CONTACT INFORMATION

JACKET DEMBY'S

Research Interests

- Machine Learning
- Deep Learning
- Robotics
- Assistive Technologies

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EDUCATION

Doctor of Philosophy (Ph.D.)
Still attending
GPA: 3.724/4

University of Missouri, Columbia, Missouri, USA
Electrical and Computer Engineering
Expected Graduation: May 2024

Master of Science (MS)
Graduated July 2020
GPA: 3.696/4

University of Missouri, Columbia, Missouri, USA
Computer Engineering

Engineering Diploma
Graduated July 2015
GPA: 15.06/20

Ucac-Icam Institute, Douala, Cameroon
Generalist Engineering
Top of class

MOST RECENT WORK EXPERIENCE

Display Electrical Engineer Intern | May 2023 – August 2023
Apple – Cupertino, California, United States of America

- Utilized state-of-the-art super resolution deep learning methods to improve display technology.
- Explored alternative hyper parameters and evaluation metrics tailored for display technology.
- **Skills**: PyTorch · Data Collection · Data Preparation · Super Image Resolution · Applied Research · Interpersonal Communication · Presentation Skills · MATLAB · Python (Programming Language) · Deep Learning

RESEARCH EXPERIENCE

August 2017 – Present: Research Assistant (Vision Guided and Intelligent Robotics Lab – ViGIR Lab)

- Behavior-based mobile robotics using multiple sensors (RGB, Intelsense, Sonars, Velodyne)
- Accuracies of approximate solutions provided by analytical, data-driven (deep learning-based), numerical, and hybrid inverse kinematics solvers for robotic manipulators
- Choosing the correct generalized inverse for the numerical solution of the inverse kinematics of incommensurate robotic manipulators
- Object detection and pose estimation based on stereo vision and deep learning algorithms in resource-limited embedded hardware

SOME COURSEWORK

- Introduction to Mechatronic and Robotic Vision
- Probability and Stochastic Processes for Engineers
- Introduction to Machine Learning and Pattern Recognition
- Parallel Programming for High Performance Computing
- Introduction to Computational Intelligence
- Digital Image Processing
- Computer Vision
- Supervised Learning
- Neural Networks and Deep Learning
- Real-Time Embedded Systems

TEACHING EXPERIENCE

Teaching Assistant, University of Missouri-Columbia, Columbia, Missouri, United-States

- **Spring 2020** **: Neural Networks**
- **Fall 2020 / 2021 / 2022 / 2023** **: Building Intelligent Vision-Guided Robots**
- **Spring 2021 / 2024** **: Introduction to Machine Learning and Pattern Recognition**
- **Spring 2022** **: Power Electronics I**
- **Spring 2023** **: Architectural Robotics**

TECHNOLOGIES

Operating Systems: Linux, Windows, MacOS

Programming languages: Python, C/C++, MATLAB, Arduino, Processing, Cuda, Lyx/Latex

Software and libraries:

- **Robotics**: ROS (Robot Operating System)
- **Machine learning**: Keras, Pytorch, TensorFlow, Jax
- **Computer vision**: OpenCV, PCL
- **Mechanical**: Solidworks, Ansys Fluent

PUBLICATIONS

1. **J. Demby's**, Y. Gao and G. N. DeSouza, "A Study on Solving the Inverse Kinematics of Serial Robots using Artificial Neural Network and Fuzzy Neural Network," *in 2019 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE 2019)*, New Orleans, LA, USA, 2019, pp. 1-6. ***(Accepted)***.
2. **J. Demby's**, Y. Gao, A. Shafiekhani, G.N. DeSouza, "Object Detection and Pose Estimation Using CNN in Embedded Hardware for Assistive Technology, " *in 2019 IEEE Symposium Series on Computational Intelligence (IEEE SSCI 2019)*, December 2019. ***(Accepted)***.
3. **J. Demby's**, A. Shafiekhani, F.B Fritschi and G. N. DeSouza, "Spatio-Temporal Reconstruction and Visualization of Plant Growth for Phenotyping," *in 2021 IEEE Symposium Series on Computational Intelligence (IEEE SSCI 2021)*, December 2021. ***(Accepted)***.
4. **J. Demby's**, J. Uhlmann and G. N. DeSouza, "Achieving Unit-Consistent Pseudo-Inverse-based Path-Planning for Redundant Incommensurate Robotic Manipulators". arXiv preprint arXiv:2308.02954. ***(Journal paper in preparation for resubmission)***.
5. **J. Demby's**, J. Uhlmann and G. N. DeSouza, "Choosing the Correct Generalized Inverse for the Numerical Solution of the Inverse Kinematics of Incommensurate Robotic Manipulators". arXiv preprint arXiv:2308.02964. (***Journal paper in preparation for resubmission***)

