# Chuangqi Wang, PhD

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## Research Background

Computational modeling for cell imaging, system biology and immunology in infectious disease
Deep learning and machine learning for time course analysis in biomedical data

## Professional Experience

**Postdoctoral Associate**, Biological Engineering, **Massachusetts Institute of Technology (MIT)**, US
Dr. Douglas Lauffenburger (MIT, System Immunology) Oct. 2019 – Present
Dr. Galit Alter (Ragon Institute of MGH, MIT and Harvard, System Serology/Infectious Disease)

**Research Associate**, **Worcester Polytechnic Institute (WPI)**, US 2014 – 2015
Dr. Patrick Flaherty (now in Statistics Dep. in UMass Amherst, Statistical genomics)

**Research Associate, Chinese Academy of Sciences,** China 2012 – 2013
Dr. Xinyu Wu. Center for Biomimetic Systems

## Education

**Ph.D.** in Biomedical Engineering, **WPI**, US 2015 – Oct. 2019
"Machine learning pipelines for deconvolution of cellular and subcellular heterogeneity from cell imaging"
Advisor: Dr. Kwonmoo Lee (now in Boston Children's Hospital/Harvard Medical School)

**M.S.** in Electronics Engineering and Computer Science, **Peking University (PKU)**, China 2009 – 2012
**B.S.** in Computer Science, **Jilin University**, China 2005 – 2009

## Selected Publications

**System Biology in Infectious Disease & Translational Medicine:**

1. Y.C. Bartsch*, **C. Wang***, S. Fischinger, C. Atyeo, T. Zohar, J. Burke, A. G Edlow, A. Fasano, …, L. R Baden, E. Wood Karlson, D. A Lauffenburger, Lael M Yonker# and G. Alter#, Humoral signatures of protective and pathological SARS-CoV2 infection in children, ***Nature Medicine***, 1-9, 2021.
2. Chaillon*, **C. Wang***, T. Schlub, W. Yu, D.A. Lauffenburger, D.M. Smith, B. Juegl, Tissue landscape of HIV antibody neutralization susceptibility, *Conference on Retroviruses and Opportunistic Infections **(CROI)***, 2021.
3. T. Zohar*, C. Loos*, S. Fischinger*, C. Atyeo***, C. Wang**, M. D. Slein, J. Burke, J. Yu, J. Feldman, B. M. Hauser, T. Caradonna, A. G. Schmidt, Y. Cai, H. Streech, E. T. Ryan, D. H. Barouch, R. C. Charles, D. A. Lauffenburger# &G. Alter#. Compromised humoral functional evolution tracks with SARS-CoV-2 mortality. ***Cell***, 183(6), 1508-1519, 2020.
4. J. D. Herman*, **C. Wang***, C. Loos*, …, D.A. Lauffenburger, L. Profski, G. Alter. Functional Antibodies in COVID-19 Convalescent Plasma, In manuscript, 2021.
5. M. J. Lee, **C. Wang**, M. Carroll, …, D.A. Lauffenburger. Computational interspecies translation between Alzheimer's Disease mouse models and human subjects identifies innate immune complement, TYROBP, and TAM receptor agonist signatures, distinct from influences of aging, Submitted, 2021.

**Cell Imaging & Machine Learning:**

6. **C. Wang*,** H. J. Choi*, S. Kim, …, K. Lee, Deconvolution of subcellular protrusion heterogeneity and the underlying actin regulator dynamics from live cell imaging, ***Nature Communications***, 9(1), pp.1-17, 2018.
7. **C. Wang**, H., Choi, L. Woodbury, K. Lee. Deep learning-based subcellular phenotyping of leading edge

dynamics reveals fine differential drug responses at the single cell level, In manuscript, 2021.

8. K. Vaidyanathan*, **C. Wang***, Y. Yu, A. Krajnik, M. Choi, B. Lin, J. Kolega, K. Lee#, Y. Bae#, Machine learning approach reveals heterogeneous responses to FAK and Rho GTPases inhibition on smooth muscle spheroid formation, In review, ***bioRxiv*** 927616, 2020.
9. H. Choi, **C. Wang**, X. Pan, M. Cao, J. Brazzo, Y. Bae, K. Lee, Emerging machine learning approaches to phenotyping temporally heterogeneous cellular processes, In review, 2020
10. F. Zhang, **C. Wang**, A. C. Trapp, P. Flaherty, A global optimization algorithm for sparse mixed membership matrix factorization new advances in statistics and data science, ***Contemporary Biostatistics with Biopharmaceutical Applications,*** pp 129-156, Springer, 2019.
11. S. Kim*****, **C. Wang***, B. Zhao, H. Im, J. Min, N. Choi, C. M. Castro, R. Weissleder, H. Lee[#], K. Lee[#]. Deep transfer learning-based hologram classification for molecular diagnostics. ***Scientific Reports***, 8:17003, 2018.
12. **C. Wang**, X. Zhang, Y. Chen, K. Lee. vU-net: Accurate cell edge segmentation in time-lapse fluorescence live cell images based on convolutional neural network, ***bioRxiv*** 191858, 2017
13. **C. Wang**, S. Kang, E. Kim, X. Zhang, H. J. Choi, A. Choi, K. Lee, Edge detection of cryptic lamellipodia assisted by deep learning, ***bioRxiv*** 181263, 2017

