

Matthew Darr

Professor

Kinze Manufacturing Fellow

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Education

Ph.D. Food, Agricultural, and Biological Engineering, 2007, The Ohio State University

M.S. Biosystems and Agricultural Engineering, 2004, University of Kentucky

B.S. Food, Agricultural, and Biological Engineering, 2002, The Ohio State University

Honors and Awards

New Holland Young Researcher Award. American Society of Agricultural and Biological Engineers. (2017)

Supplier Innovation Award for Yield Sensor Technology. Deere & Company. (2016)

ISU Award for Achievement in Intellectual Property. Iowa State University. (2016)

Early Career Engineering Faculty Research Award. Iowa State University. (2015)

PrecisionAg Excellence Award in Education and Research. PrecisionAg Institute. (2014)

W. Farrall Young Educator Award, American Society of Agricultural and Biological Engineers (2013)

Sustainable Biofuels Award for Feedstock Innovation. World Biofuels Markets. (2012)

Recent Patents and Publications

Shah, A., **M. J. Darr.** 2017. A life cycle energy use and greenhouse gas emissions analysis of the corn stover feedstock supply system for cellulosic biorefineries. *Biofuels, Bioproducts & Biorefining.* doi:10.1002/bbb.1771

Shah, A., **M. J. Darr.** 2016. A Techno-economic Analysis of the Corn Stover Feedstock Supply System for Cellulosic Biorefineries. *Biofuels, Bioproducts & Biorefining.* doi: 10.1002/bbb.1657.

Marx, S., J. Luck, R. Hoy, S. Pitla, E. Blankenship, and **M. Darr.** 2015. Validation of Machine CAN Bus J1939 Fuel Rate Accuracy Using Nebraska Tractor Test Laboratory Fuel Rate Data. *Computers and Electronics in Agriculture.* 118 (2015): 179-185.

Bruns, A., **M. J. Darr,** N. Dybro, and R. McNaull. 2014. *Multi-Sensor Crop Yield Determination.* ISURF Tech ID 04216. Patent No. US 9,578,808.

Bonefas, Z., **M. J. Darr,** J. Kruckeberg, and McNaull, R. 2013. *Artificial Intelligence for Detecting and Filling Void Areas of Agricultural Commodity Containers.* ISURF Tech ID 04101. Patent No. US 9,392,746 B2.

Teaching

Dr. Darr teaches courses related to machinery systems and instrumentation within both the Agricultural Engineering and the Technology Systems Management program. In TSM 433, Precision Farming Systems, his students experience hands on training in precision agriculture with a focus on machinery technology and data management. Class activities are conducted within the state-of-the-art Ag Leader Technology Precision Agriculture Lab. Dr. Darr is also the primary instructor for AE 410, Electronic Systems Integration for Agricultural Machinery and Production Systems. This course focuses on the use of electronic systems for multi-point control of agricultural vehicles. It emphasizes the use of CAN bus in off-road machinery applications and the use of engineering standards in electro-hydraulic system design. Dr. Darr also mentors students outside of the classroom by serving as the co-advisor for the Agricultural Systems Technology Club.



Research

Dr. Darr's research program focuses on the use of electronic technology and data analytics to solve applied engineering challenges in the agriculture industry. He currently manages a team of 26 university professionals who provide leadership to a range of ag machinery topics including precision agriculture, telematics data analytics, unmanned aerial systems, and next generation machinery automation. This work is closely aligned with industrial applications with an emphasis on intellectual property development and technology transfer. His team works globally throughout the technology development cycle with active annual research activities spanning the entire US as well as engagement in Europe, Brazil, and Australia.

Specific areas of expertise within Dr. Darr's research team include:

- ◆ *Telematics:* Dr. Darr's team is actively engaged in the development of hardware and software solutions for machinery telematics. Recent projects include demonstrating substantial operating cost reductions within biomass production supply chains through telematics infused decision making. Telematics solutions have been licensed to industry partners and are now in commercial use.
- ◆ *Model Based Software Design:* MBSD delivers a system wide platform for the development of machine intelligence and the transfer of innovations from the lab to the field. Dr. Darr's team specializes in MBSD implementation and use for developing new innovations in agricultural machinery sensing and control. MBSD solutions are routinely licensed to industry partners for incorporation into production ag machinery.
- ◆ *Unmanned Aerial Vehicles:* UAVs offer growers new technology options to evaluate and manage crop production on a nearly plant by plant basis. Dr. Darr's team is actively engaged in UAV applications for agriculture including crop scouting, machinery management, and terrain mapping.