

ALI MOGHIMI

Digital Agriculture Lab
Department of Biological and Agricultural Engineering
University of California, Davis
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EDUCATION

- Ph.D. Bioproducts and Biosystems Science, Engineering and Management** *Feb. 2019*
Ph.D. Computer Science & Engineering
(minor)
University of Minnesota - Twin Cities
Dissertation: Integrating hyperspectral imaging and artificial intelligence to develop automated frameworks for high-throughput phenotyping in wheat
- M.S. Mechanics of Agricultural Machinery** *July 2008*
Ferdowsi University of Mashhad - Mashhad, Iran
Thesis: Nondestructive measurements of quality characteristics of kiwifruit using Visible/NIR spectroscopy
- B.S. Agricultural Machinery** *Sep. 2004*
Bahonar University of Kerman - Kerman, Iran
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RESEARCH & PROFESSIONAL EXPERIENCE

- Postdoctoral Research Associate** *March 2019 - present*
Digital Agriculture Lab, Department of Biological and Agricultural Engineering
University of California, Davis
Project 1: Canopy profile mapping and yield prediction of almond trees using UAV-based RGB, LiDAR, and hyperspectral data
Project 2: Prediction of nitrogen status in table grape using aerial multispectral imagery
Project 3: Developing a low-maintenance spray back stop system to reduce spray drift without limiting the spray and air delivery
Project 4: identification of drought stress in turfgrass using remote sensing
- Graduate Research Assistant** *2015-2019*
Agricultural Robotics Lab, Department of Bioproducts and Biosystems Engineering
University of Minnesota – Twin Cities
Project 1: hyperspectral imaging and machine learning to assess salt stress tolerance in wheat
Project 2: developing an ensemble feature selection pipeline to select informative spectral bands for plant phenotyping

Project 3: selecting informative spectral bands using machine learning techniques to detect Fusarium head blight in wheat

Project 4: aerial hyperspectral imagery and deep neural networks for high-throughput yield phenotyping in wheat

Project 5: developing a deep autoencoder network for unsupervised feature learning from aerial hyperspectral images

Research Assistant

2012-2014

Research Center for Agricultural Machinery
Ferdowsi University of Mashhad

Project 1: developing a vision system of a harvesting robot and designing a gripper

Project 2: developing a solar dryer and evaluating the performance

Research Assistant

2009-2011

Khorasan-Razavi Agricultural & Natural Resources Research Center

Project: Studying on rheological properties of food materials to identify their behavior during harvesting, handling, packaging, and storage (cherries, potato, and pomegranate)

Graduate Research Assistant

2006-2008

Department of Biosystems Engineering
Ferdowsi University of Mashhad

Project: Nondestructive measurements of quality characteristics of kiwifruit using Visible/NIR spectroscopy

REFEREED JOURNAL ARTICLES

Qiu, R., Yang, C., **Moghimi, A.**, Zhang, M., & Steffenson, B. 2019. Detection of *Fusarium* head blight in wheat using a deep neural network and color imaging. *Remote Sensing* (submitted).

Moghimi, A., Yang, C., & Anderson, J.A. 2019. Aerial hyperspectral imagery and deep neural networks for high-throughput yield phenotyping in wheat. arXiv preprint, arXiv:1906.09666 [cs.CV].
<https://arxiv.org/abs/1906.09666>

Moghimi, A., Yang, C., & Marchetto, P. M. 2018. Ensemble Feature Selection for Plant Phenotyping: A Journey from Hyperspectral to Multispectral Imaging. *IEEE Access*, 6, 56870-56884.
<https://doi.org/10.1109/ACCESS.2018.2872801>

Moghimi, A., Yang, C., Miller, M. E., Kianian, S. F., & Marchetto, P. M. 2018. A Novel Approach to Assess Salt Stress Tolerance in Wheat Using Hyperspectral Imaging. *Frontiers in Plant Science*, 9, 1182.
<https://doi.org/10.3389/fpls.2018.01182>

Moghimi, A., Aghkhani, M.H., Golzarian, M.R. 2015. Designing of Computer Vision Algorithm to Detect Sweet Peppers for Robotic Harvesting Under Natural Light. *Journal of Agricultural Machinery* (in Persian).
<http://doi.org/10.22067/jam.v5i1.23528>

Aghkhani, M.H., Abbaspour-Fard, M.H., Bayati, M.R., Mortezaipoor, H., Saedi, I., **Moghimi, A.** 2013. Performance analysis of a solar dryer equipped with a recycling air system and desiccant chamber. *Journal of Agricultural Machinery* (in Persian).

