HRISHITHA PADURI

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EDUCATION

Duke University, Pratt School of Engineering Durham, NC — August 2023 - May 2025
Master of Science (M.S.), Biomedical Engineering (MEDICAL DEVICE DESIGN)

National Institute of Technology Raipur, Chhattisgarh India — July 2019 - May 2023
Bachelor of Technology (B. Tech), Biomedical Engineering

KEY SKILLS

Autodesk Fusion 360, Adobe Photoshop, PYTHON, AutoCAD (Computer aided design), Microsoft Office (Word, Excel, Microsoft PowerPoint), SQL, Cryosectioning, Basics of programming in C++, VS Code, Software Version Control (git, GitHub), Continuous Integration Testing (GitHub Actions), Testing, GUIs, Virtual Environments, Flask, HTML, NumPy, Tkinter, Pandas, Matplotlib, APIs, MongoDB, Debugging, Full stack development

WORK EXPERIENCE

Duke University, Durham, NC, United States (Research experience) — September 2024 - May 2025
Research Assistant at Truskey's lab:

- Spearheaded structural analysis of human skeletal muscle bundles (SMM) investigating environmental toxicants effects through integrated microscopy techniques, achieving 95% analysis accuracy.
- Optimized sectioning protocols to generate precise 10 µm SMM sections, enhancing visualization quality by 30% and enabling detailed structural measurements.
- Implemented advanced immunostaining methods to quantify protein filament integrity and map nuclear distribution patterns under varying concentrations.
- Captured high-resolution images using Zeiss LSM 880 confocal microscopy, generating Z-stack data to evaluate 3D structural changes in SMM.

Duke University, Durham, NC, United States (Medical Device experience) — August 2023 - December 2024
Design Health Fellow:

- Conducting ethnographic research interviewing medical professionals, and observations in hospital to analyze the challenges in healthcare.Conducted Exploratory phase research, Opportunity definition, Solution Landscaping, and Concept generation, prototyping to prove the proof of principle.
- Finalized the final functional prototype through iterative design cycles, incorporating user feedback and technical requirements. Conducted formative usability testing, water ingress testing [IP22] and FEA [ISO 60601] for our prototype.
- Developed Lean canvas business model, defined value proposition, customer segment, positioning statement and analyzed key metrics of the market opportunity.
- Created Design History File [DHF] for the design health project in adherence with 21 CFR 820.30: Design Controls and ISO 13485[QMS], ISO 14971[Risk Management], and IEC 62366[Usability of medical devices].

Merz Aesthetics, Raleigh, NC, United States (Global PMO experience) — June 2024 - August 2024
Research and Development intern:

- Developed a comprehensive user guide for a project tracking software, empowering 10+ project managers to improve navigation efficiency and increase project tracking accuracy by 25%.
- Designed and implemented Smartsheet dashboards for the product guide, streamlining access to the company's entire product portfolio and enhancing resource usability by 30%.
- Engineered a quantitative formula to predict project success using advanced statistical methods, enhancing decision-making processes and improving project assessment accuracy by 20%.
- Documented detailed minutes for 5+ RDGB meetings, ensuring 100% accuracy and facilitating timely follow-ups on key decisions and action points.
- Participated in 15 core meetings across 5 product lines, contributing to cross-functional collaboration and gaining exposure to diverse project management methodologies.

Duke University, Durham, NC, United States (Research experience) — January 2024 - May 2024
Research Assistant at Zhong's lab:

- Designed and executed experimental setups using thulium fiber lasers, infrared thermography, and optical coherence tomography to analyze thermal energy distribution in tissue models, resulting in a 25% improvement in data accuracy.
- Conducted comparative data analysis between agarose phantom models and porcine tissue, enhancing the reliability of tissue models

in studying laser-tissue interactions by 20%.

