Haozhou Wang (王浩舟)

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Graduate School of Agricultural and Life Sciences, The University of Tokyo.

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Research Interests

- High-throughput plant 3D phenotyping.
- Digital twin virtual plant model and multi-sensory data fusion.
- Open-source agricultural phenotyping tool and dataset development.

Featured Projects and Publications

3DPotatoTwin dataset *huggingface dataset*

Dataset intended to help train and benchmark multi-sensory fusion and shape completion algorithms specifically for applications involving actual potato tuber harvesting.

- **Wang, H.**, Blok, P. M., Burridge, J., Jiang, T., Miyauchi, M., et al. (2025). 3DPotatoTwin: A Paired Potato Tuber Dataset for 3D Multi-Sensory Fusion (in Press). In: *Plant Phenomics* 7.4, p. 100123. DOI: 10.1016/j.plaphe.2025.100123 ;
- **Citations**: 0; **Reported** by 日本日経新聞

Broccoli harvest date prediction application *github repo*

A demonstrable application of aerial phenotyping technology to assist farmers in optimizing financial returns and minimizing food waste.

- **Wang, H.**, Li, T., et al. (2023). Drone-Based Harvest Data Prediction Can Reduce On-Farm Food Loss and Improve Farmer Income. In: *Plant Phenomics* 5, p. 0086. DOI: 10.34133/plantphenomics.0086 ;
- **Citations**: 21; **Reported** by EurekAlert!, 日本日経新聞, and 新京报

EasyIDP intermediate data processing tool *github repo*

A handy tool for dealing with region of interest (ROI) on the image reconstruction (Metashape & Pix4D) outputs, mainly in agriculture applications.

- **Wang, H.**, Duan, Y., et al. (2021). EasyIDP: A Python Package for Intermediate Data Processing in UAV-based Plant Phenotyping. In: *Remote Sensing* 13.13, p. 2622. DOI: 10.3390/rs13132622.
- **Citations**: 40; **Github stars**: 47; **Tools Used**: Python, PyPi, Readthedocs;

UAV-HiRAP data processing platform *uav-hirap.org*

An open-source and web-based platform which provides service for image classification.

- **Wang, H.**, Han, D., et al. (2019). Landscape-Level Vegetation Classification and Fractional Woody and Herbaceous Vegetation Cover Estimation over the Dryland Ecosystems by Unmanned Aerial Vehicle Platform. In: *Agricultural and Forest Meteorology* 278, p. 107665. DOI: 10.1016/j.agrformet.2019.107665 ;
- **Citations**: 45; **Tools Used**: Python, Flask, Bootstrap, Nginx;

Professional Positions

Project Research Assistant *Tokyo, Japan*
The University of Tokyo *Oct. 2023 –present*

- Aerial sensing system for detecting abnormal potatoes and guiding in-field positioning.
- A 3D paired potato tuber dataset for close-range multi-sensor data fusion.
- Integration of Metashape stag-markers for occlusion-tolerant high-quality in-field reconstruction.
- Structural modeling and growth prediction framework for 3D virtual plants and digital twin.

Education

The University of Tokyo *Oct. 2020 –Sept. 2023*
Doctor in Agricultural Science

Thesis title: Studies on 3D-based plant phenotyping by multi-scale data fusion.

The University of New Brunswick *Sept. 2017 –Dec. 2019*
Master of Science in Forestry

Thesis title: Estimating Forest Attributes from Spherical Images.

The Nanjing Forestry University *Sept. 2013 –Jun. 2017*
Bachelor of Science in Ecology

Thesis title: Extracting DBH Measurements from RGB Photo Images.

Publications

Book Chapters (1 entries)

Wang, H., Guo, W. (2024). EasyIDP V2.0: An Intermediate Data Processing Package for Photogrammetry-Based Plant Phenotyping. In: *Harnessing Data Science for Sustainable Agriculture and Natural Resource Management*. Ed. by M. S. Raval, S. Chaudhary, J. Adinarayana, and W. Guo. Vol. 161. Singapore: Springer Nature Singapore, pp. 149–172. DOI: 10.1007/978-981-97-7762-4_7.

Patent (1 entries)

Wang, F., Han, D., **Wang, H.**, Lu, Q., Pan, X. (2017). Landscape-Scale Vegetation Coverage Calculation Method and System Based on Unmanned Aerial Vehicle. Pat. CN106403904A (CN). Chinese Academy of Forestry.

