Abhay Murthy

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Education

University of California, Berkeley (M.E.T Program) — Berkeley, CA
B.S. Bioengineering & B.S. Business Administration — *Aug. 2026 – May 2030*

Liberty High School — Frisco, TX
Rank: 4/444 | GPA: 5.559 | SAT: 1570 — *Sep. 2022 – May 2026*

- **Awards:** Jane Street M3C Intl Finalist & Top Presenter, DECA Intl (ICDC) Winner, BPA National Winner, Invited Presenter @ SfN
- **Coursework:** Multivariable Calculus, Differential Equations, Data Structures & Algorithms, AP Calculus BC, AP Statistics, AP Physics C, AP Biology, AP Computer Science A, AP Macroeconomics, Statistical Learning with Python (Stanford)

Experience

Boston University — Jun. – Aug. 2025
Research Intern (RISE) — *Boston, MA*

- Developed an ODE-based computational model of neuron–neurotrophin interactions integrating receptor affinities, cleavage enzymes, and neurodegeneration dynamics; applied MM-MD on an HPC cluster to estimate binding rates for canonical and non-canonical BDNF receptor complexes
- Proposed a novel biomarker framework identifying "tipping point" proBDNF:mBDNF ratios for early Alzheimer's detection; accepted and presented at Society for Neuroscience (SfN) Annual Meeting 2025
- Co-authored literature review on the blood-brain barrier, BDNF signaling, and drug design for BBB penetration

University of Texas at Dallas — Jun. – Aug. 2024
Data Analytics Research Intern — *Richardson, TX*

- Engineered a Python script to scrape and clean ∼2,000 data points from Transfermarkt.us across 30 years; analyzed longitudinal trends (1990–2019) with Tableau, investigating multivariate correlations between age, position, league, and individual accolades
- Tested five hypotheses on key predictive traits of Ballon d'Or winners, identifying 4 statistically significant factors

Projects

Neural Network From Scratch | *Python, NumPy, Linear Algebra, Calculus* — Present

- Built a fully custom neural network from basic neuron operations to multi-layer architectures without ML libraries
- Implemented ReLU, Softmax, Sigmoid, and Linear activations with vectorized forward passes
- Derived and coded backpropagation manually using multivariable calculus (chain rule) and matrix operations

Motor Cortex Decoder for BCI Control | *Python, PCA, MATLAB* — Jul. 2025

- Analyzed macaque motor cortex recordings during 8-direction arm-reaching tasks using Python and MATLAB-formatted neural data
- Applied PCA for dimensionality reduction on spiking data from 143 neurons across 158 trials; built a low-dimensional decoder to classify neural activity

Wake Word Detection Model | *Python, TensorFlow, Librosa, Pandas* — Aug. 2024

- Built a custom audio data collection and labeling pipeline; developed preprocessing using Librosa to extract MFCC features from audio files
- Trained and optimized a neural network using TensorFlow Keras, achieving 100% detection accuracy

Technical Skills

Languages: Python, SQL, Java, JavaScript, HTML, CSS, MATLAB, GROMACS
Frameworks & Libraries: TensorFlow, Scikit-learn, Pandas, NumPy, Matplotlib, Librosa, React, Next.js
Developer Tools: Git, GitHub, Tableau, ANSYS, Microsoft 365
Domain Skills: Computational Neuroscience, Neural Systems, Machine Learning, Data Mining, Data Visualization, Databases, Data Structures & Algorithms