Karuna Multispecialty Hospital, Suryapet, India (Clinical experience) May 2023 - June 2023
Clinical intern:

- Calibration 20+ medical ventilators daily, reducing malfunctions by 98% and significantly enhancing patient safety.
- Developed and implemented a Preventive Maintenance Program, reducing equipment downtime by 20%.
- Managed warranty expirations, device replacements, and resolved 10 system failures, cutting emergency response time by 15%.
- Streamlined documentation processes with MS Office, improving accuracy and reducing data entry errors by 20%.
- Ensured 100% equipment reliability and increased uptime by 15% through daily safety checks, showcasing a proactive approach to safety.

Promea Therapeutics, Hyderabad, India (Industry Experience) May 2022 - June 2022
Research and Development Intern:

- Ensured 98% regulatory compliance with ISO 13485 standards, driving adherence to medical device quality guidelines.
- Led prototyping and testing of over 20 trials, achieving a 15% defect reduction through effective quality assurance protocols.
- Enhanced the reliability of the electrolyte analyzer by 96%, utilizing precise problem-solving and troubleshooting techniques to improve performance.
- Handled multiple tasks including collaboration on the schematic design, involving the selection of over 10 components and the layout of PCB along with prototype testing.

PROJECTS

- **Redesigned Cystoscope handle for better usability:** Innovative & Design thinking processes including sketching and mood board creation ergonomic factors, 3D modeling and design reviews, Design for Manufacturing and Assembly, Finite Element Analysis [FEA], and creating product visualizations in medical environments using Photoshop.
- **C-Marrow Needle:** Redesigned ergonomic bone marrow aspiration and biopsy needle to enhance grip functionality for seamless use with either a single hand or both hands. Applied Innovative & Design thinking processes including sketching and mood board creation ergonomic factors, 3D modeling and design reviews, Design for Manufacturing and Assembly, Finite Element Analysis [FEA], and creating product visualizations in medical environments using Photoshop.
- **Performed LBM cost analysis on Foley catheter:** Labor Burden Material [LBM] analysis and reverse engineering of the device by carefully considering critical parts of the device.
- **Mitral Valve sewing cushion:** Designed a custom Mitral Valve sewing cushion in CAD that fits the specific anatomy of the heart of a patient cut using Slicer.
- **Performed Breakeven, Cannibalization, and Sensitive analysis** for pricing strategies analysis through case studies. Developed financial models with income statements, balance sheet, and cash flow statements to evaluate financial performance during the Harvard Business marketplace simulation.
- Designed and implemented a **RESTful Flask server** to manage patient data, test requests, and lab results, handling GET and POST routes for physicians and lab technicians. Built endpoints for patient records, test requests, and result reporting with input validation, error handling, and email notifications for abnormal test results. Developed a data storage system using Python for efficient data retrieval. Integrated email notifications via a third-party service, ensuring proper JSON formatting and response handling.
- Designed and implemented a **multi-functional Sleep Lab Monitoring System** using Flask, integrating patient-side and monitoring-station GUIs with RESTful APIs to manage patient data, CPAP settings, and results. Followed best practices in software development including PEP8 coding standards, continuous integration (GitHub Actions), and unit testing, with comprehensive documentation using doc strings and README for setup instructions and API reference.
- Developed and implemented **image analysis algorithms** using Python to quantify live and dead cells in fluorescence images, creating automated data analysis pipelines for pharmaceutical studies. Applied modular programming techniques to handle diverse patient data sets and generated JSON reports with detailed results for each patient's cell assay analysis.
- Developed comprehensive Design History File (DHF) documentation for medical device development, including product requirements specifications and verification/validation testing plans. Created and implemented risk management strategies using Use Failure Mode, Effects, and Criticality Analysis and Design Failure Mode, Effects, and Criticality Analysis methodologies aligned with FDA requirements. Generated FDA-compliant design control documentation following 21 CFR 820.30 guidelines. Established human factors testing protocols and usability requirements for medical devices. Applied statistical methods to develop verification test plans and validation strategies.
- Developed a custom Python class to manage patient blood type information, enabling donor-recipient matching with comprehensive unit testing, PEP-8 compliance, and GitHub Actions for CI integration.
- Developed predictive models using Random Forest and Logistic Regression to analyze flight delay causes, achieving an AUC of 0.670 with Logistic Regression, and providing actionable insights for airline operations based on key features like Taxi out and Airtime.