

Dewi Endah Kharismawati

Curriculum Vitae

Ph.D Candidate

University of Missouri Department of Electrical Engineering and Computer Science

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EDUCATION

Ph.D, Computer Science, University of Missouri, Columbia

Department of Electrical Engineering and Computer Science (EECS)

Anticipated Graduation in May 2025

B.Sc, Computer Science, Minor in Mathematics, University of Missouri, Columbia

Department of Electrical Engineering and Computer Science, 2017

ACADEMIC EXPERIENCE

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| 2019-present | Research Assistant to Dr. Toni Kazic, Department of Electrical Engineering and Computer Science, University of Missouri |
| 2018-present | Teaching Assistant to Dr. Yunxin Zhao, Department of Electrical Engineering and Computer Science, University of Missouri |
| 2018 | Student Researcher to Dr. John Lorry, Division of Plant Science and Technology Extension, University of Missouri |

INDUSTRY EXPERIENCE

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| 2017 | Supply Chain Management Intern, Merck Indonesia, Jakarta, Indonesia

Optimized the balance of product supply and demand for the Biopharma department by delivering precise sales forecasts for key months, which led to the development of a more efficient delivery and logistics method, resulting in both cost and time savings. |
| 2015 | Information Service Intern, Phillip Morris International, Jakarta, Indonesia

Developed an integrated Supply Chain Management dashboard to improve visibility and transparency for customers and stakeholders by implementing a database synchronization system that reduced manual administrative efforts. |

PUBLICATIONS

- 2020 **Kharismawati, D. E.**, Akbarpour, H. A., Aktar, R., Bunyak, F., Palaniappan, K., and Kazic, T. (2020). CorNet: unsupervised deep homography estimation for agricultural aerial imagery. In *16th European Conference on Computer Vision 2020 (ECCV2020)*, eds. V. Ferrari, B. Fisher, C. Schmid, and E. Trucco. 402–419. doi:10.1007/978-3-030-65414-6_28
- 2020 Aktar, R., **Kharismawati, D. E.**, Palaniappan, K., Aliakbarpour, H., Bunyak, F., Stapleton, A. E., et al. (2020). Robust mosaicking of maize fields from aerial imagery. *Appl. Plant Sci.* 8, e11387. doi:10.1002/aps3.11387

Under Review

- 2024 **Kharismawati, D. E.**, and Kazic, T. (2024). Pointillist Maize: 3D Reconstruction of Field Plants from Aerial Video.

MANUSCRIPTS IN PREPARATION

- Kharismawati, D. E.**, and Kazic, T. MaiZaic: a robust end-to-end pipeline to mosaic aerial RGB video using optical flow and unsupervised neural network.
- Kharismawati, D. E.**, Bunyak, F., Palaniappan, K., and Kazic, T. Stand-Cornter: An End-to-End Automatic Stand Count for Seedling Maize Using YOLOv9 on mosaic and raw frames.
- Kharismawati, D. E.**, and Kazic, T. Low Cost and Non-Invasive Maize 3D Reconstruction with SfM, NeRF, and Gaussian Splatting.
- Kharismawati, D. E.**, and Kazic, T. Seedling Maize Detection Dataset.

REFEREED CONFERENCE PAPER PRESENTATIONS

- 2024 **Kharismawati, D. E.**, and Kazic, T. Stand-Cornter: An End-to-End Automatic Stand Count for Seedling Maize Using YOLOv9. 8th International Plant Phenotyping Symposium. Nebraska, USA, October.
- 2024 **Kharismawati, D. E.**, and Kazic, T. Low Cost and Non-Invasive Maize 3D Reconstruction with SfM, NeRF, and Gaussian Splatting. Machine Learning for Cyber-Agricultural Systems 2024 (MLCAS2024). Nebraska, USA, October.
- 2023 **Kharismawati, D. E.**, and Kazic, T. Building 3D Models of Field-Grown Maize. Machine Learning for Cyber-Agricultural Systems 2023 (MLCAS2023). Hokkaido, Japan, July [Hybrid]. [Extended abstract](#)
- 2023 Ndubuisi, C., **Kharismawati, D. E.**, and Kazic, T. Imaging Maize Lesions. North American Plant Phenotyping Network Meeting 2022, Missouri, USA, February. [Abstract](#)
- 2022 **Kharismawati, D. E.**, Bunyak, F., Palaniappan, K., and Kazic, T. *DeepMaizeCounter (DMC)*: Smarter Stand Counts for Seedling Maize from Mosaic Imagery with YOLOv4. North American Plant Phenotyping Network Meeting 2022, February. [Virtual]. [Abstract](#)
- 2021 **Kharismawati, D. E.**, Akbarpour, H. A., Aktar, R., Bunyak, F., Palaniappan, K., and Kazic, T. 3D plant morphology in the field: experiments with a consumer LiDAR device. Machine Learning for Cyber-Agricultural Systems 2021 (MLCAS2021), 2021 [Virtual] [Abstract and slide presentation](#)