- Moghimi, A.,** Saiedirad, M.H., Ganji Moghadam, E. 2011. Interpretation of viscoelastic behaviour of sweet cherries (*Prunus avium* L.) using rheological models. *International Journal of Food Science & Technology*, 46, 855-861. <https://doi.org/10.1111/j.1365-2621.2011.02563.x>
- Moghimi, A.,** Aghkhani, M.H., Sazgarnia, A., Sarmad, M. 2010. Vis/NIR spectroscopy and chemometrics for the prediction of soluble solids content and acidity (pH) of kiwifruit. *Journal of Biosystems Engineering*, 106, 205-302. <https://doi.org/10.1016/j.biosystemseng.2010.04.002>
- Moghimi, A.,** Aghkhani, M.H., Sazgarnia, A., Abbaspour-Fard, M.H. 2009. Improvement of NIR transmission mode for internal quality assessment of fruit using different orientations. *Journal of Food Process Engineering*, 34, 1759-1774. <https://doi.org/10.1111/j.1745-4530.2009.00547.x>
- Moghimi, A.,** Aghkhani, M.H., Sazgarnia, A., Sarmad, M. 2008. Nondestructive evaluation of internal quality characteristics of kiwifruit by Vis/NIR spectroscopy. *Journal of Agricultural Science & Technology*, 22, 113-121 (in Persian).

CONFERENCE PROCEEDINGS

- Moghimi, A.,** Yang, C., Anderson, J.A., Reynolds, S.K. 2019. Deep autoencoder to reduce dimensionality of hyperspectral images collected by UAV flying over experimental plots. *ASABE*, Boston, MA. (oral presentation.)
- Moghimi, A.,** Yang, C., Anderson, J.A., Reynolds, S.K. 2019. Selecting informative spectral bands using machine learning techniques to detect Fusarium head blight in wheat. *ASABE*, Boston, MA. (oral presentation.)
- Moghimi, A.,** Yang, C., Anderson, J.A., Reynolds, S.K. 2018. Aerial Imagery for Yield Prediction of Experimental Wheat Plots. *ASABE*, Detroit, MI. (oral presentation.)
- Moghimi, A.,** Yang, C., Miller, M. E., Kianian, S. 2017. Hyperspectral imaging to identify salt-tolerant wheat lines. *SPIE Conference on Autonomous Air and Ground Sensing Systems for Agricultural Optimization and Phenotyping II*, Anaheim, CA. (oral presentation.)
- Moghimi, A.,** Aghkhani, M.H., Goltzarian, M.R., Rohani, A., Yang, C. 2015. A Robo-vision Algorithm for Automatic Harvesting of Green Bell Pepper. *ASABE*, New Orleans, LA. (oral presentation.)
- Moghimi, A.,** Aghkhani, M.H., Goltzarian, M.R. 2014. Grippers' Design Factors Determined by Integration of Computer Vision System and Mechanical Tests. *The 8th National congress on Biosystems Engineering and Mechanization*.
- Saiedirad, M.H., Zarif Neshat, S., **Moghimi, A.** 2011. Evaluation of Pomegranate Resistance against the Imposed Forces during Harvest. *National Congress on Agricultural Loss*.
- Zarif Neshat, S., Saiedirad, M.H., **Moghimi, A.** 2011. Effect of Harvest Time, Soil Moisture and Varieties on Mechanical Damage of Potato. *National Congress on Agricultural Loss*.
- Moghimi, A.,** Saiedirad, M.H. 2010. Viscoelastic Behavior of Cherries under Constant Strain. *The 6th National congress on Agricultural Machinery Engineering and Mechanization*. University of Tehran, Iran, September 15-16.

Moghimi, A., Aghkhani, M.H., Sazgarnia, A., Sarmad, M. 2008. Application of Near-infrared Spectroscopy in Determination of Internal Quality of Apple, Orange and Kiwifruit in a Nondestructive Way. *The 18th National congress on Food Technology*. Mashhad, Iran, October 15-16.

GRANT WRITING EXPERIENCE

- Development of a UAV-based canopy profile mapping technique to replace the mobile platform lightbar. *Funded by Almond Board of California*. (I was one of the Co-PIs). May 2019
 - Building Resilience into Pistachio Production Systems. *Submitted to Specialty Crop Research Initiative (SCRI) – USDA*. (I was one of the Co-PIs). May 2009
 - Airborne hyperspectral imaging-based field high-throughput phenotyping system for assessing FHB severity. *Funded by US Wheat and Barley Scab Initiative*. (I wrote the first draft and was invited to present it to the steering committee of USWBSI). Sep 2017
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INVITED PRESENTATIONS

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| Guest Presenter: | Artificial intelligence in agriculture: applications and limitations
Dean's Advisory Council, College of Agricultural and Environmental Sciences, <i>University of California, Davis</i> | Oct. 2019 |
| Guest Presenter: | Artificial intelligence and hyperspectral imaging for high-throughput plant phenotyping
IEEE Agricultural Robotics and Automation. <i>Live stream webinar on YouTube and Zoom</i> | Sep. 2019 |
| Guest Presenter: | Integrating hyperspectral imaging and deep learning for high-throughput yield phenotyping in wheat
Seminar EBS290, <i>University of California, Davis</i> | April 2019 |
| Guest Presenter: | Development of a high throughput phenotyping platform for assessing <i>Fusarium</i> head blight severity in wheat and barley using RGB/hyperspectral imaging
US Wheat and Barley Scab Initiative (USWBSI). <i>Crowne Plaza Aire, Bloomington, Minnesota</i> | April 2017 |
| Guest Lecturer: | Remote sensing for high throughput phenotyping
Topics in Applied Plant Sciences (HORT/AGRO 8280), <i>University of Minnesota - Twin Cities</i> | Winter 2017 |
| Guest Lecturer: | Non-contact sensing technologies for precision agriculture
Introduction to Precision Agriculture (SOIL 4111), <i>University of Minnesota - Twin Cities</i> | Spring 2015 |
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TEACHING AND MENTORING EXPERIENCE

