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KEIRAN CANTILINA

*** **PERSONAL PROJECT PORTFOLIO**: **https://keirancantilina.github.io** ***

PERSONAL STATEMENT

My interests focus on solving problems by drawing on interdisciplinary knowledge and resources. I have a demonstrated history of using this knowledge to very quickly pick up complex electromechanical systems and new programming languages on the fly. I love to use quantitative methods to gain insight especially in contexts where biology, engineering and programming intersect. I have 5 years of experience contributing to a wide variety of bioengineering research.

EDUCATION

MS in Bioproducts and Biosystems Engineering, University of Minnesota, June 2018

BS in Biological Sciences, Cornell University, May 2015

RELEVANT EXPERIENCE

Senior Research Engineer – *Cleveland Clinic Automated Surgical Robotics Lab* Aug 2019 –

- Developed algorithms for real-time motion and force control of multi-robot surgical platforms
- Wrote code to handle kinematics of 7-DOF redundant robotic arms to enable execution of secondary tasks (collision, singularity, and joint limit avoidance)
- Wrote LabVIEW, C++, Python, and Java drivers for control of hardware (sensors and robots)
- Wrote high-speed multithreaded UDP and TCP server/clients in Python, LabVIEW, C++, and Java for a coordinated multi-robot multi-sensor system
- Upgraded vision system of extant surgical robot by sourcing new cameras, designing a mechanical adaptor for optics, and writing Python drivers to stream video feed to a VR headset
- Designed and fast-prototyped novel robotic end-effectors
- Implemented real time object recognition, localization, and depth-mapping using neural networks with OpenCV in Python
- Implemented camera calibration and distortion correction with OpenCV in Python
- Designed and executed experiments to quantify susceptibility of competing magnetic motion tracking systems to interference/field distortion from metallic objects
- Invented a method for identifying non-purposeful movements in a recording of teleoperated surgical robotic movements

Instrumentation Engineering Grad Research Asst. - *U of MN* Aug 2016 – May 2018

- Tested and characterized prototype water quality sensors and other devices using test equipment
- Invented novel water conductivity sensors for Master's thesis
- Wrote scripts to do statistical analysis of large datasets
- Wrote data mining scripts to fetch data from geostationary climate satellite systems
- Managed project timelines and personnel (Gantt charts, project management software, etc.)
- Reverse-engineered communication protocol and built replacement for proprietary water sampler programming cable
- Upgraded sampler power supply circuits to be more robust and resistant to user error
- Programmed, inspected, and repaired ISCO autonomous water samplers
- Wrote image processing pipeline to automatically determine microplastic concentration in effluent from degraded artificial floating treatment wetlands

Bioengineering Laboratory Service Tech - *Cornell University* May 2015 – Jun 2016

- Instrument software/hardware design and troubleshooting
- Experimental design consulting
- Creation of data processing scripts and programs
- Used ImageJ to develop automated colony counting image processing script
- Provided laboratory members with full-time multidisciplinary support
- Managed projects in coordination with other departments and lab groups

Plant Genetics Research Assistant – *Nat'l Chung Hsing University, Taiwan* May – Aug 2014

- Planned and initiated a cloning project aimed to develop a viral cross-protection vector for Vietnam-strain Papaya ringspot virus (PRSV)
- Became familiar with cross-cultural research contexts

Plant Bioinformatics Summer Intern – *NYS Agricultural Research Station* May – Aug 2013

- Planned and contributed to cloning projects related to the improvement of Grapevine fanleaf virus (GFLV) as a virus induced gene silencing (VIGS) vector
- Gained proficiency in confocal laser microscopy
- Became familiar with UV photography

Plant Pathology Research Assistant – *NYS Agricultural Research Station* May – Aug 2012

- Learned sequence analysis, primer design, and phylogenetic analysis
- Ran mid-scale IC-RT-PCR and electrophoresis reactions, screening projects, and cloning projects
- Learned laboratory greenhouse skills such as planting, transplanting, inoculating, seed collecting, and sample collecting
- Created and presented poster to share research results with research station faculty

PAPERS

- BAEF Research Thesis: Use of additive manufacturing methods for carillon "autospeelwerk" mechanisms. *Koninklijke Beiaardschool 'Jef Denyn' Bibliotheek,* (2019)
- Absence of genetic selection in a pathogenic *Escherichia coli* strain exposed to the manure-amended soil environment. *PLOS ONE*, (2018).
- Master's Thesis: The Development of a Novel Capacitive Water Conductivity Sensor. *University of Minnesota Digital Conservancy*, (2018).
- Genetic variability, evolution, and biological effects of grapevine fanleaf virus satellite RNAs. *Phytopathology*, (2013).

RELEVANT SKILLS

Electronics/Mechanical

- 2D and 3D CAD (AutoCAD, Onshape/Solidworks, Inventor)
- Parametric CAD techniques
- Finite Element Analysis
- Electronics design, reverse engineering, troubleshooting
- PCB design and assembly (soldering, choosing components, etc.)
- HF and VHF RF circuit and antenna design
- Mechanical design for fast prototyping (3D printing, laser cutting, or waterjet)
- Mechanical design for traditional machining
- Use of test equipment
- Use of power tools and standard shop equipment
- Basic woodworking and welding

Programming/Data Analysis

- Languages: R, C++, Python, Java, LabVIEW, MATLAB, bash, ROS
- Proficient in multithreading
- TCP/UDP clients & servers
- Design and implementation of software-hardware interfaces
- Optimization of code for embedded hardware
- Optimization of code for fast execution
- Robotic control and motion planning
- OpenCV machine vision and neural networks
- Image processing and camera distortion calibration
- Design of Experiments (DOE)
- Data mining/web scraping
- Statistical analysis of large datasets
- Test method development
- Data visualization

Bio/Wet Lab

- Conventional genetic engineering/cloning
- Plant, bacterial, viral and soil DNA and RNA extraction
- PCR, electrophoresis, ligation, primer & expression cassette design
- Plant and bacterial transformation
- Analysis of sequencing data
- Brightfield, darkfield, dissecting, confocal, and laser scanning microscopy
- Standard microbio skills (cell culture, pipetting, etc.)
- Biosafety Level 2 training
- Sterile technique, etc.
- Greenhouse plant care

HONORS & AWARDS

Belgian American Education Foundation Fellowship July 2018 – June 2019
Thesis: "Use of additive manufacturing methods for carillon "autospeelwerk" mechanisms." Yearlong fellowship to study Belgium's UNESCO-protected carillon culture at the Belgian Royal Carillon School.

Fulbright U.S. Student Researcher Grant May 2018
Award declined in order to accept the BAEF Research Fellowship

Diversity of Views and Experiences Fellowship Aug 2016 – July 2017
Two-semester fellowship including tuition and stipend

2015 Plant Biology Student Excellence Award May 2015
Awarded by faculty of Cornell University Department of Plant Sciences

LICENSES

Guild of Carilloneurs in North America June 2019
Professional Carilloneur License (valid in North America)

Mechelen Beiaardschool Eindediploma May 2019
Professional Carilloneur License (valid in Europe)

US FCC Amateur Radio License March 2016
General Class Privileges, callsign KD2KQE

REFERENCES

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