

LUCAS SCHULZE

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Summary

Master in Electrical Engineering, passionate about robotics. Experience with robotics control, model predictive control, robust control, systems modeling, applied electronics, and embedded systems. Worked with development of Autonomous Mobile Robots (AMRs) at industry. Research focus on predictive control applied to robotics.

Work Experience

System Analyst – 06/2020 to 07/2021**Pollux Automation**, Joinville, Brazil

- Conducted experiments on real robot prototype for software validation.
- Developed Navigation and Autonomous Docking systems with ROS.
- Hired to continue the project development from a partnership with UDESC.

Robotics Software Developer - 01/2020 to 04/2020**Pollux Automation and UDESC Partnership**, Joinville, Brazil

- Developed an AMR on Gazebo Simulator using ROS Control and ROS Navigation Stack.
- System Architecture for management of Mission and Tasks.
- Leader of the UDESC's software team.

Intern at IT team focus on technology innovation - 08/2019 to 12/2019**WEG**, Jaraguá do Sul, Brazil

- Implemented a facial biometric system with OpenCV and Deep Learning for a Manufacturing Execution System.
- Study of operating systems for IoT Gateways.

Education

Master Degree in Electrical Engineering – concluded in 01/2022

Universidade do Estado de Santa Catarina – UDESC, Joinville, Brazil

Bachelor Degree in Electrical Engineering – concluded in 2019

Universidade do Estado de Santa Catarina – UDESC, Joinville, Brazil

Score 9.2/10.0

Technical course in Electro-electronics Int. with High School – concluded in 2014

Instituto Federal de Educação, Ciência e Tecnologia de Santa Catarina – IFSC, Joinville, Brazil

Academic Experience

Master Thesis: **Stochastic Model Predictive Control for Dynamic Locomotion of Legged Robots**

Advisor: Douglas Wildgrube Bertol

02/2020 to 01/2022

- Evaluated MPC and SMPC for legged locomotion on rough terrains.
- Partnership between Instituto Italiano di Tecnologia (IIT) and UDESC to work with HyQ quadruped robot.

Undergraduate Thesis: **Offline Model Predictive Control applied to Robotic Systems**

Advisor: Douglas Wildgrube Bertol

08/2018 to 07/2019

- Implemented algorithms to generate the Explicit MPC by the multiparametric approach.
- Proposed a new algorithm to decrease by half the computational time of Explicit MPC.
- Compared the computational cost of Explicit MPC and MPC to control a quadcopter in Gazebo Simulator with ROS running in a Raspberry Pi.
- Resulted in a conference paper and a journal paper.

Research Project: **Development of a base computational system for navigation and control of UAVs**

Advisor: Douglas Wildgrube Bertol

01/2017 to 07/2018

- Developed a predictive controller to a quadcopter in the Gazebo Simulator.

PET Electrical Engineering of UDESC

Coordinator: Mariana Santos Matos Cavalca

01/2017 to 07/2018

- Developed education, research, and extension activities, among them were workshops about technology and lessons about programming in public schools of Joinville.
- Organized and conducted the development of the strategic planning for years 2018-2019.

GERM – Student Group of Mobile Robotics

05/2015 to 07/2017

- Developed robots for competitions: line follower, micromouse, and sumo robots.
- Lead the team to participate with 7 robots in the biggest America Latina competition.
- Migrated the microcontroller board platforms from Arduino to STM32 family.

Teaching

Udemy Course: **Introdução ao Robot Operating System (ROS)**

- Introduction course addressing the basic concepts of ROS: setup, ROS environment, nodes, topics, services, and launch files.
- First course about ROS in Portuguese.

Honors and Awards

- Academic Honor for highest score among all engineering classes of 2019/2 at UDESC.
- Gold and Bronze Medal at UDESC Programming Contest of 2017 and 2016, respectively.
- Bronze Medal at 10th, 9th and 8th Brazilian Mathematics Olympiad of Public Schools - OBMEP of 2014, 2013 and 2012, respectively.

Publications

- Schulze, L., Bertol, D. W., and Raffo, G.V.. **Fast computation of binary search tree for PWA functions representation using intersection classification**, Automatica, 141, 2022.

- Schulze, L., Bertol, D. W., and Sebem, R.. **Conventional and Explicit MPC Applied to Robotic Systems: a Computational Cost Evaluation**, in Proc. 29th Mediterranean Conference on Control and Automation - MED, pp. 861-866, 2021.
- Schulze, L., Sebem, R., and Bertol, D. W.. **Performance of PSO and GWO Algorithms Applied in Text-Independent Speaker Identification**, in Proc. 15th Brazilian Congress on Computational Intelligence - CBIC, 2021.
- Schulze, L., Ijuim, F. K., and Dezuio, T. J. M.. **Controle LFR Discreto de Quadrirotores usando o Framework ROS**, in Proc. 14th Brazilian Symposium on Intelligent Automation - SBAI, 2019.

Languages and Skills

- Portuguese: native language.
- English: excellent reading, good speaking, and writing.
- German: basic reading, speaking, and writing.
- Teamwork and Leadership.
- Experience with engineering software, such as Matlab, Proteus, PSpice, and SolidWorks.
- Experience with robotics software, such as ROS1, ROS2, and, Gazebo.
- Competent in C, C++, and Python programming languages.
- Competent in Microcontroller programming (STM32, Atmel, Freescale).
- Git Version Control and Jira.