Mentor of 10 interns

Summer 2019

University of California, Davis

- advising them on various projects
 - Spike detection in wheat using convolutional neural network
 - Designing/fabricating an inflatable spray backstop prototype
 - Pre- and post-processing of aerial images
- Teaching remote sensing course
- Leading a two-day data collection boot camp for collecting aerial imagery and LiDAR

Mentor of a UROP student (Undergraduate Research Opportunities Program)

Summer 2016

University of Minnesota

Research title: *Investigating the Capability of Hyperspectral Imaging for the Estimation of Wheat Leaf Rust Disease*

- Advised her on how to do literature review and write a report. Developed a MATLAB code for pre-processing of images, segmentation of leaves from background, and feature extraction.

Lecturer at Payame Noor University of Mashhad

2011-2014

- Statics
- Strength of Materials
- Technical drawing and drafting
 - ❖ Responsible for teaching and grading of 20-30 undergraduate students

Lecturer at University of Applied Science and Technology

2009-2014

- Mechanisms in Agricultural Machinery
- Post-harvest Technology
- Fundamentals of Physics
 - ❖ Responsible for teaching and grading of 30-40 undergraduate students

Teaching Assistant at Ferdowsi University of Mashhad

Fall 2008

- Physical & Mechanical Properties of Agricultural Products
 - ❖ Responsible for lab sessions of 5-10 graduate students

HONORS AND AWARDS

BBE Graduate Fellowship

2018-2019

- Stipend, tuition, and health benefits for 12 months

MnDRIVE Global Food Ventures Fellowship

2017-2018

- Stipend for 12 months (\$28,500)
- Grant for professional development activities (\$1,000)
- Travel grant for World Food Prize / Borlaug Dialog conference

Food Systems Leadership Certificate (four one-week courses arranged by MnDRIVE)

- Food Safety and Defense in the Context of Global Food Security May 2018
- Global Food Systems Policy, Governance and Regulation May 2018
- Leadership to Address Global Grand Challenges - Focus on Food Systems Jan. 2018
- Focus on Food Production Aug. 2017

Best Paper Award – Runner-up

- SPIE Conference on Autonomous Air and Ground Sensing Systems for Agricultural Optimization and Phenotyping II (\$500) 2017
- The 8th National Congress on Biosystems Engineering and Mechanization, Mashhad 2014

Distinguished Graduate Student

- Department of Biosystems Engineering, Ferdowsi University of Mashhad 2007

PROFESSIONAL MEMBERSHIPS

American Society of Agricultural and Biological Engineers (ASABE)

- ASABE - ITSC-312 Machine Vision Committee 2015 - present
- ASABE - Unmanned Aerial Systems (MS-60) Committee 2015 - present
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Institute of Electrical and Electronics Engineers (IEEE)

- IEEE Geoscience and Remote Sensing Society 2019 - present
 - IEEE RAS Technical Committee on Agricultural Robotics and Automation 2019 – present
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ACADEMIC SERVICES

Journal Reviews

- IEEE Access – *IEEE*
- Remote Sensing – *MDPI*
- Plant Methods – *BMC*
- Computers and Electronics in Agriculture – *Elsevier*
- Journal of Food Science and Technology – *Springer*
- Journal of Food Chemistry – *Elsevier*
- International Journal of Food Properties – *Taylor & Francis*
- Agronomy – *MDPI*
- Journal of Agricultural Machinery

Extension services

- Remote sensing applications in vineyard, El Dorado, California 2019
- Open House at the Southern Research and Outreach Center, Waseca, Minnesota 2018
- Open House at the Southern Research and Outreach Center, Waseca, Minnesota 2016

Selected Volunteer Activities

- Member of planning committee for Production Agriculture Symposium - Minnesota 2018-2019
 - Member of conciliation board at Como Student Community Cooperative - Minnesota 2016-2017
 - Member of reception board at 8th National Congress on Biosystems Engineering and Mechanization - Iran 2014
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PROFESSIONAL SKILLS

Programming	MATLAB; Python; Robotino
Data Analysis/Mining	Keras (Neural Network library running on top of <i>TensorFlow</i>) WEKA (Data Mining Software in Java) Scikit-learn (Python package for machine learning)
Remote Sensing/GIS	ERDAS Imagine; QGIS; eCognition; SpectranonPro
CAD	CATIA

REFERENCES

Available upon request