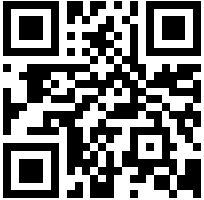


CONTACT

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SKILLS

C++	3+ yrs
MATLAB/Simulink	10+ yrs
Git	2+ yrs
Python	2+ yrs
Linux	10+ yrs
Arduino	3+ yrs
Octave	1+ yrs
FreeRTOS	1 yrs
ROS2	1+ yr
PX4 Autopilot	2 yrs
KiCad	2+ yrs
Altium Designer	1+ yr
Bash	2 yrs
SolidWorks	2+ yr
Blender	3+ yrs

Luis Ariel Valbuena Reyes

Ph.D. M.sC.

HIGHLIGHTS

- **Experienced in robotics:** Serial and parallel manipulators as well as autonomous ground and aerial mobile robots in **simulations and experimental validation**.
- Direct experience in **multi-agent systems** and **autonomous, multi-robot communication and coordination**.
- Solid Understanding of **navigation, path-planning, obstacle avoidance, estimation, and control**. Strong mathematical and problem-solving skills.
- Skillful in developing custom-designed robotic platforms: Motoman, PUMA, Stanford manipulators, and **my own parallel manipulator**.
- Experienced with path planning and control methods (PID, MPC, **Optimal Control, A*, Dijkstra**).
- Experienced with signals, socket programming, and **multi-threading applications**.
- Seasoned at **developing, debugging, and optimizing real-time controls** on highly dynamic machines.
- Competent with microcontrollers **ARM Cortex -M7, ATME/L/PIC, Arduino, Raspberry Pi, and Gumstix**.
- Experience designing and building functional prototypes of mechatronic systems incorporating computation, sensing, and actuation, from selecting drivers to onboard compute platforms.
- Experience using/modeling System-level sensor integration and hardware synchronization for **GPS/GNSS receivers, accelerometer, IMU's, LIDAR, gyroscopes quadrature encoders**. Background of integrating a variety of sensors via peripheral interfaces such as **Serial/UART, I2C, SPI**.
- Experience designing and building functional prototypes of mechatronic systems incorporating computation, sensing, and actuation, from selecting drivers to onboard compute platforms.
- Autonomous and self-motivated, with a strong foundation for building from sketch.

Specialities: Multi-Agent Robotics, Controls, Estimation, Embedded Real Time Systems.

PROFESSIONAL EXPERIENCE

Sr. Software Engineer-Controls SafeAI, Inc.

SEP, '22 - MAR, '23
Santa Clara, CA

- Conducted kinematic and dynamic modeling of different mobility platforms (Skid-steer, Ackermann, Articulated) and formulated the structure of a new control module on the operating system stack.
- Developed complex, reliable, efficient, production-level well-tested and latency-optimized software in C++ for deployment in a modern CPU/GPU platform.

Sr. Control Systems Engineer Volansi, Inc.

MAR '21 - JUL '22
Concord, CA

- Worked in MATLAB tools to conduct tuning for extended Kalman filters on autonomous aerial vehicles.
- Conducted benchmarking for multiple Autopilots.
- Created implementations of SIL(C++, Gazebo) and HIL for multiple autonomous aerial vehicles towards validation of components and safety.
- Created module/drivers in multi-threaded AutoPilot operating system.
- Created a "black-box" device for data acquisition for model calibration.
- Developed a redundant AutoPilot to remove single point of failure.

Research Assistant, IDI Laboratory University of New Mexico

AUG '16 - DEC '20
Albuquerque, NM

- Worked on predictive models for (processor) hardware to assess the viability and deviations of software execution paths on computing systems.
- Formulated two new approaches based on the Navier-Stokes equation to complement the Hamilton-Jacobi-Evans partial differential equation for the construction of reachable sets.
- Application of new reachability techniques to assess vulnerabilities in processor's architectures in the presence of (extreme) electromagnetic interference.
- Built a test-bed to corroborate theoretical formulation.

