

YANG HU

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Plant Science Building 403(B)

Washington State University, Pullman, WA 99163

EDUCATION

Washington State University Ph.D. in Computer Science	<i>January 2015 - May 2019</i>
Washington State University M.S. in Mechanical Engineering	<i>August 2011 - July 2013</i>
South China University of Technology, China M.S. in Polymer Chemistry and Physics	<i>September 2005 - July 2008</i>
Shenzhen University, China B.S. in Applied Chemistry	<i>September 2001 - July 2005</i>

EMPLOYMENT

Washington State University Department of Crop and Soil Science <i>Postdoctoral Research Associate</i>	<i>Jun 2019 - Dec 2022</i> Pullman, WA
Washington State University Department of Crop and Soil Science <i>Research Assistant</i>	<i>Jan 2019 - May 2019</i> Pullman, WA
Washington State University Department of EECS <i>Teaching/Research Assistant</i>	<i>May 2018 - Dec 2018</i> Pullman, WA
Washington State University STAR Program <i>Teaching Assistant</i>	<i>August 2015 - May 2018</i> Pullman, WA
Washington State University School of Mechanical Engineering <i>Teaching Assistant</i>	<i>January 2013 - May 2015</i> Pullman, WA
Washington State University Tensile Research Lab <i>Lab Assistant</i>	<i>May 2012 - December 2012</i> Pullman, WA
Self-employed <i>Middle School Science Tutor</i>	<i>December 2010 - August 2011</i> Huizhou, China
BoDa Plastic and Metal Ltd., Co <i>Product Manager</i>	<i>July 2008 - September 2009</i> Zengcheng, China

EXPERIENCE

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| Washington State University Department of Crop and Soil Science
<i>Postdoctoral Research Associate</i> | <i>Jun 2019 - Dec 2022</i>
Pullman, WA |
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- Developed AI4EVER MacOS software (<https://zzlab.net/AI4EVER>), by a hybrid of Swift and Python assists no computer programming skill users to construct, train, and validate machine learning/neural network models by mouse clicking and dragging on blocks in the graphical user interface (GUI).
 - Trained and implemented an auto-encoder neural network (Python, Tensorflow) that reproduces breast cancer fiber images and highlighted the key features by the dense layer from the auto-encoder network. The work is published in Cancers (<https://doi.org/10.3390/cancers13225857>)
 - Developed GridFree software (<https://zzlab.net/GridFree/>), by Python, with GUI, employed unsupervised machine learning methods (PCA, K-Means) for plant science researchers to extract areas of interest from images for item counting purposes or generating machine learning training dataset. The work is published in Plant Physiology (<http://dx.doi.org/10.1101/2020.07.31.231662>).

- Developed Rooster software (<https://zzlab.net/Rooster>), by Python build-in TkInter library, that automatically generates image training dataset by cropping an image into pieces and predicting each piece by plugging in pre-trained Neural Networks.
- Developed a website application, Audio4EDU (<https://zzlab.net/audio4edu/>), by Javascript and Python Django, that implement pre-trained neural network to mimic users' input voice, and generates audio documents that speech word-by-word from users' input text.
- Supervised graduate students in a wheat strip rust project, applying imaging analysis to predict disease state of the plants by their drone pictures.
- Supervised graduate students in a satellite-drone breeding project, pioneered applications of deep-learning neural networks in identify pixel-leveled farming fields from satellite images.

Washington State University Department of Crop and Soil Science Jan 2019 - May 2019
Research Assistant Pullman, WA

- Implemented an method to automatically extract boundaries of agricultural crop field from Satellite images.

Washington State University Software Engineering Principles I class Aug 2018 - Dec 2018
Teaching Assistant Pullman, WA

- Prepared and gave a 50 minutes Python lecture to 17 students regarding backend programming, debugging, web app deployment, and skills of using Git.
- Finished the class web app project (website, frontend, backend) in 3 days, and successfully deployed the web app on Heroku.
- Help students resolve problems of the class web application project (HTML/CSS, Javascript, Python flask ,and testing (Frontend&Backend).
- Grade class project and reading homework.

