

Miguel Campusano

Ph.D. in Computer Sciences

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I am a postdoctoral researcher in the Unmanned Aerial System Center (UAS Center) of the University of Southern Denmark since March 2020.

My research interests include software engineering, software visualization, software testing and programming environment applied to cyber-physical systems, in particular, mobile robots and aerial robots (drones, UAS).

I am interested in improving the way we build software for robots and drones. This includes the way of how we test and validate these software and how developers interact with the software and the systems.

STUDIES

- 2014 - 2020 **Ph.D. in Computer Science**, *Computer Science Department*, University of Chile, Web Page: <http://www.dcc.uchile.cl/doctorado>.
Graduation: April 17, 2020 Thesis: Mapping State Machines to Developers' Mental Model: Fast Understanding of Robotic Behaviors in the Real World.
I explored the concepts of meaningful feedback and live programming for robotic behaviors. I built two artifacts to validate both concepts: VizRob and LRP. I designed and conducted a case study for VizRob and a controlled experiment for LRP.
- 2007 - 2013 **Computer Engineering**, *Computer Science Department*, University of Chile, Web Page: <http://www.dcc.uchile.cl>.
Graduation: June 26, 2013 Thesis: The Friendly Aspect Language: Casper.
Casper is an aspect oriented language for Pharo Smalltalk with a focus on speed at run-time.

PUBLICATIONS

- 2021 **Fuzz Testing in Behavior-Based Robotics.**
Rodrigo Delgado, Miguel Campusano, Alexandre Bergel
2021 IEEE International Conference on Robotics and Automation (ICRA), 2021 (Leading conference in robotics).
- Towards a Service-Oriented U-Space Architecture for Autonomous Drone Operations, Tool Paper.**
Miguel Campusano, Kjeld Jensen, Ulrik Pagh Schultz
3rd International Workshop on Robotics Software Engineering (RoSE), 2021.
- 2020 **Towards Declarative Specification of Multi-Drone BVLOS Missions for UTM, Poster Paper.**
Miguel Campusano, Niels Heltner, Niclas Mølby, Kjeld Jensen, Ulrik Pagh Schultz
Fourth IEEE International Conference on Robotic Computing (IRC), 430-431, 2020.
- 2019 **Live Programming in Practice: a Controlled Experiment on State Machines for Robotic Behaviors.**
Miguel Campusano, Johan Fabry, Alexandre Bergel
Information and Software Technology 108 (IST), 99-114, 2019 (Impact Factor: 2.921).

- VizRob: Effective Visualizations to Debug Robotic Behaviors.**
Miguel Campusano, Alexandre Bergel
Third IEEE International Conference on Robotic Computing (IRC), 86-93, 2019.
- 2017 **Live Robot Programming: The language, its implementation, and robot API independence.**
Miguel Campusano, Johan Fabry
Science of Computer Programming (SCP) 133, 1-19, 2017 (Impact Factor: 0.740).
- 2015 **From Robots to Humans: Visualizations for Robot Sensor Data, NIER Paper.**
Miguel Campusano, Johan Fabry
IEEE 3rd Working Conference on Software Visualization (VISOFT), 135-139, 2015.
- 2014 **Towards Live Programming in ROS with PhaROS and LRP.**
Pablo Estefó, Miguel Campusano, Luc Fabresse, Johan Fabry, Jannik Laval, Noury Bouraqadi
Fifth International Workshop on Domain-Specific Languages and Models for Robotic Systems (DSLRob), 2014.
- Live Robot Programming.**
Johan Fabry, Miguel Campusano
Ibero-American Conference on Artificial Intelligence (IBERAMIA), 445-456, 2014.
- An Interpreter For Live Robot Programming.**
Miguel Campusano, Johan Fabry
33rd International Conference of the Chilean Computer Science Society (JCC-SCCC), 2014.
- Live Programming the Lego Mindstorms.**
Johan Fabry, Miguel Campusano
6th International Workshop on Smalltalk Technologies (IWST), 2014.

PUBLICATIONS IN SPANISH

- 2017 **Aprendizaje Interdisciplinario en Robótica: La Innovadora Experiencia de Duckietown Chile.**
Interdisciplinary Learning in Robotics: The Novel Experience of Duckietown Chile
Matías Mattamala, Gonzalo Olave, Miguel Campusano, Christopher Gómez, Luz Martínez, Pablo Estefó, Joaquin Ugalde, Javier Urrutia, Felipe San Martín, Pablo Zúñiga, Javier Carrasco, Camila Villar, Rocío González
30th Congreso Chileno de Educación en Ingeniería, 2017.
- 2014 **Preparación para Competencia de Programación ACM-ICPC: Experiencia Inicial en Universidad de Chile 2011-2014.**
Training for ACM-ICPC Programming Competition: Initial Experience in the University of Chile 2011-2014
Miguel Campusano, Camilo Garrido, Jorge Pérez, Mauricio Quezada
XVI Encuentro Chileno de Educación Superior en Computación (CCESC), 2014.

TEACHING ACTIVITIES

- 2019 **Artificial Intelligence in Robotics, Teaching Assistant**, Diploma Course, University of Chile, Web Page: <https://www.dcc.uchile.cl/ia>.
Teaching assistant in the artificial intelligence for robotics section of the diploma course of artificial intelligence of the University of Chile.
- 2017 - 2019 **Duckietown Chile, Lecturer**, University of Chile, Web Page: <http://www.duckietown.cl>.
I co-designed and co-taught the Chilean version of the MIT course ‘Duckietown’ (<http://duckietown.mit.edu/>), called Duckietown Chile. Here we taught robotics using self-driving vehicles, but we focused on second year engineering students, unlike the original version that was focused to graduate students.

