CARLOS VILLANUEVA, EIT

312-972-7332 |Email: carlos.villanueva2718@gmail.com | https://www.linkedin.com/in/carlos-villanueva-890219123/

EDUCATION

University of Illinois at Urbana-Champaign December 2024
Bachelor of Science in Systems Engineering & Design GPA: 3.09/4.00
Concentration: Automation and Robotics

Related Coursework:

Digital Control Systems | Mechatronics | Mech. Component Design | Robot Dynamics/Control

TECHNICAL SKILLS

Programming Languages: Python, MATLAB, Simulink, C++, C
Tools: Code Composer Studio, LabView VI, Ladder Logic Programming, Linux, ROS, SSH, Git
CAD: Autodesk Inventor, Fusion360, ANSYS (Mechanical, Workbench)
Spoken Languages: Spanish and English

CAPSTONE PROJECT

Company: *Crandall Stats and Sensors* Rockford, IL
Role: *Engineering Student Consultant* August 2024 – Dec 2024

PANDORAS BOX

- Reduced testing area 95% through building a universal test instrument for analog pneumatic devices, saving the company an annual cost of $15,000 with an 8-month payback period
- Researched the company catalog to determine the specifications for the universal test instrument
- Designed a wiring diagram for power distribution and communication between devices in the instrument
- Calibrated sensors to ensure desired precision while ignoring noise
- Developed an HMI (Human Machine Interface) and ladder logic program for a Keyence-8000 series PLC
- Performed a present net worth analysis and found the internal rate of return for the project on Excel and MATLAB
- Assisted in the development of a CAD model used to layout pneumatic tubing such that head losses were minimized
- Annotated datasheets to set constraints on designs and aid in troubleshooting errors
- Won the Fall 2024 Bernt O. Larson Award

PROJECT HIGHLIGHTS

ARM NAVIGATION & FORCE CONTROL January 2024 – May 2024

- Achieved a ~10 sec run of an obstacle course and applied a steady force to an egg (between 4.9N-9.8N)
- Derived the Denavit-Hartenburg forward kinematic equations for a CRS robotic arm controlled by a TI TMS320F28335
- Utilized waypoints to find the straight-line trajectories to guide the robot, adjusting velocity readings using an Infinite Impulse Response filter
- Ensured smooth motion through an impedance control scheme for the line trajectories and friction compensation on the joints

AUTONOMOUS MOBILE ROBOT OBSTACLE COURSE January 2024 – May 2024

- Navigated course in 3 minutes using A* path planning and motion capture camera data combined via Kalman Filtering
- Wrote a computer vision program to detect and collect golf balls via a combination of blob detection, color detection, and an area-to-distance mapping function
- Developed code for manual velocity control of the vehicle over SSH for debugging
- Programmed an HMI displaying real time traversal on a map, ball locations, and end goal

EXTRACURRICULAR ACTIVITIES

Black Underrepresented Indigenous & Latino in Tech Champaign, IL
Member January 2023 – Present

- Volunteered at university events as a representative of the team and advertised the group
- Assisted underclassmen in mathematics and answered questions regarding the transition college life
- Competed in the 2024 NASA Space Apps Hackathon and worked on scope for an agricultural weather app