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 for biomedical data

Education

Ph.D. in Biomedical Engineering 2015 – Oct. 2019
Worcester Polytechnic Institute (WPI), MA, USA
Designated Emphasis: Deep learning, Machine learning, Live cell imaging, Cell Migration

M.S. in Electronics Engineering and Computer Science 2009 – 2012
Peking University (PKU), Beijing, China
Designated Emphasis: machine learning, robotics, motion planning.

B.S. in Computer Science 2005 – 2009
Jilin University (with Honors), Changchun, China

Professional Experience

Postdoctoral Associate, MIT Oct. 2019 – Present
Dr. Douglas Lauffenburger. System Biology/Computational Immunology

Graduate Research Assistant, **WPI** 2016 – 2019
Dr. Kwonmoo Lee. (Lab of Quantitative Cellular Imaging, now in Boston Children's Hospital, HMS)

Research Associate, **WPI** 2014 – 2015
Dr. Patrick Flaherty (Genomics Lab, now in Statistics Dep. in UMass Amherst)

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

Research Associate, **Peking University** 2009 – 2012
Dr. Hong Liu. Open Lab on human robot interaction

Undergraduate Research Assistant, **Jilin University** Summer 2007 – 2008
Dr. Hongwei Zhao. Embedded wireless video surveillance system

Publications in Chronological Order

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, A. Schmidt, E. S Fischer, E. J Nilles, 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***, In press, 2021.
2. Chaillon*, **C. Wang***, T. Schlub, W. Yu, D. A. Lauffenburger, D. M. Smith, B. Juegl, Tissue Landscap 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.

Cell Imaging & Machine Learning:

4. **C. Wang**, H., Choi, K. Lee. Fine-grained deconvolution of subcellular protrusion heterogeneity by deep feature learning, In Preparation, 2021.
5. 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.
6. 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.
7. 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.
8. **C. Wang*,** H. J. Choi*, S. Kim, A. Desai, N. Lee, D. Kim, Y. Bae, K. Lee, Deconvolution of subcellular protrusion heterogeneity and the underlying actin regulator dynamics from live cell imaging, ***Nature Communications***, 9, 1688, 2018.
9. 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.
10. **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
11. **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:

12. 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).
13. **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).
14. 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.
15. 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).
16. **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

Tissue landscape of HIV antibody neutralization susceptibility **Science Spotlight™ talk:** virtual *CROI* 2021

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

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