Yin BAO, Ph.D.

Assistant Professor
213 Corley Building
Department of Biosystems Engineering
Auburn University, Auburn, AL 36849
Email: yzb0016@auburn.edu Phone: (334) 844-3560

Education

Ph.D., Agricultural and Biosystems Engineering, Iowa State University (ISU) 2018
- Dissertation: "Automated Plant Phenotyping using 3D Machine Vision and Robotics"

B.E., Mechanical (Vehicle) Engineering, China Agricultural University 2012

Professional Experience

Assistant Professor, Biosystems Engineering Dept., Auburn University 2019.08 to date
Postdoctoral Research Associate, Ag & Biosystems Engineering Dept., Iowa State University 2018.05-2019.08
Graduate Research Assistant, Ag & Biosystems Engineering Dept., Iowa State University 2013.01-2018.05

Research Interests

Cyber-physical systems for smart agriculture and forestry. Specific elements include remote and proximal sensing, computer vision, robotics and machine learning. I am highly interested in inventing technologies for scientists to characterize biological subjects in a quantitative, high-throughput and non-invasive manner, for instance, plant and animal phenotyping.

Teaching

Teaching Assistant

Guest lecturer and lab instructor for *TSM 465 Automation Systems* (ISU) Spring 2016 and 2017
- Guest lectured on number systems for over 100 students.
- Facilitated students to design Programmable Logic Controller programs in lab sessions.
- Designed exam problems, and assessed homework and exams.

Professional Affiliations

American Society of Agricultural and Biological Engineers (ASABE) 2014 to date
Association of Overseas Chinese Agricultural Biological Food Engineers (AOCABFE) 2014 to date
International Society of Precision Agriculture (ISPA) 2019 to date
American Association for the Advancement of Science (AAAS) 2018 to date

Honors & Awards

2018 Reverend P. T. Taiganides Award
2018 Iowa State Research Excellence Award

Service

Secretary of ASABE Robotics Student Design Competition Committee	2019 to date
Student Activity Committee Chair of AOCABFE	2016 to 2017
Associate Editor for AOCABFE IMPACT Newsletter	2015 to 2017

Peer-Reviewed Journal Publications

- **Yin Bao**, Scott Zarecor, Dylan Shah, Taylor Tuel, Darwin A. Campbell, Antony V.E. Chapman, David Imberti, Daniel Kiekhaefer, Henry Imberti, Thomas Lübberstedt, Yanhai Yin, Dan Nettleton, Carolyn J. Lawrence-Dill, Steven A. Whitham, Lie Tang, Stephen H. Howell (2019). "Assessing plant performance in the Enviratron". *Plant Methods*, 15(1): 117. (IF: 3.2)
- Matthew W. Breitzman, **Yin Bao**, Lie Tang, Patrick S. Schnable, Maria G. Salas-Fernandez (2019). "Linkage disequilibrium mapping of high-throughput image-derived descriptors of plant architecture traits under field conditions". *Field Crop Research*, 244. (IF: 3.9)
- Lirong Xiang, **Yin Bao**, Lie Tang, Diego Ortiz, Maria G. Salas-Fernandez (2019). "Automated morphological traits extraction for sorghum plants via 3D point cloud data analysis". *Computers and Electronics in Agriculture*, 62, 951-961. (IF: 3.2)
- **Yin Bao**, Lie Tang, Srikant Srinivasan, and Patrick S. Schnable (2019). "Plant architectural traits characterization for maize using time-of-flight 3D imaging". *Biosystems Engineering*, 178, 86-101. (IF: 3.0)
- **Yin Bao**, Lie Tang, Matthew W. Breitzman, Maria G. Salas-Fernandez, and Patrick S. Schnable (2018). "Field-based robotic phenotyping of sorghum plant architecture using stereo vision", *Journal of Field Robotics*, 36(2), 397-415. (IF: 4.3)
- **Yin Bao**, Dylan S. Shah, and Lie Tang (2018). "3D perception-based collision-free robotic leaf probing for automated indoor plant phenotyping". *Transactions of the ASABE*, 61(3), 859-872. (IF: 1.1)
- Maria G. Salas-Fernandez, **Yin Bao**, Lie Tang, and Patrick S. Schnable (2017). "A high-throughput, field-based phenotyping technology for tall biomass crops". *Plant Physiology*, 174(4), 2008-2022. (IF: 5.9)
- **Yin Bao** and Lie Tang (2016). "Field-based robotic phenotyping for sorghum biomass yield component traits characterization using stereo vision". *IFAC-PapersOnLine*, 49(16), 265-270.