**Robotics and Path Planning:**

14. H. Liu, **C. Wang**. Collision probability based safe path planning for mobile robots in changing environments. ***Applied Mechanics and Materials***. vol. 197. pp. 401-408, (2012).
15. **C. Wang**, B. Chen and H. Liu. Path updating tree based fast path planner for unpredictable changing environments. IEEE International Conference on Robotics and Biomimetics (***ROBIO*** 2012). pp. 1529-1535. Guangzhou, China. Dec 11-14, (2012).
16. H. Liu, T. Zhang, **C. Wang**. A 'capacitor' bridge builder based safe path planner for difficult regions identification in changing environments. IEEE/RSJ International Conference on Intelligent Robots and Systems (***IROS***). pp. 3179-3186. Algarve, Portugal. Oct 7-12, 2012.
17. H. Liu, J. Wang and **C. Wang**. Sub-goal choosing and updating strategy based on hierarchy sampling strategy. Journal of Huazhong University of Science and Technology (Natural Science Edition). vol. 39. pp. 208-211, 2011(in Chinese).
18. **C. Wang**, H. Liu, Motion planning method for robots in dynamic environments based on improved particle swarm optimization, the 13nd China National Conference on Artificial Intelligence (CAAI 2009). pp. 393-399. Beijing, China. Oct 25-28, 2009 (in Chinese).

*Equal Contribution, #Co-corresponding authors.

## Selected Talks

Workshop: "System Serology/Machine Learning", C. Loos, A. Nilsson & **C. Wang** 2020

A machine learning approach to devonolute the subcellular protrusion heterogeneity

**Oral talk**: Single Cell Biology Keystone Symposium, Colorado January, 2019
**Poster**: International Society for computational biology (ISCB), Chicago July 2018
**Poster**: Graduate Research Innovation Exchange (GRIE), WPI 2017, 2018
**Poster**: ASCB/EMBO, Philadelphia December, 2017

Path Updating Tree based fast path planner for unpredictable changing environments

**Oral talk**: IEEE International Conference on Robotics and Biomimetics (*ROBIO*) December, 2012

## Awards, Honors and Notable Service

Reviewer in Scientific Reports 2019
Graduate Travel Award, WPI 2017, 2018
Reviewer in New England Statistics Symposium (NESS) 2018
Reviewer in International Conference on Robotics and Automation **(**ICRA), IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM) 2013
Session Chair of Motion Planning I in ROBIO 2012
Judge in Shenzhen Youth Robot Competition 2010, 2011
Studying Excellence Award, Peking University 2010
National Endeavor scholarship / National Endeavor scholarship, China Ministry of Education 2006-2008
Outstanding Student Scholarship, Jilin University 2007, 2006

## Professional Skills

**Computation/Statistics:** representation learning (CNN, Autoencoder, LSTM), unsupervised learning (density peaks), supervised learning (MLP, SVM, RF), time series data analysis, convex and global optimization.
**Programming:** Proficient in R, Python, MATLAB and C++. Competent in ImageJ.

## Patents

An Intelligent Education Robot (CN201320117097.5) J. Sun, **C. Wang**, P. Jiang, etc. August, 2013
Chinese Academy of Sciences/Shenzhen Institute of Advanced Integration Technology

A Robot Path Planning Framework inspired by Bionics in Dynamic Environments (CN201310233773.X) Peking University. H. Liu, **C. Wang**, etc. September, 2013

## Teaching Experience

**Mentee, WPI**

Melody Yu (Undergraduate Student, Biological Engineering, MIT) Oct.2020 – Present
Xiang Pan and Yudong Yu (MS student, Biomedical Engineering, WPI) May. 2018 – May. 2019
Tessa Curtis (REU program, Biomedical Engineering, UNC) Summer, 2019
Xitong Zhang (MS student, Data Science, WPI) March, 2017 – May, 2018
Lucy Woodbury (REU program, Biomedical Engineering, University of Arkansas) Summer, 2018
Yenyu Chen (Undergraduate student, Biomedical Engineering, WPI) Summer, 2017

**Teaching Assistant, WPI** 2015 - 2016
Biomedical Data Analysis, Biomedical Engineering Design, Introduction of Biomedical Engineering

**Teaching Assistant, Peking University** 2010 - 2012
Image Processing, Robot Technologies