Surafel Anshebo

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Education

Virginia Tech *May 2023 – Present*
MSc - Mechanical Engineering
Addis Ababa Science and Technology University *2013 – 2018*
BSc - Mechanical Engineering

Experience

Graduate Research Assistant, Virginia Tech *May 2023 – Present*

- Implemented a Dockerized simulation environment for ArduPilot SITL, integrated with Flask.
- Built ground and air risk map using Leaflet.js and QGIS for Beyond Visual Line of Sight (BVLOS) simulations.
- Developed and deployed flight management software adhering to Association for Uncrewed Vehicle Systems International (AUVSI) standards, incorporating flight requests, pre/post-flight procedures, and safety reporting system.

Line Process Engineer, Coca Cola Beverages *June 2003 – Aug 2003*

- Designed and implemented an optimized level control system for the fuel tank and condensed water return tank of an 8-ton boiler, in compliance with ISO 12100 standards for machinery safety and risk reduction. Achieved enhanced operational efficiency, improved safety measures, and generated annual cost savings of $12,000.
- Optimized Overall Equipment Efficiency (OEE) by understanding machine structures, detecting abnormalities, and conducting Root Cause Analysis (RCA) using SAP.
- Maintained 90% Machine Efficiency (ME) and 85% Unconstrained System Line Efficiency (USLE) ensuring operational reliability.
- Ensured compliance with Safety, Health, Environment, and Quality (SHEQ) standards.

Skills

Software: Python, C++, MATLAB, ROS, Flask, Docker, OpenCV, SolidWorks, QGIS, SAP
Hardware: Raspberry Pi, STM32, Arduino, Vicon motion capture, 3D Printing
Certifications: Part 107, SolidWorks Associate (CSWA)
Selected coursework: Applied Linear Control, Computer Vision, Advanced Mechatronics

Projects

Vicon Motion Capture for Indoor Flight

- Conducted system calibration to minimize tracking errors, ensuring millimeter accuracy in position estimation.
- Implemented an Extended Kalman Filter (EKF) for sensor fusion enabling precise position and altitude estimation.
- Deployed ROS nodes on a Raspberry Pi companion computer to handle communication between the motion capture system and Pixhawk flight controller.

Full State Feedback Control Using Pole Placement

- Optimized system dynamics using pole placement techniques, ensuring stable descent.
- Developed closed-loop control using Linear-Quadratic Regulator (LQR) and Luenberger Observer for accurate trajectory tracking with 5% settling time in 3 seconds in MATLAB.

Flood Mapping, Search and Rescue Operation Using S500 Drone

- Mapped areas prone to flood hazards using aerial imagery processed in QGIS.
- Designed a gripper in SolidWorks to be mounted on S500 drones for delivering lifesaving vests.

Publications

- D. Aggarwal, **S.T. Anshebo**, K. Kochersberger, A.L. Abbott. "Comparative Study of Vision-Based Methods for Real-Time Traffic Monitoring" *XPONENTIAL 2024 Conference*, pp. 68–79. DOI: 10.52202/075106-0004.
- **S.T. Anshebo**, K. Kochersberger. "Beyond Visual Line of Sight Drone Simulator with User-Defined Risk Layers" *SPIE Defense+Commercial Sensing* (Accepted).

Leadership

- Managed financial records and ensured all accounts and records adhered to school and ASME policies.