Simbiso Maphosa

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Education

Bucknell University, Lewisburg, PA *Expected graduation – May 2023*

- Bachelor of Science, Biomedical Engineering
- Dean's List

Medical Device Design and Development Projects

Development of Cardiovascular Temporary Pacing Wires *08/2022 – 05/2023*

- Developed temporary epicardial pacing wires and methods of attaching pacing wires to the heart with the goal of mitigating damage to the cardiac tissue in collaboration with the Geisinger Medical Center cardiology team
- Supported device development and design processes focused on problem identification, device fabrication and prototyping, failure modes and effects analysis (FMEA), and feasibility and verification testing
- Created and maintained project documentation, including design functions, specifications, verification and validation reports in a well-established and organized the design history file (DHF)

Medical Device Innovation & Entrepreneurship: Global Health Technologies & Drug Delivery *05/2021 – 05/2023*

- Developed a portable, non-electric, inhalation drug delivery device for severe asthma treatment in low resource areas (Sub-Saharan Africa) in collaboration with local medical practitioners in Zimbabwe
- Designed and executed feasibility & verification tests following ISO standards, completed product iteration and optimized drug delivery by reducing aerosol size and increasing device flow rate
- Selected to present project scope and results at the Biomedical Engineering Society Annual Conference

Work Experience

Engineering Innovation Project Manager, Small Business Development Center *05/2022 – 05/2023*

- Supported an interdisciplinary team of business and engineering consultants with new product research, design, and developments in addition to keeping up to date with industry trends and advancements
- Collaborated with cross-functional teams to lead and execute projects from initial concept to prototyping, ensuring project timelines, product specifications, client expectations, and SBDC standards are adhered to
- Worked jointly with the Product Development laboratory team to complete device optimization following DFMA guidelines, prepare engineering drawings and BOM documents, manufacture full product prototype, and ensure design for manufacturability and quality

Technical Experience

Cell Culture & Biocompatibility Testing - CITI Biosafety Level 2 Certified

- Applied sterile techniques to successfully culture a line of Madin-Darby Canine Kidney (MDCK) cells and performed an in-vitro cytotoxicity assay to investigate the biocompatibility of different materials used in medical devices following ISO 10993, ASTM F748/F813 and AAMI 1999 standards
- Utilized machine learning techniques for image recognition and compiled MATLAB algorithm and FIJI image processing code to automate biological image analysis including cell counting and characterization

Alveolar Airflow COMSOL Model for Pulmonary Drug Delivery

- Applied computational fluid dynamics techniques to develop a fluid flow COMSOL model for pulmonary airflow and drug aerosol delivery in the alveoli
- Carried out finite element analysis to analyze drug delivery in the lower respiratory system and determine effective aerosol flow rate and particle size to optimize aerosol drug delivery for COPD treatment

Honors and Awards

Bucknell Reed-Garman Engineering Entrepreneurship Award | Burma-Bucknell Award | Bucknell Emerging Leader Award | Bucknell Michael M. & Lillian A. Fremont General Scholar | 1st Runner Up Twilio Design Challenge

Technical Skills

CAD | SolidWorks | OnShape | COMSOL | MATLAB | Arduino | 3D printing | Laser Cutting | Machining | Data Analysis | R-Studio | Image Processing | Fiji | ImageJ | ITK-Snap | Cell Culture | Surface Functionalization | Validation and Verification testing | Biocompatibility testing | Signal Processing | FDA Regulation | Microsoft Office Suite (Word, Excel, PowerPoint)

Leadership and Organizations

BMES | NSBE| Bucknell TEDx Executive Committee | Affinity House Leader | Bisonettes Dance Team| Global Connections, Cultures and Community (GC3) Program Coordinator | L&IT Tech-Desk Consultant Leader | D&I Office Assistant