Washington State University Artificial Intelligence (AI) class Aug 2018 - Dec 2018
Teaching Assistant Pullman, WA

- Developed an application(Python) in 8 hours to grade around 80 AI homework submissions(C++) within 1 hour. Including unzip, compiling, testing, recording scores, and generating grading comments.
- Developed an application(Python) in 10 minutes to grade around 80 AI homework submissions (text) within 1 hour. Including taking a string input, parse the string, and grading the input with comments.
- Help students resolve problems of AI homework.
- Grade AI class around 80 students homework and exams.

Washington State University IRL lab May 2018 - August 2018
Research Assistant Pullman, WA

- Investigate teaching strategies (Java) that a Reinforcement Learning (RL) agent can apply to teach an RL student to play a complicated game
- Implement and investigate Support Vector Machine(SVM) in training the RL teacher to learn teaching strategies.

Washington State University STAR Program August 2015 - May 2018
Teaching Assistant Pullman, WA

- Tutor undergraduate students enrolled in different classes, Chem 101, Chem 105, Chem 106, and entry programming classes (Python, C, C++)
- Prepare weekly after-class practices and mock exams
- Joined in formulating lab report grading rubrics for engineering lab ENGR 107
- Help students complete ENGR 107 labs

- Graded engineering lab reports and mathematics homework of ENGR 107

Washington State University School of Mechanical Engineering January 2013 - May 2015
Teaching Assistant in engineering classes Pullman, WA

- Prepared and taught labs and regular lectures in engineering design class ME316
- Tutored students on class exercises in class ME316
- Graded homework and midterm exam sheets of engineering class ME310, ME316, and ME475
- Helped students finish homework

Washington State University Tensile Research Lab May 2012 - December 2012
Lab Assistant Pullman, WA

- Prepared pending test samples
- Conducted mechanical characteristic measurement of prepared samples
- Recorded experimental data

Self-employed December 2010 - August 2011
Middle School Science Tutor Huizhou, China

- Prepared review practices of chemistry and physics to help students prepare middle school graduation exam
- Tutored students for middle school graduation exam

BoDa Plastic and Metal Ltd., Co July 2008 - September 2009
Product Manager Zengcheng, China

- Led a project of manufacturing fruit basket by recycled polypropylene materials
- Explored formulas to improve durability of recycled materials
- Set up a test center and inspected qualities of recycled materials and products made from recycled materials
- Developed metrics for recycled raw material selection
- Built a system for piece-rate wage calculation for each product made by recycled materials
- Launched and carried out an internship program for freshly graduated college students

EDUCATION REALTE RESEARCH EXPERIENCE

Washington State University - Compute Science May 2015 - May 2019
Intelligent Tutoring System development Pullman, WA

- Research and investigate teaching strategies (Java) that a Reinforcement Learning(RL) teacher agent can apply to teach an RL student to play a complicated game (Pac-man). The teacher agent learns strategies to teach the student agent by balancing information collected from Support Vector Machine(SVM) models, and the student's situations.
- Developed two Intelligent Tutoring Systems from scratch
 - Developed a web app tutor system(Javascript, PHP, MySQL) in 3 months, with a self-explained user interface and simple human-computer interaction, comprises eight tasks, teaches people the principles of installing a smart-home kit. Enrolled 166 adults within a month from a crowdsourcing platform (Amazon's Mechanical Turk), and 20 within a month adults from Pullman, Washington. Collected data and analyzed them. The experiment results show participants like to use the ITS. Moreover, the ITS can help people save over 45 minutes to 1 hour of installing the smart-home kit.
 - Developed an Intelligent Tutoring System (Python) in 3 months from scratch, within a CAD software, with a user interface, human-computer interaction, and can teach over 100 ways for each 3D model. The system teaches college students to make CAD models in multiple ways. Enrolled

45 students in two months from Washington State University to have experimented with the ITS. Collected data and analyzed them. The results show students were confident of their learning and were interested in learning through multiple-solutions.

Washington State University - Mechanical Engineering November 2011 - December 2014
Product Design and Optimization Pullman, WA

- Developed a SolidWorks API application in 4 months in C# from scratch, with functions of recognizing 3D components' relationships, generating the architecture of 3D assembly models, computing the disassembly time, and giving design modification suggestions regarding reducing the disassembly time. The application implemented search algorithms to compute quantitative representations of 3D assembly models. The application can take any SolidWorks 3D assembly models as input and output disassembly time and design suggestions.

