Léo Gustavo Vailati

+1-573-560-0238 | leovailati@gmail.com | Hudson, OH, USA

EDUCATION

Vanderbilt University, Nashville, TN   **GPA 4.0/4.0**   Aug. 2023
Ph.D. in Electrical Engineering,
M.S. in Electrical Engineering

Federal University of Santa Catarina, Florianópolis, Brazil   **GPA 8.7/10.0**   Sept. 2015
B.S. in Control and Automation Engineering

RESEARCH EXPERIENCE

Vanderbilt University, Nashville, TN   Aug. 2017 – Aug. 2023
Center for Rehabilitation Engineering and Assistive Technology / Center for Intelligent Mechatronics
Graduate Research Assistant

- Proposed, developed, and demonstrated a control methodology to optimize energy regeneration in an above-knee prosthesis while providing the user with adequate walking behavior
- Developed and assembled embedded system for an above-knee prosthesis (torque control in a BLDC motor, operation of solenoid clutches, and measurement of IMU, encoders, and load cell sensors)
- Created a control technique that intrinsically guarantees passive behavior in DC motors while enabling accurate torque control; approach can be extended to provide asymmetric behavior to direction of rotation
- Developed and tested walking and stair controllers for a fully-powered above-knee prosthesis
- Investigated biomechanics of stumble events with machine learning classification techniques to identify most relevant features involved in recovery strategy selection
- Developed and validated real-time algorithm to estimate air consumption and actuator motion in industrial pneumatic systems based on pressure sensing at the valve

Federal University of Santa Catarina, Florianópolis, Brazil   Mar. 2011 – Sept. 2015
Metrology and Automation Laboratory
Undergraduate Research Intern

- Developed machine vision technique with telecentric lens for inspection of induction motors in a production line of Whirlpool refrigeration compressors
- Participated in the electronic design and was responsible for assembly and programming of a signal acquisition system controlled by FPGA
- Developed image processing and networking software for a novel duct inspection apparatus for Petrobras

PROFESSIONAL EXPERIENCE

Parker Hannifin - Human Motion and Control, Cleveland, OH   Mar. 2022 – Dec. 2022
Ekso Bionics, Cleveland, OH   Dec. 2022 – Present
Senior Systems Engineer

- Developed embedded software for the Indego exoskeleton and the Nomad powered orthosis
- Improved performance of the low-level motor control subsystems in the Indego exoskeleton
- Improved walking speed adaptability and step initiation in the Nomad orthosis
- Created and executed software testing protocols for a 510(k) submission
- Contributed with the development of multiple auxiliary software units and systems used in production

Custom Technologies, St. Louis, MO   Nov. 2017 – Dec. 2021
Engineering Consultant

- Programmed and interconnected industrial PLC, robotic manipulator, and HMI for production cell automation for medical device manufacturer
- Designed and installed electrical and pneumatic subsystems of production cell
- Developed software solutions for data capture (local and cloud databases) and report generation

Nexmatix LLC, St. Louis, MO   Feb. 2016 – Jul. 2017
Automation Engineer
- Was responsible for IIoT prototype and demonstration, including development of custom hardware and software across multiple levels of abstraction:
  - Embedded software for the company's smart pneumatic valve with fault detection system
  - Custom single-wire serial bus for communication between the valves and manifold
  - Electronics and embedded software for valve manifolds: WiFi and cellular versions were tested and demonstrated to potential customers and investors
  - Custom backend software deployed on the cloud to collect data from the valves
  - Web dashboard frontend to display the collected data in real-time
- Built the production test bench with PLC (ladder logic) and HMI
- Developed applications for valve production line, integrating product serialization, testing, and shipping
- Was responsible for IT infrastructure, services, and support

Federal University of Santa Catarina, Florianópolis, Brazil

Vibration and Acoustic Laboratory   Aug. 2014 – Apr. 2015
Control and Automation Consultant
- Specified, procured, and installed instrumentation for the automation of a pneumatic system for near sound speed aerodynamic analysis for Embraer
- Developed LabVIEW software to remotely operate test facility and wrote the user manual
- Implemented controllers to regulate air pressure and maintain jet velocity

University IT Department   Dec. 2009 – May 2011
Intern
- Participated in major upgrade to the university's network backbone
- Administration of network services with Linux and Windows servers

PUBLICATIONS

Vailati, L. G., Goldfarb, M. (2023). On the Benefits and Limitations of Modulated Damping with Passive Motor Control. Journal of Dynamic Systems, Measurement, and Control; 145(6)

Culver, S., **Vailati, L. G.**, Goldfarb M. (2022). A Power-Capable Knee Prosthesis with Ballistic Swing-Phase. IEEE Transactions on Medical Robotics and Bionics; 4(4): 1034-1045

Vailati, L. G., and Goldfarb, M. (2022). "On Using a Brushless Motor as a Passive Torque-Controllable Brake." ASME. J. Dyn. Sys., Meas., Control; 144(9): 091001

Eveld, M. E., King, S. T., **Vailati, L. G.**, Zelik, K. E., Goldfarb, M. (2021). On the Basis for Stumble Recovery Strategy Selection in Healthy Adults. Journal of Biomechanical Engineering; 143(7): 071003

Vailati, L. G., Goldfarb, M. (2020). A Method for Mass Flow and Displacement Estimation in a Pneumatic Actuation System Using Valve-Based Pressure Sensing. IEEE/ASME Transactions on Mechatronics.

Vailati, L. G. (2016). Development of machine vision system for measurement of airgap in induction motors. Universidade Federal de Santa Catarina *(undergraduate thesis)*

SUMMARY OF SKILLS

Electronics: PCB design, manufacturing, and assembly (Altium, Eagle), embedded software development (Microchip PIC12, 16, 32, and dsPIC, Cypress PSOC 4, Arduino), FPGA (Cyclone III, VHDL), BLDC motor control

Software Development: C, C#, numerical computing (MATLAB, Simulink), version control (GIT), desktop user interfaces (Windows Forms), databases (Microsoft SQL Server, SQLite)

Automation: programming and installation of PLC and HMI systems (Ladder logic, Allen-Bradley CompactLogix, Micro800, Panel View), bench automation and process control with LabVIEW

Languages: English (fluent), French (basic level), Brazilian Portuguese (native)

AWARDS

Brazil Scientific Mobility Program (*Ciência sem Fronteiras*) Aug. 2012 – Jul. 2013
Awarded scholarship by the Brazilian government for one academic year as a non-degree seeking student at the University of Kansas in Lawrence, KS. Focus: Computer Engineering.