

# LENA BARTELL

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## SKILLS

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| TECHNIQUES      | Computer vision (filtering, morphological image processing, registration, segmentation) • Microscopy • Machine learning (exploratory analytics, regularization, normalization, regression, classification, cross-validation) • Regression (linear, logistic, mixed-effects, random forest) • Data visualization (figure design, dashboards) |
| LANGUAGES, ETC. | Python (Pandas, NumPy, SciPy, scikit-learn, StatsModels, Matplotlib, Scrapy) • MATLAB • Flask/Dash • HTML/CSS • SQL (Postgres) • Inkscape (vector graphics) • Autodesk Inventor (3D CAD) • LaTeX • Tableau • Git  |

## PROJECTS & EXPERIENCE

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| 2018 – PRESENT | <b>Let's Get Clinical: Predicting clinical trial drop-out rates</b> ( <i>Insight Data Science project</i> )<br><i>Fellow, Insight Data Science, Boston, MA</i> <ul style="list-style-type: none"><li>· Extracted and cleaned data (continuous, categorical, text) from 40-table relational database using Python (pandas) and PostgreSQL</li><li>· Modeled trial dropout rates using linear regression and random forests in Python (StatsModels, scikit-learn)</li><li>· Deployed online app via Dash/Heroku to predict the number of patients that will drop out of a clinical trial (<a href="http://lrb-insight-project.herokuapp.com">lrb-insight-project.herokuapp.com</a>)</li></ul>   |
| 2012 – PRESENT | <b>Injury-induced cellular dysfunction in articular cartilage</b> ( <i>PhD thesis</i> )<br><i>PhD Candidate, Cornell University, Ithaca, NY</i> <ul style="list-style-type: none"><li>· Built custom mechanical testing stage that interfaced with optical microscopy to measure soft tissue properties</li><li>· Analyzed multi-dimensional imaging data sets (~20×1 GB) to segment, track, and classify cell behavior over space and time using MATLAB and Python</li><li>· Quantified relationship between cell dysfunction and treatment using mixed-effects regression (linear, logistic)</li><li>· Presented research quarterly in small-group meeting and at 7 scientific conferences</li><li>· Mentored 5 researchers and cultivated collaborations with veterinary surgeons and biomedical engineers</li></ul> |
| 2017           | <b>GUI for automated segmentation and classification of microscopy images</b> ( <i>PhD thesis</i> )<br><i>PhD Candidate, Cornell University, Ithaca, NY</i> <ul style="list-style-type: none"><li>· Developed custom image segmentation and classification algorithm based on the watershed transform</li><li>· Deployed image algorithm as a portable GUI using MATLAB, enabling non-technical collaborators to utilize computer vision techniques (GUI and tutorial: <a href="https://github.com/itaicohengroup/watershed_cells_gui">github.com/itaicohengroup/watershed_cells_gui</a>)</li><li>· Published training tutorial and distributed GUI to collaborators using GitHub</li></ul>   |
| 2015 – 2017    | <b>4D flow behavior of protective glass coatings</b> ( <i>PhD thesis</i> )<br><i>PhD Candidate, Cornell University, Ithaca, NY, in collaboration with Corning Inc., Corning, NY</i> <ul style="list-style-type: none"><li>· Implemented N-dimensional Barnes smoothing interpolation in MATLAB, extending previously 2D algorithm</li><li>· Compiled and analyzed large, multi-dimensional confocal microscopy data sets using MATLAB and Python</li><li>· Coordinated collaboration with Corning Inc., including quarterly presentations and final reports</li></ul>   |
| 2016           | <b>WXPN radio "A to Z" marathon playlist analysis</b> ( <i>Personal project</i> ) <ul style="list-style-type: none"><li>· Scraped playlist metadata from web and linked to additional open database APIs using Python (Scrapy)</li><li>· Cleaned data and calculated summary statistics using Python (pandas, NumPy)</li><li>· Created and shared interactive visualization using Tableau &amp; Twitter (<a href="http://viz.public.tableau.com/views/XPNA_AtoZ/XPNA-Z">viz: public.tableau.com/views/XPNA_AtoZ/XPNA-Z</a>, news coverage: <a href="http://thekey.xpn.org/2016/12/16/lena-bartell/">thekey.xpn.org/2016/12/16/lena-bartell/</a>)</li></ul>  |
| 2009 – 2011    | <b>X-ray dosimeters for diagnostic breast cancer imaging</b> ( <i>Undergraduate thesis</i> )<br><i>Undergraduate Researcher, University of Pennsylvania, Philadelphia, PA</i> <ul style="list-style-type: none"><li>· Designed, constructed, and studied the response of a custom X-ray dosimeter</li><li>· Simulated measurement biases of existing dosimeters from first-principles using MATLAB</li></ul>  |

