Tarnpreet Bhatti

tarnpreet.com | tarnpreeteng@gmail.com | (647) 544-4650 | https://www.linkedin.com/in/tsbhatti/

SUMMARY

Results-driven Mechatronics Engineer with a strong foundation in robotics, software development, and sensor integration. Multi-talented across engineering disciplines, I excel at quickly mastering new technologies and methodologies. Proven expertise in delivering innovative robotic solutions from concept to implementation, optimizing performance through rapid prototyping, advanced PCB design, and 3D modeling. Skilled in embedded systems and control algorithms, with a track record of solving complex engineering challenges and enhancing user experiences. Passionate about continuous learning and staying at the forefront of technology to drive impactful innovations. Please visit my portfolio at tarnpreet.com to learn more about my work.

WORK EXPERIENCE

Self-Employed   Aug 2024 – Present
Engineering Consultant
- Provided consulting and freelance services to startups, delivering various high-impact projects while consistently meeting deadlines and receiving positive client feedback on quality and reliability
- Developed a precision measurement platform for conveyor bed leveling using **ESP32**, **VL53L0X** sensors over **I2C**, 3D-printed mounts, and custom **PCB** design in **KiCAD,** reducing operator time significantly
- Delivered advanced 3D models in **Fusion 360** and optimized **CNC** toolpaths, reducing machining time by 1000% for medium-volume production while maintaining product quality
- Led full-stack development of a **Next.js** project, integrating Stripe and Plaid APIs for secure payments and identity verification, delivered within two weeks for Startupfest

Plumber.AI   Nov 2023 – Aug 2024
Senior Software Engineer
- Collaborated with a small team of engineers to establish foundational architecture, guiding product development and making key strategic decisions
- Researched and evaluated technologies including Mage, DBT, Airbyte, React, GraphQL, Hasura, PostgreSQL, LangChain, and Large Language Models (**LLM**) to identify optimal solutions
- Designed and implemented a robust ELT data pipeline, streamlining data integration and transformation to support Retrieval-Augmented Generation (**RAG**) and **AI** model fine-tuning
- Architected a functional beta prototype's software structure as a blueprint for the Minimum Viable Product (MVP) based on client specifications
- Built backend services using **Python** and **FastAPI**, leveraging **AWS** to ensure scalability and reliability, achieving 99.9% uptime and 30% improved response times
- Developed comprehensive Product Requirement Documents (PRDs) for technical and non-technical audiences, aligning roadmap goals with usability and performance metrics

Stellantis   May 2022 – Nov 2023
Systems Powertrain Controls Engineer
- Performed Software-in-the-Loop (SIL) testing of control algorithms with **MATLAB**, Simulink, dSpace VEOS, and ControlDesk, reducing potential algorithmic errors by 15% and increasing verification speed by 20%
- Led feature proposals and hybrid powertrain analyses, identifying conflicts that saved 20% implementation time, supporting the company's 50% carbon emission reduction goal by 2030
- Applied advanced data collection techniques to extract actionable insights from control signals, reducing integration time by 20%
- Optimized the SIL virtual testing build process using **Git**, eliminating cross-functional bottlenecks and reducing turnaround times by 50%

Korio Inc   May 2021 – Mar 2022
Software Developer
- Developed backend business logic to create a search query algorithm to retrieve data from **PostgreSQL**
- Built a three-tiered business application with data collection in **Angular**, data processing in **Java**/**Spring**, and data storage in **PostgreSQL**, adhering to client specifications

Avidbots   **Sept 2019 – Dec 2019**
Software Developer Sensors
- Implemented a **Python**-based tolerance model to assess the feasibility of sensor mounting point tolerances in manufacturing, providing critical insights that reduced research time by 25%
- Conducted rigorous cliff detection testing, evaluating sensor angle, range, and material interactions to validate accuracy and effectiveness in various conditions
- Prototyped and validated sensors including 1D time-of-flight (TOF) laser sensors, 2D LiDAR, and 3D TOF cameras using **ROS** and **C++** on **Ubuntu**, contributing to robot safety and performance

Multimatic Inc   **Jan 2019 – Apr 2019**
Mechatronics Engineer
- Developed a state machine in **LabView** for ECU flashing and DTC reading over **CAN** using ISO standards
- Created a **PID**-controlled **FPGA** system for dual-motor synchronization to prevent drivetrain lockup
- Assembled automotive wire harnesses and electrical panels for mechanical bearing tests

Bluejay Networks   **Sept 2017 – Dec 2017**
Full-Stack Developer
- Integrated NLP libraries to assist medical professionals in diagnosis by extracting relevant information
- Enhanced NLP outputs through a rule-based filtering system to improve diagnosis accuracy

teaBot   **Jan 2017 – Apr 2017**
Android Developer
- Optimized app performance, reducing memory usage by 50 MB (35%) by eliminating memory leaks
- Decreased teaBot servicing time by 25% through implementing a streamlined service menu
- Enhanced real-time performance of nested listview through feature redesign

EDUCATION

University of Waterloo   **Sept 2016 – May 2021**
Bachelor Of Applied Science in Mechatronics Engineering
- Graduated with Distinction; Dean's Honours List

PROJECTS

Visually Impaired Assistance Device   **Sept 2020 – Apr 2021**
University of Waterloo
- Developed a wearable vest with an **Intel RealSense** depth camera for object detection, providing real-time haptic feedback for visually impaired users
- Programmed **I2C** communication to independently control haptic motors for responsive feedback

Ball & Beam Controller   **Sept 2020 – Dec 2020**
University of Waterloo
- Designed and simulated multiple discrete SISO controllers for a ball and beam system using the emulation approach in **Simulink** to meet specifications for zero steady-state error, overshoot, and settling time

Autonomous Robot   **Jan 2020 – Mar 2020**
University of Waterloo
- Built an obstacle-navigating robot using 1D TOF sensors, encoders, and **Arduino**; strategically placed sensors for maximum coverage while utilizing Gantt charts and decision matrices to optimize design within budget constraints

SKILLS & INTERESTS

- **Skills:** 3D Printing, Fusion 360, STM32, RTOS, controls, LabView, Git, Rust, Python, C/C++, PCB Design
- **Interests:** Running, FPV drones, robotics, machining, wood working, coin collecting, One Piece