- 2021 **Kharismawati, D. E.**, Aktar, R., Bunyak, F., Palaniappan, K., and Kazic, T. *CorNetv2: Deep Learning for Mosaicking Maize Field*. North American Plant Phenotyping Network Meeting, Georgia, USA, 2021 [Virtual]. [Presentation](#)
- 2020 **Kharismawati, D. E.**, Akbarpour, H. A., Aktar, R., Bunyak, F., Palaniappan, K., and Kazic, T. *CorNet: Unsupervised Deep Homography Estimation on Agricultural Aerial Imagery*. European Conference on Computer Vision (ECCV) the Computer Vision Problems in Plant Phenotyping (CVPPP) workshop, Glasgow, Scotland, 2020 [Virtual]. [Presentation](#)
- 2019 **Kharismawati, D. E.**, Akbarpour, H. A., Aktar, R., Bunyak, F., Palaniappan, K., and Kazic, T. *Deep Learning to Estimate Homography Matrices for Maize Stand Counts from UAV Imagery*. Midwest Big Data Hub, Kansas, USA, 2019. [Poster](#)

OTHER CONFERENCES

- 2019 Executive Women's Forum National Conference 2019, Arizona, USA.
- 2015 Singapore Maker Faire 2015, Tampines, Singapore.
- 2014 Challenges of ASEAN-ROK Issues from Young Generation Perspective, ASEAN Cyber University Ambassadorial Scholar Program, Gyeonggi, South Korea.
- 2013 6th Science Conclave, Indian Institute of Information Technology, Allahabad, India.

RESEARCH EXPERIENCE

Graduate Research Assistant

University of Missouri, Columbia, Missouri, United States

Advisor: Dr. Toni Kazic

January 2019 – Present

Developed five innovative end-to-end pipelines leveraging deep learning and computer vision to analyze complex maize phenotypes, specialized in autonomous systems, remote sensing, image registration, object detection, segmentation, and 3D reconstructions:

1. Developed *MaiZaic*, a robust pipeline for mosaicking freely flown aerial RGB video, contributing five novel features to the project: dynamic frame sampling, automated calibration, unsupervised homography estimation (*CorNetv3*), shot detection, and mini-mosaics to minimize error accumulation. Achieved 96.5% accuracy compared to ground truth, an 11% improvement over ASIFT.
2. Built *CorNet*, an unsupervised deep homography estimation pipeline to mosaic aerial imagery without telemetry, utilizing VGG8 architecture with Python, TensorFlow, and OpenCV. *CorNet* achieved 10x faster processing with comparable accuracy to ASIFT.
3. Created *DeepMaizeCounter (DMC)*, an advanced stand-counting algorithm for seedling maize using YOLOv4, YOLOv7, and YOLOv9. Automated row and range detection, and created a seedling maize dataset categorized into three population classes. Achieved an r^2 of 0.906 on raw frames and 0.616 on fragmented mosaics.
4. Developed *PointillistMaize*, generating 3D maize reconstructions from 360° aerial videos using Structure from Motion (SfM), Neural Radiance Fields (NeRF), and Gaussian Splatting. Comparative analysis demonstrated that NeRF produces 90.4% of points and computes 7.3 times faster than SfM, while Gaussian Splatting produces 8.1% of points and operates 3.0 times faster than SfM.