Journal articles (22 entries)

Blok, P. M., Magistri, F., Stachniss, C., **Wang, H.**, Burridge, J., Guo, W. (2025). High-Throughput 3D Shape Completion of Potato Tubers on a Harvester. In: *Computers and Electronics in Agriculture* 228, p. 109673. DOI: 10.1016/j.compag.2024.109673.

Li, H., Liu, H., Wang, W., **Wang, H.**, Yu, Q., Qian, J., Wu, W., Shi, Y., Geng, C. (2025). A Point-Supervised Algorithm with Multiscale Semantic Enhancement for Counting Multiple Crop Plants from Aerial Imagery. In: *Computers and Electronics in Agriculture* 234, p. 110289. DOI: 10.1016/j.compag.2025.110289.

Liu, H., Li, H., **Wang, H.**, Liu, C., Qian, J., Wang, Z., Geng, C. (2025). Improved Detection and Location of Small Crop Organs by Fusing UAV Orthophoto Maps and Raw Images. In: *Remote Sensing* 17.5, p. 906. DOI: 10.3390/rs17050906.

Wang, H., Blok, P. M., Burridge, J., Jiang, T., Miyauchi, M., Miyamoto, K., Tanaka, K., Guo, W. (2025). 3DPotatoTwin: A Paired Potato Tuber Dataset for 3D Multi-Sensory Fusion (in Press). In: *Plant Phenomics* 7.4, p. 100123. DOI: 10.1016/j.plaphe.2025.100123.

Wang, Z. et al. (2025). The Global Wheat Full Semantic Organ Segmentation (GWFSS) Dataset. In: *Plant Phenomics*, p. 100084. DOI: 10.1016/j.plaphe.2025.100084.

Zhang, W., Zheng, C., Wang, C., Blok, P. M., **Wang, H.**, Guo, W. (2025). GrapeCPNet: A Self-Supervised Point Cloud Completion Network for 3D Phenotyping of Grape Bunches. In: *Computers and Electronics in Agriculture* 237, p. 110595. DOI: 10.1016/j.compag.2025.110595.

Zhou, J. et al. (2025). Global Rice Multiclass Segmentation Dataset (RiceSEG): Comprehensive and Diverse High-Resolution RGB-Annotated Images for the Development and Benchmarking of Rice Segmentation Algorithms. In: *Plant Phenomics*, p. 100099. DOI: 10.1016/j.plaphe.2025.100099.

Zhang, W., Peng, X., Bai, T., **Wang, H.**, Takata, D., Guo, W. (2024). A UAV-Based Single-Lens Stereoscopic Photography Method for Phenotyping the Architecture Traits of Orchard Trees. In: *Remote Sensing* 16.9, p. 1570. DOI: 10.3390/rs16091570.

Drofova, I., Guo, W., **Wang, H.**, Adamek, M. (2023). Use of Scanning Devices for Object 3D Reconstruction by Photogrammetry and Visualization in Virtual Reality. In: *Bulletin of Electrical Engineering and Informatics* 12.2, pp. 868–881. DOI: 10.11591/eei.v12i2.4584.

Wang, H., Li, T., Nishida, E., Kato, Y., Fukano, Y., Guo, W. (2023). Drone-Based Harvest Data Prediction Can Reduce On-Farm Food Loss and Improve Farmer Income. In: *Plant Phenomics* 5, p. 0086. DOI: 10.34133/plantphenomics.0086.

Zhang, W., Peng, X., Cui, G., **Wang, H.**, Takata, D., Guo, W. (2023). Tree Branch Skeleton Extraction from Drone-Based Photogrammetric Point Cloud. In: *Drones* 7.2, p. 65. DOI: 10.3390/drones7020065.

Dai, X., Ducey, M. J., **Wang, H.**, Yang, T.-R., Hsu, Y.-H., Ogilvie, J., Kershaw, J. A. (2021). Biomass Estimates Derived from Sector Subsampling of 360 Spherical Images. In: *Forestry: An International Journal of Forest Research* 94.4, pp. 565–575. DOI: 10.1093/forestry/cpab023.

Dai, X., Ducey, M. J., Kershaw, J. A., **Wang, H.** (2021). Sector Subsampling for Basal Area Ratio Estimation: An Alternative to Big BAF Sampling. In: *Canadian Journal of Forest Research* 51.8, pp. 1–9. DOI: 10.1139/cjfr-2020-0496.