Conference Papers and Presentations

- **Yin Bao** and Lie Tang. "Temporal leaf tracking of maize plant using a convolutional neural network". 2019 ASABE Annual International Meeting, July 7 – July 10, Boston, MA, USA.
- **Yin Bao** and Lie Tang. "A robotized multi-sensor perception-driven indoor plant phenotyping system". 2018 ASABE Annual International Meeting, July 29 – August 1, Detroit, MI, USA.
- **Yin Bao** and Lie Tang. "Plant architectural traits characterization for maize using Time-of-Flight 3D imaging". 2018 ASABE Annual International Meeting, July 29 – August 1, Detroit, MI, USA.
- **Yin Bao**, Lie Tang, and Dylan S. Shah. "Robotic 3D plant perception and leaf probing with collision-free motion planning for automated indoor plant phenotyping". 2017 ASABE Annual International Meeting (paper no. 1700369), July 16 – 19, Spokane, WA, USA.

- **Yin Bao**, Lie Tang, Patrick S. Schnable, and Maria G. Salas-Fernandez. "Infield biomass sorghum yield component traits extraction pipeline using stereo vision". 2016 ASABE Annual International Meeting (paper no. 162462338), July 17 – 20, Orlando, FL, USA.
- **Yin Bao**, Lie Tang, Patrick S. Schnable, and Maria G. Salas-Fernandez. "GPU-based parallelization of a sub-pixel high-resolution stereo matching algorithm for high-throughput biomass sorghum phenotyping". 2015 ASABE Annual International Meeting (paper no. 152188089), July 26 – 29, New Orleans, LA, USA.
- **Yin Bao**, Akash D. Nakami, and Lie Tang. "Development of a field robotic phenotyping system for sorghum biomass yield component traits characterization". 2014 ASABE Annual International Meeting (paper no. 1901199), July 13 – 16, Montreal, Quebec, Canada.

Invited Talks

- "High-Throughput Phenotyping: Plant Architecture". 2019 Tree Improvement Program Contact Meeting, November 14, Tascaloosa, AL, USA.
- "Robotic plant phenotyping". 2019 ASABE Alabama Station Section Meeting, April 12, Auburn, AL, USA.

Research Grants

- Rapid On-Line Characterization of Southern Pine Residues for Biomass Conversion Processes ($2,146,958). Sushil Adhikari, Timothy McDonald, **Yin Bao**, Masoud Mahjouri-Samani, Brian Via, Brian Thurow, Oladiran Fasina, Tom Gallagher, Edmon Perkins. Department of Energy. 2019-2022. (not funded)

Education Grants

- Development of hands-on trainers in electrical systems and electronic control systems to strengthen electrical problem solving skills in poultry processing plants, feed mills, hatcheries, and on the farm ($31,946). Jeremiah Davis, Jess Campbell, William Batchelor, **Yin Bao**, Dennis Brothers and Kelly Goneke. Alabama Poultry and Egg Association. 2019.

Technical Reviewer

Applied Engineering in Agriculture
Biosystems Engineering
Computers and Electronics in Agriculture
Plant Methods
Plant Phenomics
Precision Agriculture
Transactions of the ASABE

Patent

Lie Tang, Ji Li, **Yin Bao**, Jian Jin, Akash D. Nakarmi (2017). Crop stand analyzer using reflective laser proximity sensors. Patent No.: US9804097B1