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EDUCATION

MSc. Advanced Robotics 2022 - Now
Queen Mary University of London
Currently finishing my last semester and working on my research project on Inflatable Robotics.

BSc. Electromechanical Engineering 2014 - 2019
Technological University of Panama

PROFESSIONAL EXPERIENCE

Head of Electrical Engineering and Software October 2022 - Now
Hyperlink Hyperloop - London, UK

- Led a team in a comprehensive redesign of the power and electronics subsystems resulting in a significantly improved design that meets high standards for safety and performance.
- Created a new software stack that implemented decision making, high-level and low-level control, hardware drivers, telemetry, state estimation and data recording using C, C++, Python and ROS.
- Collaborated closely with mechanical design team heads to create a high-performance, competitive pod for upcoming international conferences
- Employed microcontrollers from the STM32 family and an embedded Linux computer to support the system's software

Co-Founder May 2022 - Now
Meliora Robotics - Panama City, Panama

- Co-founded Meliora Robotics and led a team in developing a highly maneuverable omni-directional swerve drive robot.
- Designed and sourced components, oversaw mechanical development and fabrication, and tested the robot in various fields.
- Programmed the robot drivers and navigation stack using ROS, C++, and Python. Created a C++ threaded ROS driver for the CAN Bus communications with the actuators using SockeCAN.
- Designed and assembled custom PCBs using the STM32 familily of microcontrollers for low-level motor control.

Research Assistant December 2020 - May 2022
LEADS UTP - Panama City, Panama

- Provided design solutions and training to new staff members
- Contributed to the development of complex projects through expertise in electrical design, programming, and mechanical design
- Led a small team of engineers on emergency healthcare projects commissioned by the Ministry of Health, including the development of an emergency medical ventilator and an emergency medical high-flow humidifier

- Ensured that projects were completed on time, within budget, and met safety standards

Electrical Engineer June 2019 - February 2021
Ingeniería CARPENN
Panama City, Panama

- Help manage construction projects as an on-site engineering inspector and assistant manager.
- Oversaw personnel, purchases, quotes, and budget planning for successful project completion.
- Developed skills in project management, personnel management, budget planning, and vendor and supplier relations.
- Deep understanding of the construction process and technical requirements for successful project completion.

RESEARCH & PROJECTS

Hyperlink Pod 2023 2022 - Now
Hyperlink Hyperloop - London, UK

- Hyperlink's 2023 pod has undergone a significant redesign from last year's model, with a focus on safety and improved performance. The power and electronics subsystems are now capable of handling 4kW 3 phase power, and the programming was done using Python, C++, C, and ROS. To ensure safety, various redundancies and failsafes were implemented, and microcontrollers from the STM32 family and an embedded Linux computer were used to support the system's software. Overall, the redesign was comprehensive, resulting in a significantly improved design that meets high standards for safety and performance.

Omni-Trak Swerve 2022 - Now
Meliora Robotics - Panama City, Panama

- The project involves building an omni-directional swerve drive robot that is highly maneuverable and versatile. The robot is programmed using ROS, C++, and Python, and uses custom PCBs and microcontrollers from the STM32 family. The robot runs Linux, making it highly customizable and flexible. The aluminum profile and threaded holes allow users to easily add actuators and sensors. The robot is designed to be modular, with easily detachable and replaceable wheels. It has a payload capacity of 75kg, making it suitable for a variety of applications.

Autonomous fleet of disinfection robots 2020 - 2021
LEADS UTP - Panama City, Panama

- The project involved creating a fleet of five autonomous disinfection robots, which were designed and fabricated in-house. The robots were programmed mainly in Python and used the ROS framework and a navigation stack to navigate autonomously, create maps, localize themselves, and avoid obstacles. Each robot was equipped with a disinfectant fogging machine and a 2 degree of freedom arm to hold the nozzle for agile disinfection. The robots were tested in a major market in Panama City, demonstrating their ability to disinfect large areas quickly and effectively.

HINTEDIS - Sustainable Building Design Tool 2021 - 2022
LEADS UTP - Panama City, Panama

- The project involves the creation of a tool that helps architects and engineers design sustainable buildings. The tool has a user-friendly web interface and allows users to test ideas quickly. It calculates the solar energy potential of a

building using a unique and optimized algorithm developed by us. The tool uses two simulation engines, NREL's EnergyPlus and OpenStudio, to enable accurate building energy modeling and analysis. The back-end was built using Django, while the front-end was built using React.

COVID19 Emergency Equipment 2019 - 2020
Fab Lab UTP - Panama City, Panama

- During the COVID-19 pandemic, the Ministry of Health requested the creation of two emergency medical devices: a high-flow humidifier and an emergency medical ventilator. The devices were designed and manufactured on a tight budget, using in-house designed electronics and firmware programming. The microcontroller used was from the STM32 family. The team created a Flutter app on an Android tablet that functioned as the graphical interface for the ventilator. The devices underwent rigorous testing and passed all the requirements set forth by the Ministry of Health, making them approved for use in emergency medical situations.

TECHNICAL SKILLS

Programming Languages: C, C ++, Python, Bash, Matlab, PLC
Analysis Tools: Matlab, Simulink, Scikit-learn, Numpy, LabView
Robotics Tools: ROS, ROS2, Gazebo, OpenCV
Embedded Frameworks: STM32Cube, Arduino, FreeRTOS
Electrical Design Tools: KiCad, Eagle, Altium Designer
CAD / CAM: Fusion360, AutoCAD, Inventor, Revit
Rapid Prototyping: 3D Printing, CNC Machining, Plasma Cutting, Metal Bending
Programming Tools: Git, GDB
Operating Systems: GNU / Linux, Windows, MacOS

PUBLICATIONS

Humberto R., Ilka B., Octavio E., Farid H., Héctor M. (2022) Optimal Trajectory Planning of a Mobile Manipulator for Disinfection Using Multi-objective Genetic Algorithm. In: Moreno H.A., Carrera I.G., Ramírez-Mendoza R.A., Baca J., Banfield I.A. (eds) Advances in Automation and Robotics Research. LACAR 2021. Lecture Notes in Networks and Systems, vol 347. Springer, Cham. https://doi.org/10.1007/978-3-030-90033-5_10

Montes H., Rodríguez H., Echeverría O., Perez V. (2022) Semi-autonomous Mobile Robot for Environmental Surfaces Disinfections Against SARS-CoV-2. In: Chugo D., Tokhi M.O., Silva M.F., Nakamura T., Goher K. (eds) Robotics for Sustainable Future. CLAWAR 2021. Lecture Notes in Networks and Systems, vol 324. Springer, Cham. https://doi.org/10.1007/978-3-030-86294-7_28

Montes, H., Rodríguez, H., Echeverría, O. and Pérez, V., 2020. ¿ Es recomendable la desinfección de superficies por medio de técnicas de nebulización, pulverización o rociado contra el SARS-CoV-2?. Zenodo.

COURSES

"Motion Planning for Self-Driving Cars" - University of Toronto 2020
"Visual Perception for Self-Driving Cars" - University of Toronto 2020
"State Estimation for Self-Driving Cars" - University of Toronto 2020
"Introduction to Self-Driving Cars" - University of Toronto 2020