South China University of Technology - Material Science September 2005 - June 2008
Rootcanal filling material manufacturing Guangzhou, China

- Researched chemical and physical qualities of nano-silica, successfully prepared modified nano-silica
- Researched physical qualities of canal filling materials and developed a formula to improve durability in artificial saliva

Shenzhen University - Applied Chemistry January 2005 - May 2005
Fluorescence monomer preparation Shenzhe, China

- Researched chemical preparation procedure of 8-Hydroxylquinoline Aluminum
- Successfully prepared the chemical product and was verified having fluorescence

TECHNICAL STRENGTHS

Computer Languages	Python, Javascript, PHP, R, Swift, C#, C/C++, Java
Software	R Studio, MatLab, Octave, SolidWorks, AutoCAD, Creo Pro/E Abaqus, Photoshop, CoralDraw
Tools	Git

PUBLICATIONS

- Tang, Z., Wang, M., Schirrmann, M., Dammer, K.H., Li, X., Brueggeman, R., Sankaran, S., Carter, A., Pumphrey, M., **Hu, Y.**, Chen, X., and Zhang, Z., (2022). Affordable High Throughput Field Detection of Wheat Stripe Rust Using Deep Learning with Semi-Automated Image Labeling.
- **Hu, Y.**, Sjoberg, S.M., Chen, C., Hauvermale, A.L., Morris, C.F., Delwiche, S.R., Cannon, A.E., Steber, C.M. and Zhang, Z., (2022). As the number falls, alternatives to the Hagberg–Perten falling number method: A review. *Comprehensive Reviews in Food Science and Food Safety*.
- Keller, C.R., **Hu, Y.**, Ruud, K.F., VanDeen, A.E., Martinez, S.R., Kahn, B.T., Zhang, Z., Chen, R.K. and Li, W., (2021). Human Breast Extracellular Matrix Microstructures and Protein Hydrogel 3D Cultures of Mammary Epithelial Cells. *Cancers*, 13(22), p.5857.
- **Hu, Y.** and Zhang, Z. (2021). GridFree: a python package of imageanalysis for interactive grain counting and measuring. *Plant physiology*, 186(4), 2239-2252.
- Tang, Z., Parajuli, A., Chen, C.J., **Hu, Y.**, Revolinski, S., Medina, C.A., Lin, S., Zhang, Z. and Yu, L.X., 2021. Validation of UAV-based alfalfa biomass predictability using photogrammetry with fully automatic plot segmentation. *Scientific reports*, 11(1), pp.1-13.

- **Hu, Y.**, DJ Cook, ME Taylor. Study of Effectiveness of Prior Knowledge for Smart Home Kit Installation. *Sensors* 20.21 (2020): 6145.
- **Hu, Y.**, RM Wong, O Adesope, ME Taylor, Effects of a computer-based learning environment that teaches older adults how to install a smart home system. *Computers & Education*, 149 (2020): 103816.
- **Hu, Y.**, G. Ameta A Charts-Based Approach to Estimate Disassembly Time: Hypothesis, Model and Validation. *ASME. J. Manuf. Sci. Eng.* 2018;141(2):021009-021009-13. doi:10.1115/1.4042107.
- **Hu, Y.** and ME. Taylor, A Computer-Aided Design Intelligent Tutoring System Teaching Strategic Flexibility. *Transactions on Techniques in STEM Education*, 2016
- **Hu, Y.**, D. Tilke, T. Adams, A. Crandall, D. Cook, and M. Schmitter-Edgecombe. Smart home in a box: Usability study for a large scale self-installation of smart home technologies. *Journal of Reliable Intelligent Environments*, 2016, 2 (2), 93-106.
- **Hu, Y.** and ME Taylor. Work In Progress: A Computer-Aided Design Intelligent Tutoring System Teaching Strategic Flexibility. In *Proceedings of the ASEE's 123rd Annual Conference & Exposition*, New Orleans, LA, USA, June 2016.
- **Hu, Y.**, R. Srinivasan, J. Spoll, and G. Ameta., Graph Based Method and Tool for Complete and Selective Disassembly Time Estimation in Early Design, *Journal of Computing and Information Science in Engineering* 2015, 15 (3), 031005,
- **Hu, Y.** and G. Ameta, Life-Cycle Assessment and Eco-Design of a Wireless TV/VCR Remote, *ASME 2013 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, Portland, OR, USA, Aug 4 - 7, 2013.
- F Liu, **Hu, Y.**, Z Lin, J Ling, Y Luo, D Jia Preparation and properties of new resin root canal filling materials, *Acta Materiae Compositae Sinica*(Chinese), 2008, (06)
- Y Pang, B Liu, S Qing, L Sun, W Lv, **Hu, Y.** Influence of Methylic Modification on the Forming Membrane Performance of 8-Hydroxylquinoline Aluminum, *Journal of Materials Science and Engineering (Chinese)*, 2008,(06): 883-886
- ZM Lin, JQ Ling, F Liu, **Hu, Y.**, YT Jian, Preparation and stability assessment of a new resin root canal filling material, *Journal of Stomatology*(Chinese), 2007, (04)

