

CARLOS VILLEGAS, Ph.D., M.Sc., M.Eng.

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Date of birth: 16-Dec-1978

Nationality: Irish (EU)

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Proactive and multi-lingual senior manager with business development, team leadership, marketing, and project management experience. Expertise in control engineering, embedded systems, electrical engineering, and power electronics.

WORK EXPERIENCE

- Jan 2019 –
to-date
- Speedgoat GmbH (Bern, Switzerland)**
Electrification Industry Manager
- Business development of products for electrification markets including power electronics, battery management systems, motor control and power systems
 - Writing whitepapers, scientific articles, and recording training videos
 - Generate new hardware demonstrations on machine learning, motor control, power electronics, and power systems simulations
 - Specification of new products and establish collaboration partnerships with third-party companies
- Oct 2016 –
Dec 2018
- Speedgoat GmbH (Bern, Switzerland)**
Marketing Manager and Team Leader
- Responsible for global marketing activities of leading provider of real-time hardware for MATLAB/Simulink
- Coordinate online marketing campaigns and paid advertisement (remarketing, display, search, and social media campaigns)
 - Coordinate integration of product interface with MathWorks products (MATLAB/Simulink)
 - Manage the design and deployment of a new company website
 - Creation of technical content on real-time applications (industrial protocols, I/O interfaces)
 - Create real-time hardware demonstrations from functional specification to final production
- Sep 2015 –
June 2016
- Exergyn Limited (Dublin, Ireland)**
Senior Electrical & Controls Engineer
- Developed a product that can reduce global carbon emissions by producing electricity from waste heat using shape memory alloys. I was responsible for the design and development of the electrical and control systems of our waste-heat engine. My main responsibilities included:
- Lead the electrical and controls team from concept to production;
 - Design and development of electrical and control systems for a hydraulic transmission;
 - Grid connection of prototypes and production engines;
 - Design and development of microcontroller-based control systems;
 - Implementation of design standards and practices including adherence to grid codes and European Standards;
 - Specification, design and development of test-rigs involving electromechanical actuators, chillers, gas boilers, as well as low and high pressure hydraulics.
- Oct 2012 –
Aug 2015
- OpenHydro Technology Limited (Greenore, Ireland)**
Research and Development Engineer
- Offshore system identification of turbine and power conversion;
 - Development in C and Labview of embedded systems for offshore testing;
 - Developing a database for R&D electrical tests;

- Development of a tidal time-domain simulation from water to grid in Matlab-Simulink and Simpowersystems;
- Development of a Hardware-in-the-Loop test-rig for tidal energy applications;
- Commissioning of offshore power conversion systems;
- Experimental validation of new power conversion systems at suitable scales;
- Fault-detection for generator and electrical installation.

Jan 2009 –

Oct 2012

Wavebob Limited (Maynooth, Ireland)

Simulation Manager

- Management of R&D engineers and contractors;
- Responsible for R&D and simulation of the Wavebob core technology;
- Responsible for two tank testing campaigns (single and array of devices);
- Responsible for innovation and intellectual property;
- Development of non-linear real-time simulation of wave energy converter including moorings, Power take-off (PTO) and control;
- Project management of wave energy converter with electrical PTO system;
- Coordinate and act as control engineer in development of new electrical generator with academic institution (€ 293 000 project granted in 2010);
- Collaboration in grant preparation such as economical optimization of a wave energy converters (€ 197 000 project granted in 2010), PTO development (\$2.4m granted by US in 2010) and hydrokinetic devices;
- Develop and test control systems to test hydraulic and electrical systems using Hardware in-the-Loop;
- Modeling of wave resource and reliability analysis of WECs.

EDUCATION

Nov 2004 –

Mar 2009

Ph.D. in Control Engineering

Hamilton Institute at NUI Maynooth (Co. Kildare, Ireland)

Development and testing of Integrated Controllers for passenger vehicles in collaboration with DaimlerChrysler as part of the EU project CEMACS; development of Decentralized Control Methodology based on Passivity; design of Adaptive Active Suspension design with decoupled Comfort and Handling; rear-wheel Steering Application to increase Safety and Handling.

Continuous experimental tests with two vehicles in DaimlerChrysler, Germany.

Sep 2002 –

Aug 2004

M.Sc. in Mechatronics

CINVESTAV-IPN (Mexico City, Mexico)

Stochastic dynamic systems, system identification, non-linear control, linear control, discrete event systems, real-time programming, among others.

Diplomarbeit / Master Thesis project at DaimlerChrysler (9-months), Germany on active suspension control and its interaction on steering (via warp) and vehicle stability (ESP).

Sep 1997 –

May 2002

M.Eng. in Mechanical-Electrical Engineering

ITESM – Campus Ciudad de México (Mexico City, Mexico)

Electronics, power electronics, CAD, control systems, materials science, manufacturing, machine design, mechanical vibrations, power systems.

1-year exchange at EPF – École d'Ingénieurs (Sceaux, France)

Stage de fin d'études / Master Thesis project at Bureau Veritas (Paris, France) on the rules for fatigue strength of welded ship structures.