## EDUCATION

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| 2011 – 2018 | <b>Cornell University</b> (Ithaca, NY) – Ph.D. in Applied Physics, Minor in Biomedical Engineering                      |
| 2007 – 2011 | <b>Penn State University</b> (State College, PA) – B.S. with Honors in Physics, Minors in Biomedical Engineering & Math |

## PUBLICATIONS

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- 2017 J.M. Middendorf, et al. *In vitro culture increases mechanical stability of human tissue engineered cartilage constructs by prevention of microscale scaffold buckling*. Journal of Biomechanics 64, 77-84
- 2017 L.R. Bartell, et al. *Three-dimensional microscale flow of polymer coatings on glass during indentation*. MRS Communications 7, 896-903
- 2017 L.R. Bartell, L.J. Bonassar, I. Cohen. *A watershed-based algorithm to segment and classify cells in fluorescence microscopy images*. ArXiv Computer Vision and Pattern Recognition arXiv:1706.00815
- 2016 C.R. Henak, L.R. Bartell, L.J. Bonassar, I. Cohen. *Multiscale Strain as a Predictor of Impact-Induced Fissuring in Articular Cartilage*. Journal of Biomedical Engineering 139, 031004
- 2015 L.R. Bartell, L.A. Fortier, L.J. Bonassar, I. Cohen. *Measuring microscale strain fields in articular cartilage during rapid impact reveals thresholds for chondrocyte death and a protective role for the superficial layer*. Journal of Biomechanics 48, 3440-3446
- 2010 L.R. Bartell, A.K. Carton, A.D.A. Maidment. *Angular dependence of mammographic dosimeters in digital breast tomosynthesis*. Proc. of Medical Imaging 7622, 76225L
- 3 other publications: 2 submitted, 1 in preparation

## PATENT

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- 2017 "Buckling technique to determine tissue engineered construct readiness," U.S. Provisional Application (pending).

## AWARDS & FELLOWSHIPS

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- 2016 - 2018 NIH Individual F31 Predoctoral Fellowship Grant
- 2012 - 2015 NSF Graduate Research Fellowship
- 2011 - 2012 Cornell Presidential Life Science Fellowship (1 year graduate training & stipend)
- 2011 Penn State Schreyer Honors College Evans Award for Research Achievement
- 2009 Goldwater Scholarship
- 2009 American Association of Physicists in Medicine Undergraduate Fellowship
- 2007 - 2011 Penn State Braddock Scholarship (4 years full tuition, room & board)

## SELECT COURSEWORK

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- 2017 *Andrew Ng's Machine Learning Coursera Course* – Free introduction to machine learning
- 2016 *Google's Python Class* – Free introduction to programming with Python
- 2015 *Computer Vision* – Image data acquisition and analysis with emphasis on techniques for robot vision
- 2014 *Finding Your Scientific Voice Workshop* – Intensive presentation and public speaking workshop
- 2014 *Business as a Second Language* – Introduction to business finances, marketing, etc. for engineering PhDs
- 2013 *Commercializing University Technology* – Course on bringing science to market, for MBAs and engineers

## LEADERSHIP EXPERIENCE & OUTREACH

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- 2016 – 2017 *Homemade microscope outreach*– Design & produce module teaching high school students about imaging
- 2015 – 2016 *Student Employee* – Cornell McGovern Center for Venture Development in the Life Sciences
- 2015 *Leadership Assessment for Managers Course* – Leadership exercises and self-assessment
- 2014 – 2015 *Advisory Board Member* – NIH Broadening Experiences for Scientific Training program at Cornell
- 2009 – 2011 *President* – Penn State University Society of Physics Students

## RESEARCH PRESENTATIONS

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- 2015, 2017 Podium presentation, Orthopaedic Research Society
- 2014, 2016 Poster presentation, Orthopaedic Research Society
- 2014 Podium presentation, Society of Rheology
- 2013 Poster presentation, Gordon Research Conference: Soft Condensed Matter Physics
- 2011 Podium presentation, International Association of Physics Students