

EMANUEL MUÑOZ PANDURO

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RESEARCH

My main research aim is the development of robust and autonomous systems in different environments based on learning and probabilistic approaches. Currently working on manipulator robots for teleoperation in surgical procedures through haptics-and-vision controller feedback. I am highly interested in projects to develop innovative solutions for worldwide problems with technology.

EDUCATION

Electrical Engineering, Universidad de Ingeniería y Tecnología (UTEC) *March 2016 - Present*
Awarded with a full academic scholarship

Colegio Mayor Secundario Presidente del Perú *March 2013 - 2015*
Awarded with a full scholarship. Awarded with IB Diploma. Score: 39/45

EXPERIENCE AND PROJECTS

Bulk Metallic Glasses project at Yale University *January 2020 - March 2020*

- Accepted as a visiting student to research in bulk metallic glasses field.
- Prepared and elaborated samples to evaluate fracture toughness at microscale.
- Techniques learnt are also used for advanced MEMS designing.

IEEE RAS International Summer School on Deep Learning for Robot Vision *December 2019*

- Invited - Universidad de O'Higgins, Chile

Rust detection in powerline towers through aerial images *August 2019 - December 2019*

- Designed, implemented and evaluated several methods based on machine learning and non-linear control to manipulate a six-degrees-of-freedom robot through torque control.
- Analyzed performance and compared with state-of-the-art works. Results were successful with publication in process.

Rust detection in powerline towers through aerial images *August 2019 - Present*

- Image Processing Intern at Peruvian Power Network company.
- Designed a framework to acquire and label a dataset for object detection.
- Designed and evaluated several methods based on image processing and computer vision for feature extraction and machine learning for decision making.

Torque control performance in a position-based robot *September 2018 - Present*

- Designed, implemented and evaluated several methods based on machine learning and non-linear control to manipulate a six-degrees-of-freedom robot through torque control.
- Analyzed performance and compared with state-of-the-art works. Results were successful with publication in process.

Mapping and exploration algorithms in a differential wheeled robot. *December 2017 - July 2018*

- Programmed and tested algorithms for 2D mapping using depth sensors: Kinect camera and Lidar, in a differential-wheeled Turtlebot.

- Designed and implemented a framework for exploration performance in any static environment including control and sensor methods. Three publications resulted from this work.

Construction hertzian wave generator

August 2017 - December 2017

- Designed and built a framework based on Tesla coil for generating hertzian waves.
- Development proposed as a research module for electromagnetic analysis and testing materials.
- The project was awarded as Best Interdisciplinary Project 2017-1.

SKILLS AND RESEARCH INTERESTS

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- Robotics: Familiarity with concepts related to mobile and articulated robots. I developed skills for design and implementation in hardware and software. Programming: Python, ROS, Linux, C++
 - Image Processing and Computational Vision: Techniques for image treatment including color, morphological, spatial and frequency analysis. Methods related to image classification, manipulation based on Convolutional Neural Networks.
 - Control: Linear and Nonlinear control techniques. Classical and Modern approach to control problems. Programming: Matlab, Simulink
 - Machine Learning: Neural Network with different topologies. Supervised and unsupervised techniques. Programming: Matlab, TensorFlow, Keras
 - Embedded: Familiarity with Computer Design. Electronic Treatment of Sensors and Actuators. Programming: Assembly, VHDL.

PUBLICATIONS

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- Eddy Denegri, Emanuel Muñoz-Panduro, and Oscar E Ramos. Step-by-step development of an omnidirectional mobile robot. In *2019 IEEE Sciences and Humanities International Research Conference (SHIRCON)*, pages 1–4. IEEE, 2019
 - J. Munoz, E. Munoz-Panduro, and O. E. Ramos. Autonomous motion of a mobile robot based on potential fields and polar control. In *2018 IEEE XXV International Conference on Electronics, Electrical Engineering and Computing (INTERCON)*, pages 1–4, Aug 2018
 - E. Munoz-Panduro and O. E. Ramos. Random exploration framework for an autonomous real-time generation of a map. In *2018 IEEE XXV International Conference on Electronics, Electrical Engineering and Computing (INTERCON)*, pages 1–4, Aug 2018
 - G. Garcia-Chavez and E. Munoz-Panduro. Global control for the furuta pendulum based on partial feedback linearization and stabilization of the zero dynamics. In *2017 13th IEEE Conference on Automation Science and Engineering (CASE)*, pages 334–339, Aug 2017

INTERESTS AND ACTIVITIES

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- Committee member in GIIT (Group of Technology Research and Innovation). Student community at UTEC. Around 50 students.
 - Member of Mechatronics & Robotics Laboratory. Research group oriented to robotics and mechatronics topics.
 - Deep learning, non-linear control, computer vision, bulk metallic glasses, playing table tennis. reading Sherlock Adventures.