David Aviles

avile040@umn.edu   Minneapolis, MN, 55428

Professional Summary

Recent Robotics MS graduate passionate about building intelligent machines that move effectively in the real world. Hands-on experience developing hardware interfaces and control systems for legged robots, with a focus on bridging the gap between mechanical design and software implementation. Eager to apply my combined knowledge of C++, Python, and ROS to contribute to cutting-edge humanoid robotics development.

Education

University of Minnesota Twin Cities   **Minneapolis, MN**
College of Science and Engineering | Master of Science in Robotics   *August 2022 – October 2024*
- Cumulative GPA: 3.4

University of Minnesota Duluth
College of Science and Engineering | Bachelor of Science in Mechanical Engineering   *August 2019 – May 2021*
Minor – Electrical Engineering | Cumulative GPA: 3.5 – Dean's List

Skills and Interests

- **Programing languages**: C++, Python, MATLAB
- **Design Tools**: SolidWorks, Onshape, Fusion360, ANSYS FEA
- **Version Control & Collaboration**: Git, GitHub, GitLab CI
- **Operating systems**: Linux(Ubuntu), ROS and ROS2
- **Computer vision and Machine Learning:** OpenCV, Open3D, COLMAP, Keras-Tensorflow
- **Simulation Environments**: RoboDK, Gazebo, Rviz, Issac Sim

Relevant Experience

University of Minnesota - Agricultural Quadruped Robot   **Minneapolis, MN**
Research Assistant   *June 2021 – Current*
- Developed a C++ hardware interface for a 12-DOF quadruped robot that interprets CAN bus messages for locomotion control
- Implemented multi-threading in C++ to significantly reduce motor command latency, resulting in synchronized leg movement and improved stability
- Engineered a real-time control system using ROS and CAN communication protocols to manage 12 independent motors
- Successfully deployed and field-tested in diverse agricultural environments including corn, alfalfa, wheat, and grass fields
- Developed and integrated a ROS-based motion control interface utilizing CAN communication protocols to orchestrate precise control of 12 independent motor systems

University of Minnesota - Teaching Assistant   **St Paul, MN**
Teaching Assistant   *October 2022 – December 2023*
- Instructed and mentored 30 undergraduate students in advanced process control and instrumentation principles
- Facilitated laboratory sessions on sensor integration and circuit design using C++ for real-time control applications
- Guided students in implementing automated control systems for real-world applications, including traffic signal control and irrigation management systems.

Technical Projects

Robotics – Flashlight assembly with UR Cobot 6DOF robot arm   *February 2024 – May 2024*
- Programmed a Universal Robots 6DOF arm in Python to perform precision assembly tasks
- Implemented robust error handling and recovery mechanisms to ensure consistent performance
- Simulated and optimized motion paths using RoboDK to reduce assembly time by 30%

Robotics – Computer vision tool arrangement with a UR Cobot 6DOF robot arm   *February 2024 – May 2024*
- Trained a model with deep learning to recognize different types of tools using TensorFlow, Pytorch and Keras's CNN
- Applied OpenCV for image processing the images to be used for training
- Classified the tools by taking an image and then using the correct label of the trained model
- Automated robot arm to move the tool in question to the correct bin and sort all tools present in table

Mechatronics – Fetchbot, tracking robot with UWB   *September 2023 – December 2023*
- Built a tracking robot with embedded systems integration and motor control
- Developed real-time position tracking algorithms using triangulation and sensor fusion
- Implemented networking protocols for communication between robot components