Takoua Bejaoui

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Job Title: Aerospace and Mechanical Engineer (focus in Control System Design and AI)

Technical Skills

COMPUTER LANGUAGES AND IDES	Python, C, C++, Google Colab, Jupyter Notebook, Java Script, PyCharm, Visual Studio Code
DATA & AI SPECIFIC	Data Visualization, Deep Learning, Machine Learning, Data Analytics, Neural Networks, CNN, RNN, LSTM, Exploratory Data Analyst, TensorFlow, Keras
ENGINEERING SPECIFIC	Control Systems Design, PCB Manufacturing, Embedded Systems Design, Manufacturing, Testing and Deployment, Project Engineer, HVAC, Wind Tunnel Testing, Chassis Design, Heatsink Design, CAD, LQR, PID, CFD, SMC, Kalman Filter, GD&T, Orbital Mechanics, Hypersonic, Thermodynamics, Rocket Systems, Jet Propulsion, Space Mission Design, Lyapunov Stability, Adaptive Control, Nonlinear Output Tracking
SOFTWARE	SOLIDWORKS, Creo/Pro-E, AutoCAD, ANSYS, CFD-FASTRAN, Microsoft Suite, QGIS, LabView, HTML/CSS, MATLAB, Final Cut-Pro, EPANET, Simulink, TinkerCad, CEA, Social Media Platforms, MAYA, GMAT, BlockChain, FARSITE, WindNinja, FDS, Robotics Operating System (ROS)

Education

San Jose State University
Bachelors of Science Mechanical Engineering 2014
Masters of Science Aerospace Engineering 2022
Masters of Science Mechanical Engineering 2022
(Graduation Year is Stated.)

Technical & Leadership Experience

Wildfire Interdisciplinary Research Center
Research Assistant (RA)
San Jose State University (SJSU)
Sept. 2021 to Current
- Development of an inverse model using multiple data driven wildfire (non-GUI based) simulations. (bash, TestFarsite, FDS...etc.)
- Incorporated data analysis and machine learning (ML) techniques to establish data pipeline. (Anaconda, python libraries (fiona, rasterio, gdal...etc.)
- My work garnered new insights and established a pipeline that simplified future workload by 95%.
- Research supported by the IBM Public Impact Project.

San Jose State University (SJSU)
Mechatronics Lab Instructor
San Jose, CA
Aug. 2020 to Jan. 2022
- Instructed and prepared mechanical and electrical engineering students for weekly labs that involved using embedded system design firmware, circuit simulations, and Circuit-Python.
- Initiated weekly trainings to familiarize with instructional duties
- Continuously provided constructive feedback towards students and employer to improve online/virtual learning environment.
- Teaching methods increased students' retention rates and score quality by 50% despite pandemic shutdown.

Whizz Systems, Inc.
Lead Mechanical Engineer
Santa Clara, CA
May 2013 to May 2018
- Main technical projects involved: chassis design, manufacturing and thermal analysis.
- Initiated the installation and integration of 3D-printing for external and in-house projects to reduce overall production costs and time. Thus, reduced production costs by 35%.
- Supervised and managed production and assembly procedures and processes. Trained staff for proper operations of machinery, as well as, assembly procedures for assigned projects. Hence, increased the skills set of operators and production efficiency by 25%.
- Effectively collaborated with sales department and multi-disciplinary teams . Conducted meetings and provided solutions for concerning issues , acted as the main stakeholder and was the Project Manager (PM) for all projects , as well as, for off shore teams. Hence, reduced prototype manufacturing and raw resource costs by 40%.
- Increased sales by 25% by providing best customer service to our clients. My quality of work transformed short-term customers, as well as, vendors, to long term.

Research

Mapping and Correcting for Solar Gravity Perturbations via Artificial Neural Nets for Flyby Trajectories
June 2020 to July 2021
DOI: 10.13140/RG.2.2.18013.74723

Projects

Masters' Theses
June 2020 to Current
--NN, specifically LSTM modeling and Fast R-CNN, for aerospace (specifically orbital dynamics) and mechanical applications.
--Platforms to develop models were PyTorch, Google Colab (Jupyter Notebooks), and Tensorflow/Keras.
--Incorporated data standardization, visualization and analytics to structure, scale, normalize supervised and high dimensional data. (Pandas, MatPlotlib, NumPy...etc.)
-- NN model had a performance rating in the 90th percentile.
--Using Linux platform (Ubuntu) for a GPS sensor based ROS project involving a space rover and Kalman filtering. Observer model proved to be more robust than a low pass filter.

Modeling and Control of a Two-Link Robot using Feedback Linearization
Feb. 2020 to Apr. 2020
- Objective: Design and implement a feedback linearization controller to determine tracking capabilities of a nonlinear system.
- Implemented the concepts and techniques for nonlinear control design using Simulink/MATLAB.
- Result(s): The error dynamics indicated which solution was most ideal with respect to the robot links' effector end. Solution 1 proved to have the least error than Solution 2, and that increasing the filter parameter does not always guarantee better tracking performance .

Closed-Loop DC Motor Position and Speed Control
Oct. 2019 to Dec. 2019
- Objective: design and implement a closed-loop PID controller using both, Arduino and MATLAB/Simulink, to control a DC Motor's position and speed.
- Implemented the concepts of ISR, timer interrupts, and kinematic equations within Arduino, as well as, generating a motor driver function in MATLAB/Simulink to control the behavioral response of the motor
- Result(s): indicated that the proportional (Kp) and the integral (Ki) values played a dominant role in the tuning of the position and velocity response plots.

Stability & Control Analysis of a Learjet 24 for Augmented Pitch, Roll and Yaw
Oct. 2019 to Dec. 2019
- Objective: Implemented stability and control principles and formulations, along with MATLAB, to improve the Learjet 24's static and dynamic rate of response during an unstable flight condition, at cruise, caused by an internal/external short period perturbation.
- Conducted analysis, using said principles, on open and closed loop response of the full, lateral/longitudinal characterization, of the system.
- Result(s): PID or LQR controller can be used to fine tune the overall system response.

Augmented Analysis on the RD-180
Feb. 2019 to May 2019
- Propulsion modification analysis of the RD-180 engine that's used for the Atlas V 551 rocket.
- Developed MATLAB code for parametric study.
- Chemistry has an increasingly significant impact than other critical parameters in the overall performance of a chemical propulsion based rocket.

Mission to the Moon
Sept. 2018 to Dec. 2019
- Objective was to use fundamental research methods, such as literary review and necessary statistical processes, to familiarize oneself with the standard operations in a space mission plan.
- Applied the use of parametric analysis and N2 diagrams to find the critical parameters of five of the Apollo missions.
- Results: Reducing over-designing factors, while still remaining in the safety margins, aided in overall reduction of weight and cost. Furthermore, unmanned missions can be improved thru the incorporation of automation and sensor technologies.

Activities, Certificates & Awards

Kaggle and SJSU · **SVCC Datathon '21**	Dec. 2021
SJSU · **Black Engineering Science and Technology (BEST) Scholars**	Sept. 2021
Intelligent Systems Design and Controls · **SJSU Robotics Club**	
Northwestern Polytechnic University · **Hands on Blockchain Certification**	2019
SJSU · **David A. Brown Fellowship in Mechatronics**	May 2022