POSTERS

- Yang Hu and Zhiwu Zhang. GridFree: A Python Package of Image Analysis for Object Counting and Measuring without Grid Restriction. *Plant & Animal Genome (PAG) Convergence XXVIII*, San Diego, CA, USA, Jan 11-15, 2020
- Yang Hu and Matthew E. Taylor. Work In Progress: A Computer-Aided Design Intelligent Tutoring System Teaching Strategic Flexibility. In *Proceedings of the ASEE's 123rd Annual Conference & Exposition*, New Orleans, LA, USA, June 2016.
- Y. Hu and G. Ameta , Graph based automatic computation of product disassembly time from assembly models, *Wiley Research Exposition*, 2013, WSU, Pullman, WA
- Y. Hu and G. Ameta , Automatic Selective Disassembly Time Computation and Product Architecture Redesign Suggestion, *ASME 2013 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, Portland, OR, USA, Aug 4 - 7, 2013.
- Srinivasan R., Hu Y. and G. Ameta , Estimating Selective Disassembly Time using Disassembly Graph based on Connective Complexity Metrics, *International Design Engineering Technical Conference-2012/ Computers and Information in Engineering*, Chicago, IL, USA, Aug 11 - 14, 2012. (CIE Poster Award)

CONFERENCE PRESENTATION

- Yang Hu and Zhiwu Zhang. GridFree: A Python Package of Image Analysis for Object Counting and Measuring without Grid Restriction. Plant & Animal Genome (PAG) Convergence XXVIII, San Diego, CA, USA, Jan 11-15, 2020
- Yang Hu, Chunpeng(James) Chen¹, Zhou Tang¹, Long-Xi Yu and Zhiwu Zhang High Throughput Image Techniques in Breeding, "Gene Mapping by Segregation Workshop" Workshop, Plant & Animal Genome (PAG) Convergence XXVIII, San Diego, CA, USA, Jan 11-15, 2020
- Yang Hu and Ameta G., Life-Cycle Assessment and Eco-Design of a Wireless TV/VCR Remote , ASME 2013 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, Portland, OR, USA, Aug 4 - 7, 2013.

INVOLVEMENT

- *Boeing Coding Camp Instructor*, teach middle school students programming in Python, including conditions, data structure, and calling functions from Python packages, 2022-2022
- *Language Tutor*, teach two adults Chinese Mandarin Language, including speak practices, grammars, and writing practices, 2017-2020
- *Mathematic Tutor*, teach a high school student algebra, geometry, pre-calculus, and mathematic problem solving strategies, 2013-2017.
- *Volunteer*, provide manicures to senior citizens at Whitman Senior Living Community, September 2015.
- *ASME Paper Reviewer*, American Society of Mechanical Engineers (ASME) International Design Engineering and Technical Conference/Computers and Information in Engineering, 2013 and 2014
- *Language Tutor*, facilitate willingly Chinese Language study group of 4-6 people, develop and utilize lesson plans and teaching materials for basic to intermediate words, January 2013- March 2014
- Graphic designer, designed fliers and posters for college evening party, seminars and campus events, October 2001 - September 2007

AWARDS/GRANT

- Grant, \$40,000, received from Washington State University, Commercial Gap Fund, Dec 2021
- Grant, \$7,000, received from Washington Wheat Foundation Grant, July 2021
- Grant, \$7,000, received from Washington Wheat Foundation Grant, July 2020