David, E. et al. (2021). Global Wheat Head Detection 2021: An Improved Dataset for Benchmarking Wheat Head Detection Methods. In: *Plant Phenomics* 2021, p. 9846158. DOI: 10.34133/2021/9846158.

Feldman, A., **Wang, H.**, Fukano, Y., Kato, Y., Ninomiya, S., Guo, W. (2021). EasyDCP: An Affordable, High-Throughput Tool to Measure Plant Phenotypic Traits in 3D. In: *Methods in Ecology and Evolution* 12.9, pp. 1679–1686. DOI: 10.1111/2041-210X.13645.

Hsu, Y.-H., Kershaw, J. A., Ducey, M. J., Yang, T.-R., **Wang, H.** (2021). Sampling with Probability Proportional to Prediction (3P Sampling) Using Covariates Derived from Spherical Images. In: *Canadian Journal of Forest Research* 51.8, pp. 1140–1147. DOI: 10.1139/cjfr-2020-0498.

Wang, H., Duan, Y., Shi, Y., Kato, Y., Ninomiya, S., Guo, W. (2021). EasyIDP: A Python Package for Intermediate Data Processing in UAV-based Plant Phenotyping. In: *Remote Sensing* 13.13, p. 2622. DOI: 10.3390/rs13132622.

Wang, H., Yang, T.-R., Waldy, J., Jr, J. A. K. (2021). Estimating Individual Tree Heights and DBHs from Vertically Displaced Spherical Image Pairs. In: *Mathematical and Computational Forestry & Natural-Resource Sciences (MCFNS)* 13.1 (1), pp. 1–14.

Zhao, L., Guo, W., Wang, J., **Wang, H.**, Duan, Y., Wang, C., Wu, W., Shi, Y. (2021). An Efficient Method for Estimating Wheat Heading Dates Using UAV Images. In: *Remote Sensing* 13.16, p. 3067. DOI: 10.3390/rs13163067.

Wang, H., Kershaw, J. A., Yang, T.-R., Hsu, Y.-H., Ma, X., Chen, Y. (2020). An Integrated System for Estimating Forest Basal Area from Spherical Images. In: *Mathematical and Computational Forestry & Natural-Resource Sciences* 12.1, pp. 0–14.

Wang, H., Han, D., Mu, Y., Jiang, L., Yao, X., Bai, Y., Lu, Q., Wang, F. (2019). Landscape-Level Vegetation Classification and Fractional Woody and Herbaceous Vegetation Cover Estimation over the Dryland Ecosystems by Unmanned Aerial Vehicle Platform. In: *Agricultural and Forest Meteorology* 278, p. 107665. DOI: 10.1016/j.agrformet.2019.107665.

Han, D., **Wang, H.**, Zheng, B., Wang, F. (2018). Vegetation Type Classification and Fractional Vegetation Coverage Estimation for an Open Elm (*Ulmus Pumila*) Woodland Ecosystem during a Growing Season Based on an Unmanned Aerial Vehicle Platform Coupled with Decision Tree Algorithms. In: *Acta Ecologica Sinica* 38.18, pp. 6655–6663. DOI: 10.5846/stxb201803300694.

Conference proceedings (17 entries)

Wang, H., Gong, Z., Liu, H., Li, H., Guo, W., Su, B., Shi, Y. (2025). Camera Align and Folder Drag Are All You Need: Rapid Crop Lodging Aerial Assessment without Segmentation. Oral. Tokyo, Japan: Seventh International Workshop on Machine Learning for Cyber-Agricultural Systems (MLCAS2025).

Wang, H., James, C., Chapman, S. C., Guo, W. (2025). StagGCP: A Metashape Plugin for Using STag as Robust Ground Control Points for In-Field Agricultural 3D Reconstruction. Oral. Kyoto, Japan: Annual Conference of the Japanese Society of Agricultural Informatics 2025 (農業情報学会 JSAI 2025 年次大会).

Wang, H., Blok, P. M., Burridge, J., Jiang, T., Guo, W. (2024). 3DPotatoTwin: Paired 3D Dataset of Potato Tubers for Plant Phenotyping Applications. Poster. Jeju International Convention Center (ICC JEJU), Jeju, Korea: The 6th CIGR International Conference 2024 (CIGR2024).

Wang, H., Inoshishi, S., Shimizu, M., Kato, T., Guo, W. (2024). Drone-Based Multi-spectral Pipeline for Detecting Abnormal Potato Strains in the Field. Oral. Tsukuba International Congress Center, Tsukuba, Japan: The 14th Asia-Pacific Federation for Information Technology in Agriculture 2024 (APFITA2024).

