Mishek Jair Musa

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EDUCATION

PhD in Mechanical Engineering **Anticipated May 2024**

University of Arkansas, Fayetteville, AR

Master of Science in Mechanical Engineering **Anticipated December 2021**

University of Arkansas, Fayetteville, AR
GPA: 3.8 /4.00

Bachelor of Science in Mechanical Engineering, Minor in Mathematics **May 2019**

University of Arkansas, Fayetteville, AR
GPA: 3.64 /4.00

Associate Degree of Science in Math and Physics **June 2016**

St. John's College Junior College, Belize City, Belize
GPA: 3.53 /4.00

Student Program for Innovation in Science and Technology (S.P.I.S.E.) **July 2014**

University of the West Indies, Barbados

Intensive four-week residential enrichment summer program for gifted Caribbean post-secondary students, modeled after the MITES program at MIT and is spearheaded by Dr. Cardinal Warde, of the Electrical Engineering Department at MIT. Course work included physics, calculus, robotics and electronics.

SKILLS

Software: Solidworks, Autodesk Fusion 360, Autodesk Inventor, EAGLE, Microsoft Office Suite, Blender, GIMP

Programming: MATLAB & Simulink, Python, Arduino, Raspberry Pi, C++, HTML5, Java

Manufacturing: Additive Manufacturing (FDM, SLA, and SLS 3D printing), Milling (CNC and Manual), Lathe (Manual), Soft Robot Fabrication, Laser Cutting, PCB design

Language: English (fluent), Belizean Creole (fluent), Spanish (conversational)

PROJECT & WORK EXPERIENCE

Research Assistant **June 2019 – Present**

University of Arkansas, Fayetteville, AR

- Design, analysis, fabrication, and characterization of several robotic devices for percutaneous needle insertion procedures under intraoperative image-guidance
- Design and fabrication of soft robots for experimental validation of theoretical research, and design and fabrication of soft sensors for head motion detection in the MRI environment
- Authored several journal and conference papers, and assisted in the writing of several grants and proposals
- Supervised 6 undergraduate students conducting senior design projects and undergraduate honors research

Teaching Assistant **August 2019 – Present**

University of Arkansas, Fayetteville, AR

- Course: MEEG 3223 Introduction to Mechatronics
- Assisted in the initial development of the course by designing laboratory experiments and lecture materials
- Supervise students as they build circuits and perform Arduino programming-based lab tasks
- Grade lab assignments, course assignments, and examinations
- Give lectures in the absence of the professor, as well as guest lectures on control system design and robotics

Lead Mechanical Engineer **August 2018 – May 2019**

University of Arkansas Razorbotz, Fayetteville, AR

- Lead mechanical engineer for the excavation subsystem team for the NASA Robotics Mining Competition Team
- Supervised a team of 10 fellow undergraduate mechanical engineers
- Designed and built a functioning robot to perform excavation tasks on a simulated Martian environment

Assistant Engineering Technician **June 2015 – August 2015**

Guerra's Engineering Ltd., Belize City, Belize

- Assisted a technician in the installation, maintenance and servicing of air-conditioning units, refrigeration appliances and various electrical appliances.
- Assisted in the construction and installation of air-duct systems

PUBLICATIONS

Journal Papers

- **M. J. Musa**, K. Sharma, K. Cleary, and Y. Chen, "Respiratory Compensated Robot for Liver Cancer Treatment: Design, Fabrication, and Benchtop Characterization," in *IEEE/ASME Transactions on Mechatronics*, doi: 10.1109/TMECH.2021.3062984.

- Q. Xiao, R. Monfaredi, **M. J. Musa**, K. Cleary, and Y. Chen, "MR-Conditional Actuations: A Review," in *Annals of Biomedical Engineering* 48, 2707–2733 (2020). https://doi.org/10.1007/s10439-020-02597-8

Conference Papers

- **M. J. Musa**, S. Sengupta, and Y. Chen, "Design of a 6 DoF Parallel Robot for MRI-guided Interventions," *accepted by 2021 International Symposium on Medical Robotics (ISMR)*

- **M. J. Musa**, K. Sharma, K. Cleary, and Y. Chen, "Design and Workspace Analysis of a Patient Mounted Liver Ablation Robot," in *11th National Image-Guided Therapy Workshop*.

Under Review

- **M. J. Musa**, S. Sengupta, and Y. Chen, "MRI-Compatible Soft Robotic Sensing Pad for Head Motion Detection", *under review in IEEE RA-L with ICRA 2021 option*

- **M. J. Musa***, A. B. Carpenter*, C. Kellner, D. Sigounas, I. Godage, S. Sengupta, C. Oluigbo, K. Cleary, and Y. Chen, "Minimally Invasive Intracerebral Hemorrhage Evacuation: A Review", *under review in Annals of Biomedical Engineering* (* indicates co-first author)

PATENT

- Yue Chen, **Mishek Musa**, "Respiratory Compensated Robot for Liver Cancer Treatment", US Provisional Patent App. No. 63/113,050

PROFESSIONAL ACTIVITIES

Technical Reviews

- Provided technical reviews of publications submitted to IEEE Robotics and Automation Letters Special Issue: Autonomous Systems in Robotic Surgery (2021)

Memberships

- Pi Tau Sigma – International Mechanical Engineering Honor Society

CERTIFICATIONS/AWARDS

- Certified SolidWorks Associate – License C-NUA8W3Y8QZ
- Treasurer of Pi Tau Sigma – International Mechanical Engineering Honor Society (2018 – 2019)
- Mechanical Engineering Ambassador – Promote and inspire freshmen to join the Mechanical Engineering Department at the University of Arkansas through talks and presentations
- University of Arkansas Caribbean Tuition Advantage Scholarship (2016 – 2019)