Maksymilian Mroczkowski

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EDUCATION

Imperial College London — London, England
Bachelor of Science - **Bioengineering** — Sep 2023 - June 2026

Relevant Modules: Computer Architecture, Object Oriented Programming in Python, Introduction to Machine Learning, Logic and Discrete Mathematics, Data Structures and Algorithms, linear Algebra, Multivariable & Vector Calculus, introduction to C++, Medical Robotics Design, Partial Differential Equations, Statistics & Data analysis

SKILLS SUMMARY

Languages: Python, C++, JavaScript, Matlab
Libraries/Frameworks: TensorFlow, Scikit-learn, ReactJS, Numpy, Matplotlib, Pandas, Vite, Flask, Keras
Other technical Skills: HTML, CSS, Figma, fritzing, Git

EXPERIENCE

Automated Cell Subculture System - Second Year Final Project Code
- Collaborated with a team of four to develop an automated cell subculture system with a **touchscreen Interface**
- Designed the frontend on **Figma** based on **survey and user feedback** and implemented it using **ReactJS** and **Vite**
- Developed the backend using **Flask** and **Python**
- Established communication between the frontend and backend via **HTTP POST requests**
- User input volumes are sent to the backend, which converts them into pump revolutions for liquid dispensing
- The backend sent the pump rotation data to an **Arduino Mega**, which was programmed in **C++** to control the pumps
- Wired all electrical components of **Fritzing** before assembly

Rapid Prototyping of Medical Robotics Code
- Led a team of 3 to design, prototype, and build a robotic arm capable of lifting 150g with a reach of 500mm
- Achieved a reach **20% greater** than the class average, placing **first among 8 competing teams**
- Collaborated with senior industry professionals to deliver well-documented, tested, and functional code
- Designed individual components using **CAD (Fusion360)** and manufactured parts through **3D printing** and **laser cutting**
- Programmed 3 servos using **Arduino Unos** and **C++**
- Iteratively developed **3 prototypes over a 3-month period**

Convolutional Neural Network for Medical Image Classification Code
- Used **TensorFlow** and **Keras** to design, train, and evaluate a convolutional neural network designed for **classifying brain tumor categories** (e.g., "no tumor," "meningioma")
- Processed **1000+ MRI images** from an open source medical database for model training
- Used **Matplotlib** for visualising data distributions, model performance metrics, and training progress
- Automated data preprocessing using **OpenCV** and **TensorFlow** to clean directories and filter non-image files

.png Image Processing Algorithm Code
- Extracts and decodes PNG metadata (e.g., width, height, bit depth) from the **IHDR chunk** and decompresses pixel data using **zlib**
- Implements advanced **PNG filter algorithms** (Sub, Up, Average, and Paeth)
- Allows selective saving of images emphasising i**ndividual RGB channels** (red, green, or blue)
- Re-encodes and saves modified images in a **compressed, CRC-validated PNG format**
- Coded in **Python**, following Object-Oriented Programming principles

Research Study: "Assessing Wrist Loading Patterns and Muscle Activation During Handstands"
- Contributed to biomechanics research aimed at diagnosing causes of long-term wrist pain and injury in gymnasts
- Used **electromyography (EMG)** to measure muscle contraction and force distribution during handstands
- Analysed and visualised EMG data using **Python** and **MATLAB**, performing **hypothesis testing** on the data
- Integrated motion sensor data to create a **computer-simulated "skeleton" model** of participant movements
- Assisted with data collection and analysis under the guidance of a PhD student

LEADERSHIP EXPERIENCE

Department Of Bioengineering Student Ambassador — Sep 2024 - ongoing
- Represent the Imperial college London department of Bioengineering in **outreach** and **recruitment efforts**
- Presented academic showcases to **150+ prospective students** and participated in **Q&A panels for 80+ students**
- Supported the **2024 & 2025 undergraduate Biomedical Technology Ventures interviews**
- Helped host multiple **University taster** and **open days**