Research Assistant, MARHES Laboratory University of New Mexico

JAN '13 - MAY '14
Albuquerque, NM

- Implemented drivers on embedded systems (Gumstix, Raspberry Pi) for crawling and aerial robots.
- Formulated strategies to achieve circular formation with phase balancing on a group of ground and aerial robots. The experiment was verified with kinematic simulation before.

Research Assistant, Cooperative Robotics Laboratory University of Delaware

JAN '10 - DEC '12
Newark, DE

- Worked on Parallel algorithms intended for multi-agent cooperation such as the processing of multiple images to create an environment map.
- Develop a framework that merged formation control, flocking, and path following in a controller for a group of robots in a seamless fashion.
- Served on a team to develop a framework for the robotics platforms to navigate in the laboratory.

Development Engineer Colcofres LTDA

MAY '07- JUN '08
Bogota DC, Colombia

- Designed and built a digital padlock with an original design.
- Implemented a system to manage security doors according to scheduled times considering electric failures.
- Implemented a temporized vent to the Central Bank of Colombia.

EDUCATION

Ph.D. Engineering University of New Mexico

2016 - 2020
3.77 GPA

M.Sc. Applied Mathematics University of New Mexico

2014 - 2016
3.74 GPA

M.Sc. Applied Mechanical Engineering University of Delaware

2010 - 2012
3.44 GPA

B.Sc. Mechatronics Engineering National University of Colombia

2003 - 2009
4.1/5.0 GPA

PUBLICATIONS

- Luis Valbuena and Herbert G. Tanner. *Flocking, Formation Control and Path Following for a Group of Nonholonomic Robots*. IEEE Transactions on Control Systems Technology. 23. 1-1. 10.1109/TCST.2014.2363132 (November 2014).
- Luis Valbuena, Patricio Cruz, Rafael Figueroa, Francesco Sorrentino, and Rafael Fierro. *Stable Formation of Groups of Robots via Synchronization*. International Conference on Intelligent Robots and Systems. 10.1109/IROS.2014.6942587 (September 2014).
- Varsha Bhambhani, Luis Valbuena, and Herbert G. Tanner. *Spatially distributed cellular neural networks*. International Journal of Intelligent Computing and Cybernetics. 4(4):465-486 (November 2011) (2011 outstanding paper award).
- Luis Valbuena and Herbert G. Tanner. *Hybrid potential field based control of differential drive mobile robots*. Journal of Intelligent Robotic Systems. 68:307-322 (June 2012).
- K. Karydis, L. Valbuena and H. G. Tanner, *Model predictive navigation for position and orientation control of nonholonomic vehicles*. IEEE International Conference on Robotics and Automation, Saint Paul, MN, 2012, pp. 3206-3211, doi: 10.1109/ICRA.2012.6225202.
- L. Valbuena, G. L. Heileman, S. Hemmady and E. Schamiloglu, *A Hamilton-Jacobi Equation for Evaluating EEMI Propagation in a Computing System*. International Conference on Electromagnetics in Advanced Applications (ICEAA), Granada, Spain, 2019, pp. 0851-0856, doi: 10.1109/ICEAA.2019.8879393.
- L. Valbuena, G. L. Heileman, S. Hemmady and E. Schamiloglu, *Simplified Flip-Flop Gate Model for EEMI Injection*. International Conference on Electromagnetics in Advanced Applications (ICEAA), Granada, Spain, 2019, pp. 0845-0850, doi: 10.1109/ICEAA.2019.8879367.
- L. Valbuena, G. L. Heileman, S. Hemmady and E. Schamiloglu, *Predicting deviations in software execution paths due to EMI injection via reachable sets and random delays*. International Conference on Electromagnetics in Advanced Applications (ICEAA), Cartagena de Indias, 2018, pp. 578-581, doi: 10.1109/ICEAA.2018.8520450.
- L. Valbuena, G. Heileman, S. Hemmady and E. Schamiloglu, *A testbed for simulating electromagnetic effects on software execution*. 2017 IEEE International Conference on Circuits and Systems (ICCS), Thiruvananthapuram, 2017, pp. 26-31, doi: 10.1109/ICCS1.2017.8325956.