- 2010 - 2016 **Several Courses, Teaching Assistant**, University of Chile.
Teaching assistant in several courses: Algorithms and Data Structures, Computer Architecture, Programming Languages, Programming Workshop, Project Workshop (Programming with Lego Mindstorm)

ORGANIZATIONAL EXPERIENCE

- 2021 **CUAC nonprofit corporation, Chile**, Web Page: <http://www.ccuac.cl>.
Founding member of CUAC, a nonprofit corporation focused on teaching robotics in Chile.
- 2016 - 2019 **Robotic Community, University of Chile**.
Founding member of the Robotic Community of the University of Chile. In this community we bring together all students in the university that are interested in robotics.
- 2018 - 2019 **Beauchef Robotics Challenge, University of Chile**, GitHub: <https://github.com/BeauchefRoboticsChallenge/>.
Member of the organizing team of the line follower robot competition of the University of Chile: Beauchef Robotics Challenge.
- 2015 **Competitive Programming Training Camp, Valparaiso, Chile**, Web Page: <https://campamento2015.progcomp.cl>.
Member of the organizing team of the First Chilean Training Camp of Competitive Programming (ICPCCL'15). This camp was open for Chilean students to prepare them for the upcoming ACM International Collegiate Programming Contest.
- 2012 - 2015 **Competitive Programming, University of Chile**.
Coach of the university teams that participate in the ACM International Collegiate Programming Contest (ICPC). We won every Chilean competition in this period.

PROFESSIONAL EXPERIENCE

- March 2020 - Present **Postdoctoral Researcher, SDU UAS Center**, https://www.sdu.dk/en/om_sdu/institutter_centre/sduuascenter.
I research how to program high-level missions for Unmanned Aerial Systems (UAS) and software architectures for UAS. This research is done in the context of the HealthDrone project. The goal of this project is to use UAS to transport medical goods (*e.g.*, blood samples) to accelerate medical treatment to patients.
- March 2019 - February 2020 **Robotic Software Engineer, AMTC**, http://www.amtc.cl/?page_id=6095.
I worked in the field robotics laboratory of the Advanced Mining Technology Center, AMTC. I designed, developed and extended libraries to build robotic behaviors using ROS. These libraries had special requirements: remote communication, monitoring and human in the loop interaction. I also designed and developed GUIs for robot operators.
- January 2018 - January 2019 **Full-Stack Developer, LaBot**, <http://www.labot.cl>.
I developed a bot for Telegram and Facebook Messenger to send news to its users. I developed a web application used by journalists to write news presented by the bot and for journalists to have statistics of the use of the bot.
- May 2013 - February 2014 **Back-End Developer, Pivto**, <http://www.pivto.com>.
Developer of plugins for web pages. The plugins extend web pages giving them the capacity to have their own social networks. I developed tools to extract pictures and posts from many social networks and then showed them in real time.
- August 2012 - April 2013 **Web Developer, Bufys**, <http://www.bufys.com>.
Designer and programmer of the first Latin American crowd gifting platform.

AWARDS

- 2016 **Graduate Students' Academic Projects, University of Chile**, Fund raised.
Title: Towards Duckietown in the FCFM.
With the Robotic Community of the University of Chile.
Amount: \$4,170.

- 2012 **Second Place in Programming Contest**, *Acid Labs*, Bufys.
The contest goal was to develop an innovative gift recommending algorithm using social networks.
- 2011 **First Place in ACM-ICPC Programming Contest**, *Chile*.
Member of the Chilean winning team in the International Collegiate Programming Contest (ICPC) organized by Association for Computing Machinery (ACM).

ADDITIONAL INFORMATION

Student Supervisor.

- Rodrigo Delgado (2019 - Present, co-supervisor). MSc student. Fuzz testing in robotic behaviors using state machines.

Program Committee.

- IRC 2020: The Fourth IEEE International Conference on Robotic Computing.

External Reviewer.

- SAC 2019: 34th ACM/SIGAPP Symposium On Applied Computing, Software Engineering Track.

Invited Talks.

- Cochabamba 2017: Computer Science Summer School of Cochabamba 2017. Talk about software engineering in robotics and tutorial about programming self-driven vehicles.

Visited Research Labs.

- September 21 - November 10, 2016: Software Engineering Lab - University of Mons (Mons, Belgium). Contact: Tom Mens.
- September 21 - October 2, 2015: RMoD - INRIA Lille Nord Europe (Lille, France). Contact: Marcus Denker.
- August 25 - September 5, 2014: RMoD - INRIA Lille Nord Europe (Lille, France). Contact: Marcus Denker.
- August 26 - 27, 2014: CAR - Ecole des Mines (Douai, France). Contact: Jannik Laval.

Student Volunteer.

- ISRR 2017: International Symposium on Robotic Research 2017
- ESUG 2014: 22th International Smalltalk Conference

Doctoral Events.

- ISRR 2017: Doctoral Consortium - International Symposium on Robotic Research 2017
- ICSE 2017: ACM Student Research Competition - 39th International Conference on Software Engineering

Development Skills.

- *Robotic and Drone Development*: I have been involved with robotic software development since 2014 and with drone software development since 2020. I develop research tools using Pharo Smalltalk, Python, C++ and LRP (my own live programming language).
- *Software Engineering*: Since my engineering degree I have worked as a software engineer. I have used several techniques, including TDD and Live Programming, when developing software. I have lead small team of developers while designing and building software.
- *Web Development*: Since 2010 I have worked as a back-end developer in several web application projects.

Languages.

- Spanish: Native
- English: Fluent Written and Spoken