & Statistics, Carleton University Ottawa, ON

Building analysis pipelines for natural-history modelling and Quality of Life/Patient-Reported Outcomes dose comparison in rare-disease trials.

Schulich Heart Program *Aug 2025–Present*

Research Staff, Sunnybrook Health Sciences Centre Toronto, ON

Developing pilot study for Fitbit-to-12-lead ECG reconstruction and automated annotation in ablation trial cohorts. Engineered real-time signal fidelity assurance and physiologic outcome prediction algorithms.

Tech: Python (PyTorch), PostgreSQL/TimescaleDB, Grafana, Docker, Next.js dashboard.

ECG Reconstruction from Polysomnography *May–Aug 2025*

Research Assistant, Sunnybrook Research Institute, Temerty Centre for AI in Medicine Toronto, ON

Applied a conditional neural vector-quantized VAE framework to reconstruct 12-lead ECG from polysomnography signals. Validated on clinical cohorts from Health Data Nexus infrastructure.

Tech: Python (PyTorch, NumPy, SciPy); Dataproc; GCP.

Bayesian Spatial Clustering for Tumor Microenvironments *Jan–Apr 2025*

Research Assistant, Dept. of Mathematics & Statistics, McMaster University Hamilton, ON

Applied a nonparametric clustering framework for high resolution tumor microenvironment identification in Breast Cancer spatial omics dataset.

Tech: R (tidyverse, ggplot2, Bioconductor); Python (TensorFlow, squidpy).

Preventive Assessment Tools (PAT) Project *May 2024–Jun 2025*

Research Assistant, AZ Health Informatics Toronto, ON

Designed multidimensional preventive assessment tools integrating clinical data, patient history, and lifestyle factors. Structured a systematic literature review across 30+ databases; developed AI algorithms mapping risk factors to diseases and outcomes.

Tech: Python (pandas, scikit-learn, Dash/Plotly); PostgreSQL (SQLAlchemy); REST integrations.

ECG Cardiac Classification *Jan–Apr 2024*

Research Volunteer, Dept. of Electrical & Computer Engineering, McMaster University Hamilton, ON

Applied a variational autoencoder with attribute-wise attention for interpretable myocardial infarction risk stratification. Implemented a PyTorch pipeline with latent-space regularization; achieved S-O-T-A reconstruction metrics.

Hamilton Health Sciences *Jun–Nov 2024*

Research Assistant, Dept. of Emergency Medicine Hamilton, ON

Extracted EMR/Meditech data and REDCap records (labs, vitals) to support multi-site sepsis research; standardized data dictionaries and QA checks; coordinated participant recruitment and site communications; authored and delivered privacy/compliance training.

Tech: REDCap API, Meditech EMR, Excel/VBA, Power BI, Python (pandas).

Deep Learning Approach for Sleep Apnea Detection *May–Jul 2024*

Research Assistant, Resonance Lab Nashville, TN

Led EDF signal annotation and batch-processing pipeline development for NIH-funded sleep research. Automated quality checking and curation workflows for multi-channel polysomnography; supported manuscript preparation and ethical ML bias detection work.

Tech: Python (PyEDFlib), Snakemake, Docker.

Action, Cognition, & Metascience Lab *Sep 2023–May 2024*

Undergraduate Thesis Student, McMaster University Hamilton, ON

Modelled fast and slow adaptation dynamics in cooperative human–human interaction using virtual reality. Designed task protocol, collected and curated behavioural data, and fit hierarchical mixed-effects and state-space models; presented thesis and poster at SCAPPS 2024.

Tech: R (tidyverse, lme4/brms), Python (NumPy/pandas), Unity, Qualtrics.

Vascular Biology Imaging Research, Physical Sciences *Feb–Jun 2020*

Research Technician, Sunnybrook Health Sciences Centre Toronto, ON

Supported vascular biology imaging studies by drafting and maintaining SOPs, assisting data collection and imaging sessions, and coordinating with multidisciplinary teams for study logistics.

Teaching Experience

Graduate Teaching Assistant – Health Research Methods *Sep 2025–Present*

Carleton University Ottawa, ON

Organized curriculum, led tutorials, and graded assignments.

Teaching Assistant – Anatomy and Physiology *Sep 2022–May 2023*

McMaster University Hamilton, ON

Led tutorials, graded assessments, and supported laboratory sessions in human anatomy and physiology.

