

Henri-Louis Girard

PH.D. MECHANICAL ENGINEERING · INTERFACIAL SCIENCES

Somerville, MA

☎ 617-505-0083 | ✉ hl.girard@gmail.com

🏠 hlgirard.github.io | 🎓 Henri-Louis Girard | 🌐 hlgirard | 📺 hlgirard

Skills

Experimental Sciences

- Imaging and life science techniques: scanning electron microscopy (SEM), dynamic light scattering (DLS), fluorescence and polarized microscopy, UV-Vis and fluorescence spectroscopy, gel electrophoresis.
- Adhesion and adsorption characterization: atomic force microscopy (AFM), force spectroscopy, quartz crystal microbalance (QCM), X-ray spectroscopy (XPS), ellipsometry, zeta potential measurement.
- Microelectronics: moisture and light sensors, servo and motor actuators, scientific instrument interfacing (I2C, GPIB, RS232).

Data Analysis and Programing

- Python: numpy, pandas, matplotlib, plotly, scikit-image, openCV, tensorflow, scikit-learn.
 - Image processing: adaptive equalization, morphological transforms, and watershed segmentation for detection of bubbles and crystals.
 - Machine learning: image classifiers for crystal detection including support vector machines, and convolutional neural networks.
- COMSOL / MATLAB: finite element simulation of electrochemical processes and electric field distribution.
- Java / SQL: developed Plant Whisperer, an Android app to track house plants soil moisture.

Experience

Massachusetts Institute of Technology

Cambridge, MA

PH.D. CANDIDATE, GRADUATE STUDENT RESEARCHER

Sep. 2015 - Present

- Conducted experimental research and modeling on adhesion, adsorption and transport phenomena at liquid-liquid and liquid-solid interfaces including asphaltene, proteins, platelets, and ice with applications in anti-fouling, protein crystallization for low-cost vaccine manufacturing and icing mitigation.
- Implemented agile project management to coordinate up to 5 projects simultaneously.
- Mentored five undergraduate and graduate students in the conduct of their own research.
- Collaborated with other research groups to share expertise across fields including Pr. Mehmet Toner at MGH and Pr. Chris Love at the Koch Institute.
- Released 2 open source python packages: xptools and simplabel.
- Published 2 peer-reviewed articles in Physical Review Fluids.

University of California, Los Angeles

Los Angeles, CA

GRADUATE STUDENT RESEARCHER

Sep. 2013 - Jun. 2015

- Derived a mathematical model to couple ion transport and electrochemical reactions in porous electrodes.
- Implemented finite element modeling of pseudocapacitors under operational and testing (three electrodes) conditions.
- Provided design guidelines on the geometry of MnO_2 pseudocapacitive electrodes to avoid Li starvation issues.
- Published 4 peer-reviewed articles in The Journal of Physical Chemistry C, Electrochimica Acta and the Journal of the Electrochemical Society.

French Navy

France and West Africa

OFFICER OF THE DECK

Sep. 2010 - May. 2011

- Served as second lieutenant on a French warship of 250 sailors.
- Led a team of up to 25 men and women to ensure safe conduct of the ship's navigation.
- Conducted fire and assault drills, helicopter landing, and tactical formation operations.

Education

Massachusetts Institute of Technology

Cambridge, MA

PH.D. IN MECHANICAL ENGINEERING (5.00/5 GPA)

Sep 2015 - Exp. Sep 2019

"Interactions at interfaces across scales: from adsorption to adhesion" with Pr. Kripa Varanasi.

University of California, Los Angeles

Los Angeles, CA

M.S.C. IN AEROSPACE ENGINEERING (4.00/4 GPA)

Sep 2013 - Jun 2015

"Interfacial and transport phenomena in hybrid pseudocapacitors" with Pr. Laurent Pilon.

École polytechnique

Paris, France

Diplôme d'Ingénieur IN MECHANICAL ENGINEERING (3.84/4 GPA)

Sep 2010 - Jun 2013