5. Collaborated on the development of Video Mosaicking and Summarization (VMZ), a robust mosaicking of maize fields from aerial imagery, achieved over 95% SSIM across all test datasets through precise camera calibration in Python and MATLAB.
6. Participated in agricultural activities, including planting, nurturing, pollinating, and harvesting corn during field seasons

Student Researcher

University of Missouri, Columbia, Missouri, United States

Advisor: Dr. John Lory

March 2018 – December 2018

Stitched high-resolution aerial imagery using Pix4D for precise mapping in the University of Missouri Strip Trial Program, followed by segmentation of corn and soil areas to extract green values using Excess Green (ExG) and Red-Green (RG) indices to assess nitrogen deficiency across fields, providing actionable recommendations for targeted nitrogen spray applications in deficient zones. Conducted detailed statistical analysis of UAV imagery, including creating field layouts and performing spatial analysis to forecast preliminary harvest outcomes using ArcMap.

TEACHING EXPERIENCE

Courses Taught as a Teaching Assistant

CMP_SC 2270 Introduction to Digital Logic

3 credits Spring 2018 – present

Class Enrollment Average = 70

University of Missouri, Columbia, Missouri, United States

Conducted weekly office hours to provide individualized assistance and clarify course materials, managed attendance records, and supported the creation and administration of assignments, exams, and grading.

TECHNICAL SKILLS

Programming Languages: Python, MATLAB, Java, C, C++, JavaFXML

Libraries: Open3D, NumPy, SciPy, OpenCV, Matplotlib

Frameworks: PyTorch, TensorFlow, Keras, Scikit-Learn

Web Technologies: PHP, HTML, CSS

Databases: MySQL, MongoDB

Version Control: GitHub

Cloud Computing: Google Cloud, Azure, AWS

Operating Systems: Linux, MacOS

Typesetting/Markup Languages: LaTeX

Projects

PointillistMaize | Developer

Github Repository (Currently Private): <https://github.com/dek8v5/PointillistMaize>

- Using Structure from Motion – Multiview Stereo, Neural Radiance Field, and Gaussian Splatting to get Maize 3D point clouds
- SfM-MVS achieved 93.38% accuracy, NeRF 90.18%, and Gaussian Splatting 89.37%
- Technology used: Python, C++, PyTorch, Open3D

DeepMaizeCounter(DMC) | Developer

Github Repository (currently private): <https://github.com/dek8v5/DMC-DeepMaizeCounter>

- automated stand-counting pipeline processing freely flown videos captured by UAVs
- Two modes based on the source image: one mode patchifies the mosaic and feeds it to YOLOv9 for detection, while the other mode feeds the raw frames to YOLOv9, then mosaics both the frames and their bounding boxes using homography matrices
- Mosaic mode achieved an R^2 of 0.616, while the raw frames mode achieved an R^2 of 0.906
- Technology used: Python, PyTorch, OpenCV, Numpy, SciPy

MaiZaic | Developer

Github Repository (currently private): <https://github.com/dek8v5/MaiZaic>

- An end-to-end mosaicking algorithm that takes videos from UAV aerial imagery
- 5 novel contributions: dynamic sampling with optical flow, automatic lens calibration, homography Estimation with Cornetv3, shot detection via UAV movement analysis, and mini mosaicking to minimize error accumulation.
- 96.5% accuracy compared to ground truth, an 11% improvement over ASIFT.
- Technology used: Python, Tensorflow, OpenCV, Numpy, SciPy, Matplotlib

CorNet | Developer

Github Repository: <https://github.com/dek8v5/CorNet>

- Unsupervised Homography Estimation
- Achieved 10x faster with comparable quality to ASIFT
- Created the training and testing dataset from freely flown uav aerial imagery collected over maize field
- Technology used: Python, Tensorflow, OpenCV, Numpy

Malaria detection | Developer

Github Repository:

https://github.com/dek8v5/Malaria_detection_with_Faster-RCNN_and_YOLOv3

- Malaria detection and counting using Faster R-CNN and YOLOv3.
- Faster R-CNN achieved F1 score of 67.3%, while YOLOv3 achieved 61.2%.
- Technology used: Python, Keras, Numpy