High School Science Teacher *Jan–Jun 2025*

Fort Erie International Academy Fort Erie, ON

Delivered Ontario curriculum remotely for SBI3U, SCH4U, and SCH3U (Biology and Chemistry).

Professional Experience

Funding Policy Analyst (Co-op) *May–Aug 2024*

AdvantAge Ontario Toronto, ON

Developed and automated population forecasting models (ARIMA, Prophet, exponential smoothing) in Python for provincial policy committees. Built interactive dashboards (Power BI, Tableau) and increased survey completion rates by 15%.

Tech: Python (pandas, statsmodels, Prophet); SQL (PostgreSQL); Power BI (Power Query/DAX); Tableau.

Human Factors Intern (Co-op) *May–Sep 2023*

Schaeffler Aerospace Inc. Stratford, ON

Developed 500+ eLearning modules on health and safety protocols. Performed hierarchical clustering and time-series analysis on workplace safety data; designed ergonomic workstations in AutoCAD. Best practices adopted company-wide.

Tech: Python (pandas, scikit-learn, statsmodels); Tableau/Power BI; AutoCAD.

Physiotherapy Assistant *May 2021–Dec 2023*

Physical Activity Centre of Excellence, McMaster University Hamilton, ON

Provided clinical support and documentation for Multiple Sclerosis, Spinal Cord Injury, and Cancer rehabilitation patients. Developed and executed patient assessment protocols and streamlined clinical documentation workflows.

Awards & Honours

Faculty of Science Graduate Scholarship ($12,000), Carleton University 2025
TCAIREM Studentship ($10,000), Temerty Faculty of Medicine, University of Toronto 2025
Faculty of Science Award of Excellence ($3,000), McMaster University 2020
Dean's List (4x), McMaster University 2020–2023
Department of Biology Honour Roll, McMaster University 2022
Royal Conservatory of Music: Level 10 Piano; Level 8 Guitar & Voice 2018–2022

Peer-Reviewed Publications

Araz, S., Josevski, R., Kuruparan, N., Lian, J., **Manivannan, M.**, Meng, R., Sin, V., & Zhang, V. (2019). Using *Sphingomonas* to Decrease Estrogen Levels in Water. *BioTreks Journal*. https://biotreks.org/e201908/

Presentations

"Bayesian Spatial Clustering Models for Tumor Microenvironment Identification in High-Resolution Spatial Omics Data" *(Poster)*, Ottawa Mathematics and Statistics Conference, Ottawa, ON Apr 2025
"ECG Reconstruction from Polysomnography Using Conditional Neural Vector-Quantized VAE" *(Oral)*, SRI Summer Student Conference, Sunnybrook Research Institute, Toronto, ON Aug 2025
"ECG Reconstruction from Polysomnography Using Conditional Neural Vector-Quantized VAE" *(Oral)*, TCAIREM Conference, University of Toronto, Toronto, ON Jul 2025
"Ethical Bias in Deep Learning Algorithms" *(Oral)*, Racism and Health Conference, Faculty of Health Sciences, McMaster University, Hamilton, ON Dec 2024
"Modelling Fast and Slow Adaptation Dynamics in Cooperative Human–Human Interaction Using Virtual Reality" *(Poster)*, Canadian Society for Psychomotor Learning and Sport Psychology (SCAPPS), Winnipeg, MB Oct 2024

Leadership & Extracurricular

Student Committee Chair *Jun 2024–Present*

Chair, Association of Canadian Ergonomists (ACE) Canada

Lead national student initiatives for ergonomics professional development, networking, and educational outreach.

Vocal Director *Sep 2020–Jun 2024*

McMaster A Cappella Club Hamilton, ON

Directed vocal arrangements and led team performances at the International Championship of Collegiate A Cappella (2021–2023).

VP & Co-Founder *Jan 2020–Dec 2022*

Technaffect Health Markham, ON

Founded student-run non-profit for AI-driven health technology for underserved communities. Secured $15,500+ in competitive grant funding; deployed culturally tailored mobile mental health app.

Varsity Athlete *Sep 2022–Sep 2023*

McMaster Dragon Boat Team Hamilton, ON

Competed in intercollegiate dragon boat racing; developed team coordination and athletic endurance.