europass Curriculum vitae

PERSONAL INFORMATION

Donald Selmanaj

Sheshi “Nënë Tereza”, Nr. 4, Tiranë, Shqipëri

donald.selmanaj@fie.upt.al

Gender Male | Date of birth 10 May 1987

Nationality Albanian

PROFESSIONAL EXPERIENCE

March 2017 – Present — Lecturer

Department of Automation, Polytechnic University of Tirana, Tirana, Albania

Involved in teaching and research in the oldest technical university in Albania.

January 2016 – February 2017 — Postdoctoral Researcher

Institute for Dynamic Systems and Control, ETH, Zürich, Switzerland

Studying advanced control algorithms for knock control in internal combustion engines. The study spans from model-based control techniques to stochastic techniques and rule based algorithms. Focus is paid to limiting the knock phenomenon while maximizing engine efficiency. The research is part of the Hercules–2 project funded from the European Union’s Horizon 2020 research and innovation programme.

EDUCATION

2012 – 2015 — PhD - Information Technology

University	Politecnico di Milano, Milano, Italy
Area	Systems and Control
Thesis title	“Inertial Measurement Based Wheeled Vehicle State Estimation”
Advisor	Sergio M. Savaresi
Co-advisor	Matteo Corno

2009 – 2012 — Master of Science in Automation Engineering

University	Politecnico di Milano, Milano, Italy
Thesis title	“Dynamics of over-actuated Wheeled Vehicles”
Advisor	Sergio M. Savaresi
Co-advisor	Matteo Corno
Final grade	110/110 cum Laude

2006 – 2009 — Bachelor of Science in Automation Engineering

University	Politecnico di Milano, Milano, Italy
Thesis title	“Modelling of a back-injection laser for blood speed measurement”
Advisor	Prof. Michele Norgia
Final grade	106/110

2001 – 2006 — High School diploma

School	ITIS Galileo Galilei, Gioia del Colle, Italy
Specialism	Technical institute with specialism in Computer Science
Final grade	100/100

PUBLICATIONS ON INTERNATIONAL JOURNALS

[1] Donald Selmanaj, Giulio Panzani, Stijn van Dooren, Jonatan Rosgren and Christopher Onder. "Adaptive and Unconventional Strategies for Engine Knock Control". *IEEE Transactions on Control System Technology*, ISSN: 1063-6536, doi: 10.1109/TCST.2018.2827898.

[2] Pau Bares, Donald Selmanaj, Carlos Guardiola, Christopher Onder. "A new knock event definition for knock detection and control optimization". *Applied Thermal Engineering*, Volume 131, 25 February 2018, pp. 80-88, ISSN: 1359-4311, doi:10.1016/j.applthermaleng.2017.11.138.

[3] Pau Bares, Donald Selmanaj, Carlos Guardiola, Christopher Onder. "Knock probability estimation through an in-cylinder temperature model with exogenous noise". Mechanical Systems and Signal Processing, Volume 98, 1 January 2018, Pages 756-769, ISSN 0888-3270, https://doi.org/10.1016/j.ymssp.2017.05.033.

[4] Donald Selmanaj, Matteo Corno, Giulio Panzani and Sergio M. Savaresi. "Vehicle sideslip estimation: A kinematic based approach". Control Engineering Practice, Volume 67, 2017, Pages 1-12, ISSN 0967-0661, http://dx.doi.org/10.1016/j.conengprac.2017.06.013.

[5] Donald Selmanaj, Matteo Corno and Sergio M. Savaresi. "Hazard Detection for Motorcycles Via Accelerometers: A Self-Organizing Map Approach". *IEEE Transactions on Cybernetics*, Volume 47, November 2017, pp. 3609-3620, ISSN: 2168-2267, doi: 10.1109/TCYB.2016.2573321.

PUBLICATIONS ON INTERNATIONAL CONFERENCES

[1] Donald Selmanaj, Matteo Corno and Sergio M. Savaresi. "Friction State Classification Based on Vehicle Inertial Measurements", *Advances in Automotive Control - 9th AAC 2019*. Orléans, France, June 24-27 (submitted).

[2] Giulio Panzani, Olga Galluppi, Donald Selmanaj, Sergio Savaresi, Jonatan Rösgren and Christopher H. Onder. "Engine knock margin control using in-cylinder pressure data: preliminary results". *2017 IEEE Conference on Decision and Control (CDC)*. Melbourne, Australia, December 12-15, pp. 256-261, doi: 10.1109/CDC.2017.8263675.