Wang, H., Tang, L., Nishida, E., Fukano, Y., Kato, Y., Guo, W. (2023a). Virtual Broccoli Farmland by Fusing Close-Range and Aerial Phenotyping. Oral. Sarabetsu Village, Hokkaido, Japan: Fifth International Workshop on Machine Learning for Cyber-Agricultural Systems (MLCAS2023).

Wang, H., Tang, L., Nishida, E., Fukano, Y., Kato, Y., Guo, W. (2023b). Virtual Broccoli Farmland Implementation by Drone-Based Phenotyping and Cross-Scale Data Fusion. Oral. Guangzhou, China: The 10th International Horticulture Research Conference (IHRC2023).

Wang, H., Kato, Y., Guo, W. (2022). Procedural Geometric Modeling for Plant Phenomics by Blender: Case Study of Maize. Oral. Kyoto, Japan: Annual Conference of the Japanese Society of Agricultural Informatics 2022 (農業情報学会 2022 年次大会, JSAI2022).

Wang, H., Tang, L., Nishida, E., Fukano, Y., Kato, Y., Guo, W. (2022). Estimate Optimal Harvest Time by Cross-scale Assimilated Digital Broccoli Farmland. Poster. Wageningen, Netherlands.: 7th International Plant Phenotyping Symposium: "Plant Phenotyping for a Sustainable Future".

Wang, H., Tang, L., Nishida, E., Fukano, Y., Kato, Y., Guo, W. (2021). Cost-Efficient Broccoli Head Phenotyping Using Aerial Imagery and SfM-based Weakly Supervised Learning. Nanjing, Jiangsu, China: The 8th International Horticulture Research Conference.

Wang, H., Yoichiro, K., Guo, W. (2021a). EasyIDP: A Python Package for Intermediate Data Processing in UAV Based Plant Phenotyping. Zoom online, Tokyo, Japan.: Annual Conference of the Japanese Society of Agricultural Informatics 2021 (農業情報学会 2021 年次大会, JSAI2021).

Wang, H., Yoichiro, K., Guo, W. (2021b). EasyIDP: A Python Package for Intermediate Data Processing in UAV Based Plant Phenotyping. Zoom online, Tokyo, Japan.: The 1th Research Meeting of Society of Trans-disciplinary Plant Sciences (超分野植物科学研究会第１回研究集会, TDPS2021).

Feldman, A., **Wang, H.**, Fukano, Y., Kato, Y., Ninomiya, S., Guo, W. (2020). Affordable High-Throughput Processing of Handheld Camera Images of Container Plants to Phenotypic Data. Tucson Convention Center, Tucson, Arizona, USA.: Phenome 2020, p. 1.

Feldman, A., **Wang, H.**, Fukano, Y., Guo, W. (2019). Affordable High-Throughput Processing of Multi-Scale Images to Phenotypic Data. Nanjing Dongjiao State Guesthouse, Nanjing, Jiangsu, China.: The 6th International Plant Phenotyping Symposium, p. 1.

Wang, H., Kershaw, J. A. (2019). Estimating Forest Attributes from Spherical Images. Oral, Poster. Kamloops Hotel and Conf. Center, Kamloops, British Columbia, Canada: The Western Mensurationists 2019 Annual Meeting.

Wang, H., Kershaw, J. A. (2018). Measuring Plant Area Index (PAI) from Panorama Photo Images. Oral. Wu Conference Center, Fredericton, New Brunswick, Canada.: The 25th Annual UNB Graduate Research Conference (GRC).

Wang, H., Kershaw, J. A. (2017). Extracting DBH Measurements from RGB Photo Images. Oral. New York, U.S: The Northeastern Mensurationists 2017 Annual Meeting.

Wang, H., Wang, F., Yao, X., Mu, Y., Bai, Y., Lu, Q. (2017). UAV-HiRAP: A Novel Method to Improve Landscape-Level Vegetation Classification and Coverage Fraction Estimation with Unmanned Aerial Vehicle Platform. Oral. Beijing, China: The 12th International Congress of Ecological (INTECOL).

Awards

The 6th CIGR international conference young researcher travel award.	*May 2024*
The 12th JSAI (農業情報学会年次大会) young researcher innovation award.	*May 2021*
The third prize of the 8th Liang Xi youth paper award (梁希青年论文奖).	*Nov 2020*
The first place for oral presentation on 25th UNB GSA Conference.	*May 2018*