Forest Cover Estimation | Developer

Github Repository: https://github.com/dek8v5/clustering_forest_cover

- Compared clustering performance using hierarchical, spectral, k-means, Gaussian Mixture Model, and agglomerative clustering algorithms for forest cover estimation.
- Spectral Clustering achieved NMI of 0.42 and Accuracy of 51.1%
- Technology used: Matlab

Fuzzy Clustering | Developer

Github Repository: https://github.com/dek8v5/fuzzy_clustering

- Implemented and compared clustering performance using fuzzy c-means, fuzzy local information c-means, probabilistic local information c-means, and sequential possibilistic local information c-means for image clustering.
- Technology used: Matlab

Nuclei Segmentation | Developer

- Implemented Mask R-CNN algorithm for nuclei segmentation in Kaggle Data Science Bowl 2018.
- Achieved IoU of 0.503
- Technology used: Python, Keras, and TensorFlow.

Mitochondria Segmentation | Developer

- Implemented Mask R-CNN for mitochondria segmentation on CA1 3D electron microscopy
- Achieved a Jaccard score of 0.68.
- Technology used: Python, Keras, and TensorFlow.

Operating System Controller Using Hand Gestures | Developer

Github repository:

https://github.com/dek8v5/Capstone2_operating_system_controller_using_hand_gestures

- Developed an application to control operating system with Leap Motion 3D Camera and decision tree algorithm.
- Technology used: Java and JavaFXML.

CERTIFICATIONS

FAA Part 107 Remote Pilot Certificate with over 200 hours flying experience

AWARDS & HONORS

2019	Teaching Assistant Choice Award for 2018-2019 Academic Year
2018	Upsilon Pi Epsilon, International Honor Society for the Computer Science and Information Technology, University of Missouri
2017	Graduated with Honor – Cum Laude, University of Missouri
2014	Second place on the final presentation in education sector at the ASEAN Cyber University Ambassadorial Scholar Program
2014	Phi Theta Kappa, Beta Phi Nu Chapter, International College Honor Society, Lone Star College Jakarta

SCHOLARSHIPS

\$23,000	Department of Electrical engineering and computer Science assistantship, University of Missouri, annually, 2018-present
\$1,000	NSF Travel Grant Awardee of 8 th International Plant Phenotyping Symposium, 2024
\$500	Department of Electrical Engineering and Computer Science Conference Travel Grant 2024
\$2,000	Curator's Grant-in-Aid Scholarship International student grant, University of Missouri, annually, 2016-2017
\$95,000	Putera Sampoerna Foundation Scholarship for Undergraduate Degree, 2013-2017

SERVICE

Service to the Profession

Reviewer, 7th workshop on Computer Vision in Plant Phenotyping and Agriculture, 2021

Service to the University of Missouri and Department

Volunteer, Mizzou College of Agriculture, Food and Natural Resources Showcase, 2024

Mentor, Evelyn Wilbur, Undergraduate Research, 2024 – present

Mentor, Alondra Conchas-Sanchez, Undergraduate Research, 2023 – present

Volunteer, Mizzou South Farm Research Center Showcase, 2019

Vice President, Missouri Indonesian Student Association, 2016-2017

Historian, Upsilon Pi Epsilon, 2016-2017

International Ambassador, Mizzou International Center, 2016-2017

Mentor, prospective masters and doctoral international students in computer science, 2019-present

Member, Interdisciplinary Plant Group University of Missouri, 2019-present

Director of Publicity team, Missouri International Student Council, 2015-2016

Volunteer, International Student Orientation, 2016

Service to the Community

Volunteer, Mizzou Alternative Break Albuquerque, 2016

Vice President and founder, Phi Theta Kappa, Lone Star College Jakarta, 2014

MEDIA APPEARANCE

Tim Mata Bandung, (2024, September). *CorNet: Mengembangkan Pertanian Indonesia dengan Drone dan Artificial Intelligence*. [*CorNet: Developing Indonesian Agriculture with Drones and Artificial Intelligence*.] (<https://matabandung.pikiran-rakyat.com/pendidikan/pr-1828599991/cor-net-mengembangkan-pertanian-indonesia-dengan-drone-dan-artificial-intelligence?page=all>)

REFERENCES

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Hadi Ali Akbarpour

Assistant Professor

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St. Louis University
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Teaching References

Yunxin Zhao

Professor

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