[3] Denis Panxhi, Donald Selmanaj, Matteo Corno, Fabio Todeschini, Sergio Savaresi, Aida Spahiu and Orion Zavalani. "Analysis of a Vibrotactile Actuator for Bicycle Handlebars". *International Conference on Smart Systems and Technologies 2017*. Osijek, Croatia, October 18-20.

[4] Donald Selmanaj, Matteo Corno, Giulio Panzani and Sergio Savaresi. "Robust Vehicle Sideslip Estimation Based on Kinematic Considerations". *IFAC 2017 World Congress*. Toulouse, France, July 9-14, pp. 14855-14860. doi:10.1016/j.ifacol.2017.08.2513

[5] Aida Brankovic, Jacopo Guanetti, Donald Selmanaj and Alberto Leva. "Applying simple PID tuning rules with extended frequency response knowledge". *2016 IEEE Conference on Decision and Control (CDC)*. Las Vegas, USA, December 12-14, pp. 7573-7578. doi: 10.1109/CDC.2016.7799439.

[6] Donald Selmanaj, Matteo Corno and Sergio M. Savaresi. "Accelerometer-based Data-driven Hazard Detection and Classification for Motorcycles". *2014 European Control Conference (ECC)*. Strasbourg, France, June 24-27, pp. 1687-1692. doi:10.1109/ECC.2014.6862549.

[7] Paolo Giani, Mara Tanelli, Sergio M. Savaresi and Donald Selmanaj. "Electro-mechanical clutch-by-wire control for sport motorcycles". *2014 European Control Conference (ECC)*. Strasbourg, France, June 24-27, pp. 1011-1016. doi:10.1109/ECC.2014.6862513.

[8] Donald Selmanaj, Harald Waschl, Michael Schinnerl, Sergio M. Savaresi and Luigi del Re. "Dynamic Injection Adaption by Input Shaping for Low NOx Emissions during transients". *SAE 2014 World Congress & Exhibition*. Detroit, Michigan, USA, April 8-10. doi:10.4271/2014-01-1161.

[9] Donald Selmanaj, Matteo Corno, Olivier Sename and Sergio M. Savaresi. "Advantages of rear steer in LTI and LPV vehicle stability control". *2013 IEEE Conference on Decision and Control (CDC)*. Florence, Italy, December 10-13, pp.3523-3528. doi:10.1109/CDC.2013.6760424.

PATENTS

[1] Sergio Savaresi, Matteo Corno, Donald Selmanaj, Giulio Panzani, Christian Girardin, Giovanni Bussalai. "Method for estimating a vehicle side slip angle, computer program implementing said method, control unit having said computer program loaded, and vehicle comprising said control unit". International patent, WO2016062327 A1, https://www.google.com/patents/WO2016062327A1?cl=en.

TEACHING EXPERIENCE

2017 – present

Responsible Lecturer - Polytechnic University of Tirana

[1] Fundamentals of Automatic Control - undergraduate (B.Sc.) course

[2] Electrical Applications - graduate (M.Sc.) course

[3] Industrial Communication Systems - graduate (M.Sc.) course

2013 – 2015

Teaching assistant - Politecnico di Milano

[1] Model Identication and Data Analysis - graduate course (M.Sc.) - taught in English

[2] Control Systems for Aeronautics - graduate course (M.Sc.) - taught in Italian

[3] Fundamentals of Control Systems - undergraduate course (B.Sc.) - taught in Italian

INTERNATIONAL EXPERIENCE

April 2013 – October 2013

Visiting PhD

University Johannes Kepler University, Linz, Austria

Department Institute for Design and Control of Mechatronical Systems

November 2011

Visiting Scholar

University Ecole Nationale Des Ponts et Chaussees, Paris, France

Course on Passive safety in Automotive

September 2010 – December 2010

Exchange Semester

University Oulu University, Oulu, Finland

ERASMUS student exchange programme.

MAIN PROJECTS

January 2016 – February 2017

Knock Control Strategies for Spark Ignited Engines

The project is part of HERCULES-2, the next phase of the R&D programme HERCULES on large engine technologies jointly funded by the E.U. and Swiss Government. The project is targeting at a fuel flexible large marine engine, optimally adaptive to its operating environment. Engine design and development is a multi-disciplinary activity involving thermo-fluids, combustion, mechanics, materials, dynamics and control. Improved engine performance, operational optimization, health monitoring and adaptive control over the lifetime of the powerplant, are further R&D issues to ensure lifelong reliability and economy.