ACHIEVEMENTS AND ACTIVITIES

May 2019 – present	Student Member of IEEE.
December 2017	Best 3rd final project in Digital Image Processing class (Fall 2017).
August 2017 – present	Member of the University of Missouri Fulbright Organization (**MUFO**).
July 2017 – present	Recipient of the **Fulbright Scholarship** in Congo Brazzaville to pursue a M.Sc. in Computer Engineering at the University of Missouri-Columbia.
January 2017	Participant for the Business and Entrepreneurship Track of the Young African Leaders Initiative (YALI Program) in Nairobi, Kenya.
April 2016	2nd prize ($13,000) of the 2015-2016 national Startup Challenge of Total E&P in Congo Brazzaville.
January 2015 – June 2015	Participant of the internal Icam exchange program to conduct an industrial mission on Computational Fluid Dynamics (CFD) in Lille, France.
June 2012 – July 2013	Recipient of the **Sogea-Satom scholarship** to study at Ucac-Icam Cameroon.
August 2010 – June 2012	Recipient of the **Total E&P scholarship** to study at Ucac-Icam Congo.

SOME COURSEWORK PROJECTS INVOLVING FINAL PRESENTATIONS

Class: Real-Time Embedded Systems (Spring 2020)
Project: Data generation for supervisory control and data acquisition system (DataGen-SCADA)
Main objective, results and tools: Build a real-time data generation simulator for distributed SCADA systems using IoT devices; to gather and analyze data in real-time industrial settings and behaviors. Python, Processing, Arduino and ESP8266 devices were used.

Class: Neural Networks (Spring 2019)
Project: Solving the inverse kinematics of a 4 DoF SCARA robot using extreme learning machines and radial basis function networks
Main objective, results and tools: Conduct a comparative study between extreme learning machines and radial basis function networks in solving the inverse kinematics of the chosen robotic arm. Lowest MSE (Mean-Squared Error) results were obtained with extreme learning machines. Matlab and Python were used.

Class: Introduction to Computational Intelligence (Fall 2018)
Project: Solving the inverse kinematics of a 6 DoF Kinova robot using artificial and fuzzy neural networks
Main objective, results and tools: Conduct a comparative study between artificial and fuzzy neural networks in solving the inverse kinematics of the chosen robotic arm. A trade-off was observed in terms of precision of the predicted joint configuration depending on the workspace. Matlab and Python were used.

Class: Computer Vision (Spring 2018)
Project: Hardware integration of a real time object detection CNN (Yolo V2)
Main objective, results and tools: Develop an android mobile application based on YOLO V2 to recognize and pronounce objects in real-time. Android, Darknet and a pretrained Yolo V2 model were used.

Class: Introduction to Mechatronic and Robotic Vision (Fall 2017)
Project: Investigating the control of a robotic arm with a real-time tracking of human hand motions
Main objective, results and tools: Track human hand motions using a Kinect sensor and control the robotic arm with the hand motions tracking information. C/C++ and ROS were used.

Class: Digital Image Processing (Fall 2017)
Project: Super Image Restoration (SIR)
Main objective, results and tools: Develop a Matlab application with a friendly Graphical User Interface (GUI) to restore old damaged images with cracks in only three click steps. Matlab, Python and Algorithmia Colorization API were used.

PREVIOUS WORK EXPERIENCE

Junior Project Engineer | December 2016 – July 2017
Total E&P Congo - Pointe-Noire, Republic of Congo

- Prepared, supervised and generated daily reports for construction activities of the Floating Production Unit (FPU) Likouf alongside contracted companies.
- Worked on Pressure Safety Valves (PSV) Recalibration Campaign, managed a database of the PSV joint stocks, and ensured team members compliance with on-site safety measures.

Maintenance Engineer | September 2015 – October 2016
Sogea-Satom - Brazzaville, Republic of Congo

- Monitored the computer-assisted supply chain and maintenance management software and produced monthly analysis reports.
- Developed and maintained Excel VBA (Visual Basic for Applications) programs for monthly stocks' management analysis, optimization and periodic inventories follow up.

Intern Maintenance Engineer by Alternance | January 2013 – December 2014
Sogea-Satom - Brazzaville, Republic of Congo

- Monitored the computer-assisted supply chain and maintenance management software.
- Continually improved methods and procedures for processes, stocks' management, documenting and workflow techniques.

LANGUAGES AND INTERESTS

Languages

- French: native language
- English: fluent (speaking, reading, writing)

Interests

Sport: Walking, Running, Volleyball, Swimming
Board games: Scrabble, Ludo, Chess, Checkers

VOLUNTEER WORK

Intervarsity at University of Missouri-Columbia | Volunteer photographer and events' organizer

- Organize events (games, discoveries, English clubs, shopping, etc.) to help international students feel welcome at the university.
- Take pictures during the events and share them with all the members.

University of Missouri Fulbright Organization (MUFO) | Volunteer

- Work with the International Center to provide rides to new international sponsored students.
- Lead scavenger hunt activities to help international sponsored students discover and locate key facilities and resources on campus.

OVA (Œuvre de Vie et d'Amour) Association in Cameroon | Volunteer

- Organize activities on the International Day of the African Child and Christmas for street children and children with special needs.