Pranav Chandrakumar

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Education

McMaster University Hamilton, ON
B.Eng. in Mechatronics and Biomedical Engineering, Minor in Math/Stats | cGPA: 3.95 *Sep. 2022 - Present*

Projects

Hip Implant Model | *Autodesk Inventor, Prusa Slicer* October 2022 – December 2022

- Modelled a miniaturized hip implant, specialized for patients with rheumatoid arthritis, using Autodesk Inventor.
- Conducted in depth materials research, identifying materials which are both bio-compatible and posses requisite mechanical properties (resistance to deformation).
- Fabricated the final model using Prusa Slicer 3-D Printers, which required working with a printing preparation software to correctly orient components for printing supports.

Automated Self-rocking Crib | *Autodesk Inventor, Python, Raspberry Pi* January 2023 – March 2023

- Created a complex assembly using Autodesk Inventor (which required GD&T, material planning, etc.).
- Assembled a Raspberry Pi and Breadboard, connecting miniature sensors and actuators to the Breadboard.
- Created a Python program which controlled the devices connected to the Breadboard, which were used to monitor health parameters of the user of the product.
- Combined the 3-D printed components of the crib with the Raspberry pi and Breadboard to create a fully functional prototype of a self-rocking crib.

Genetic Algorithm Optimization | *C, WSL, VS Code, GitHub, LaTeX* October 2023 – November 2023

- Created a program using C (working in the VS Code environment) which uses numerical methods to optimize an objective function.
- Modelled the genetic distribution of a randomized population by supplying the Ackley Function to the algorithm.
- Connected VS Code to WSL and produced this entire project while working through the Linux Shell.

CSR Matrix Linear System Solver | *C, WSL, VS Code, GitHub, LaTeX* November 2023 – December 2023

- Created a program using C which reads CSR Matricies (in the .mtx file format) and computes the optimal solution vector for the linear system.
- Implemented a numerical method algorithm (Jacobi method) as the primary method to compute the solution to the system.
- Used program optimization tools (such as Vtune and gcov) to determine program inefficiencies and to reduce program runtime.
- Created a comprehensive report which detailed program functionality, documentation, and areas for improvement using LaTeX.

Heliocentric Orbital Simulation | *Python, VS Code, GitHub* December 2023 – Present

- Developed a program using Python which applies orbital data published by NASA to produce a fully-functioning 2-D model of the planetary bodies of the Solar System.
- Implemented a GUI using the pygame library to provide the user with an ability to change the relative timescale (simulation speed), to observe the differences in orbital period.

Technical Skills

Programming Languages/Operating Systems: Python, C/C++, WSL (Linux/Ubuntu Distribution)
Mathematical/Solid Modelling Software: Autodesk Inventor, MATLAB, Maple, FlexPDE
Developer Tools: GitLab, GitHub, VTune (Program Efficiency), VS Code (IDE), LaTeX (Document Preparation)
Hardware: Raspberry Pi, Breadboard Setup, Arduino