The phenomenon of knock is a major limitation for SI engines. Knock has its name from the audible noise that results from autoignitions in the unburned part of the gas in the cylinder and causes undesired pressure oscillations in combustion chamber. In order to avoid knock, the engine has to be run in a sub-optimal way with respect to efficiency. Closed-loop knock control systems acting on spark timing are crucial in order to maximize the engine efficiency while limiting the knock rate. The main challenge with knock control systems is the stochastic nature of the phenomena, making it difficult the application of classical model-based control techniques.

December 2014 – January 2015

Tire grip detection for four-wheeled vehicle

The aim of the project is the discernment of low grip from high grip road surfaces. The estimate is based on inertial measurements and is independent from vehicle parameters. The challenges for grip estimation applications are the estimation convergence speed and the system excitation. Typical vehicle inertial measurements are affected by unknown and undesired disturbances such as gravity, road banking and road profile. A reliable estimate requires exciting running conditions as well as large amount of sampled data to overcome the disturbances. The proposed solution is based on the RLS estimation algorithm. The RLS algorithm is modified to have the possibility to add a bias to the estimate, which is managed with a bistable logic. The solution allows the reduction of disturbance and a faster grip transition estimate.

December 2013 – March 2015

Sideslip estimate of four-wheeled vehicles

Sideslip angle estimate is crucial for vehicle stability control. The proposed solution is based on the kinematic approach and has the advantage of being independent from vehicle parameters and road surface conditions. The proposed technique is composed of three main parts: an algorithm for the vehicle longitudinal velocity estimate, an algorithm for the online estimate of the sensor offsets and a non-linear state observer (with Lyapunov-like proven stability) for the estimate of the sideslip angle. The proposed observer was tested on experimental data, showing satisfactory result for different running conditions and vehicles.

April 2013 – October 2013

NOx reduction for IC engines

The main influence factors for Diesel engines pollutants (NOx and PM) are the in-cylinder oxygen concentration and the injected fuel amount. During transient maneuvers the engine optimal set-up may differ from static maps (optimized on test-benches), leading to undesired emission peaks. In this work, instead of the common way to address the air system, the fuel system is considered to reduce emission peaks. The idea is to adapt the injection parameters, start and amount of pilot and main injection. To this end, an input shaping technique is applied. The input shaping is based on an identified response model of the transient emission profile and used to generate a desired correction trajectory. By input shaping it was possible to reduce the NOx overshoot during the transient scenario while maintaining PM emissions and noise level.

December 2012 – April 2013

Crash identification for motorcycles

Developed in collaboration with, the work dealt with collision and hazard detection for motorcycles via accelerometer measures. For this kind of vehicle the most difficult challenge is to distinguish the situations due to road's anomaly from real hazards. This is usually done by setting absolute thresholds on the accelerometer measurements. These thresholds are heuristically tuned from expensive crash tests. This empirical method is expensive and not intuitive when the number of signals to deal with grows. In this work, a method based on self-organized neural networks has been proposed. The algorithm can deal with a large number of signals from different types of sensor such as accelerometer and gyro measurements. The proposed approach is capable of recognizing dangerous states although no crash test is needed for tuning. This work was focused on an airbag deployment application, nevertheless the method is suitable for different uses.

October 2011 – July 2012

4WD/4WS vehicle modeling

The project, developed in collaboration with *Fastom*, was focused on building, modelling and analysis of a scaled over-actuated fully-electric vehicle. The vehicle was equipped with four driving and steering wheels. The project involved two parts: a practical one concentrated on the system set-up and integration and a methodological one focused on the analyses of the over-actuation capabilities.

PERSONAL SKILLS

Mother tongue: Albanian, Italian

Other Languages: English, very good knowledge (Toefl iBT and Toeic)

Computer skills
- competent with most Microsoft Office programmes
- MATLAB, Simulink, INCA
- CarSim, BikeSim
- dSpace, Micorchip, Arduino

Main PhD subjects attended
- Microcontrollers: Hardware, Firmware and Software Design
- Control and Grid Integration of Renewable Energy Sources
- Techniques for Industrial PID Autotuning
- Model Predictive Control
- Hybrid Systems

ADDITIONAL INFORMATION

Driving licence B

Waiver Authorization to personal data storage according to Albanian Law 9887/2008.