SOFTWARE

Modelling and control:

Simulink, Simscape Electrical, Simulink Real-Time, HDL Coder - *expert*

Labview – *expert*

Computer languages:MATLAB – *expert*C, python – *advanced*Perl, SQL/sqlite – *intermediate***CAD/CAM/CAE:**Solidworks Electrical – *advanced*Solidworks 3D – *advanced*ProEngineer - *intermediate*LANGUAGES

English	proficiency speaking, reading and writing
German	fluent (C1-level) speaking, reading and writing
French	fluent speaking and reading. Intermediate writing
Spanish	mother tongue

PATENTS AND LICENSES

2008	Villegas, C. “Method and System For Providing A Text Messaging Service”, WO/2010/089642. <u>Patent licensed and used in Facebook application.</u>
2009	Dick, W., C. Villegas, “A wave energy conversion system”, Irish patent No. 85852. Patent granted in several countries.
2010	Dick, W., C. Villegas, “A wave energy conversion system”, British patent No. GB2465642. Patent granted in several countries.
2011	Villegas, C. “A wave energy conversion system”, Patent application GB111502.2.

PUBLICATIONS

Oct 2006	Barreras, M., C. Villegas, M. Garcia-Sanz, and J. Kalkkuhl, “Robust QFT tracking controller for a car equipped with 4-wheel steer-by-wire”, In Proc. of the <i>IEEE International Conference on Control Applications</i> , Munich.
Jun 2007	Villegas, C., D. Leith, R. Shorten, and J. Kalkkuhl, “A disturbance response decoupling controller for emulating vertical dynamics” In <i>IEEE Intelligent Vehicles Symposium IV’07</i> , Istanbul, Turkey.
Jun 2007	Villegas, C., M. Akar, R. Shorten, and J. Kalkkuhl, “A Robust PI controller for Emulating Lateral Dynamics of Vehicles”, In <i>IEEE Intelligent Vehicles Symposium IV’07</i> , Istanbul, Turkey.
Apr 2008	Villegas, C., M. Corless, R. Shorten, M. Readman, and S. Solmaz, “Decentralised control design of lateral and vertical vehicle dynamics using passivity”, In 79th Annual Meeting of the <i>International Association of Applied Mathematics and Mechanics</i> , Bremen, Germany.
Apr 2008	Readman, M. C., M. Corless, C. Villegas, and R. Shorten, “Adaptive road disturbance decoupling for active suspensions”, In 79th Annual Meeting of the <i>International Association of Applied Mathematics and Mechanics</i> , Bremen, Germany.
Jun 2008	Readman, M. C., M. Corless, C. Villegas, and R. Shorten, “Self-tuning for disturbance transmission decoupling in active vehicle suspensions”, In Proceedings of the <i>American Control Conference</i> , Seattle.
December 2009	Readman, M. C., M. Corless, C. Villegas, and R. Shorten, “Adaptive Williams Filters with application to suspension control: the vector case”, In Proceedings of 48 th Conference on Decision and Control , Shanghai, China.
March 2010	Readman, M. C., M. Corless, C. Villegas, and R. Shorten, “Adaptive Williams Filters for Active Vehicle Suspensions”, Transactions of the Institute of Measurement and Control , doi:10.1177/0142331208095430.
Jan 2011	Villegas, C., M. Corless, W. Griggs and R.Shorten, “A passivity based decentralized control design methodology with application to vehicle dynamics control”, ASME Journal of Dynamic Systems, Measurement, and Control .

- Sep 2011 Villegas, C. and Schaaf, H.v.d., “Implementation of a Pitch Stability Control for a Wave Energy Converter”, *European Wave and Tidal Energy Conference 2011*, Southampton.
- Sep 2011 Signorelli, C.D., Villegas, C., Ringwood, J.V., “Hardware-In-The-Loop Simulation of a Heaving Wave Energy Converter”, *European Wave and Tidal Energy Conf. 2011*, , Southampton.
- Sep 2011 Schlemmer, K., Fuchshumer, F., Böhmer, N., Costello, R., Villegas, C., “Design and Control of a Hydraulic Power Take-off for an Axi-symmetric Heaving Point Absorber”, *European Wave and Tidal Energy Conference 2011*, Southampton.
- Dec 2011 Villegas, C., Chow, Y.L., M. Corless, W. Griggs and R.Shorten, “A decentralized control technique for vehicle chassis control”, *In Proc. of IEEE Conference on Decision and Control and European Control Conference*, Orlando, USA.
- March 2012 Schlemmer, K., Fuchshumer, F., Villegas, C., Böhmer, N., Costello, R., “Hydraulic Power Take-off for an Axi-symmetric Heaving Point Absorber”, *8th International Fluid Power Conference (IFK)*, Dresden.
- Nov 2012 Brady, G., O’Loughlin, C., Griffiths, D., Massey, J. and Villegas, C., “Design and construction of a linear switched reluctance generator for use in wave-energy applications”, *International Conference on Ocean Energy 2012*, Dublin.
- Oct 2013 Villegas, C. and Cawthorne, S., “Hardware-in-the-loop testing for tidal energy power conversion”, *IEEE PES European Innovative Smart Grid Technologies (ISGT) Conference 2013*, Copenhagen, Denmark.
- Sep 2018 Carpiuc, S. and Villegas, C., “Real-time position control in permanent magnet synchronous machine drives”, *20th European Conference on Power Electronics and Applications (EPE’18 ECCE Europe)*, Riga, Latvia.
- May 2019 Carpiuc, S. and Villegas, C., “ FPGA-based rapid control prototyping of permanent magnet synchronous motor servo drives ”, *PCIM Europe 2019 International Exhibition and Conference*, Nuremberg.
- July 2020 Carpiuc, S. and Villegas, C., “ Control and FPGA-Based Real-Time Simulation of Grid Side Converters”, *PCIM Digital Days 2020*.
- Sep 2020 Carpiuc, S., Schiesser, M., and Villegas, C., “Current Control and FPGA-Based Real-Time Simulation of Grid-Tied Inverters”, *EPE Digital Days 2020*.

HOBBIES

Swimming, cycling, medieval history.