Md Zafar Iqbal, Ph.D.

Postdoctoral Associate, Department of Agricultural and Biological Engineering, University of Florida

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Education

PhD in Biological & Agricultural Engineering from Texas A&M University, USA.   Dec 2024

Dissertation title: Round Cotton Modules Monitoring System: A Smart Solution for Efficient Module Management Between Harvest and Ginning.
Committee: Robert G. Hardin, Azlan Zahid, John R.C. Robinson, Joshoua Peeples, Edward M. Barnes

MSc in Bioproduction Machinery Engineering from Chungnam National University, South Korea.   Aug 2019

Thesis title: Design of a Gear Driven Hopper Type Dibbling Mechanism for a 2.7 kW Two-row Pepper Transplanter.
Committee: Sun-Ok Chung, Yong-Joo Kim, Dae-Hyun Lee

BSc in Agricultural Engineering from Hajee M. Danesh Science & Technology University, Bangladesh.   May 2017

Thesis title: Development of a Low-cost Smart Evaporative Cooling System for Storing Fresh Tomatoes.
Committee: Md Shaha Nur Kabir, Muhammad Abdul Munnaf

Experiences

- **Postdoctoral Research Associate**

I have been employed at the University of Florida since Fall 2024, working with Dr. Thomas Burks' research group (Agricultural Robotics & Mechatronics). My research focuses on detecting various diseases in fruits (citrus) and leaves (soybean, grape, citrus, spinach), as well as performing morphological analysis using non-destructive imaging approaches. I also work on detecting *E. coli* on different leaf surfaces and common inorganic surfaces in food-processing environments. My work primarily involves hyperspectral reflectance and fluorescence imaging, RGB-D imaging, image processing, machine vision, and artificial intelligence. I have customized an existing hyperspectral imaging (HSI) system, developed new RGB-D imaging systems, and designed graphical user interfaces (GUI) to support data acquisition and analysis. Additionally, I have implemented several new analytical approaches combining vision transformers (ViTs) and convolutional neural networks to improve data interpretation and decision-making.

- **Research Experiences**

During my PhD studies, I served as a **graduate research assistant** from spring 2020 to fall 2023. In this role, I developed and tested a sophisticated monitoring system for high-quality cotton production. This system integrated moisture, temperature, GPS route, and image data, along with Unique RFID tags for each round cotton module during handling. Utilizing a convolutional neural network, the system automatically identified modules with damaged cover, thus enhancing overall production quality.

While employed as a **graduate research assistant** at Chungnam National University from fall 2017 to fall 2019, I designed and developed a walking-type pepper transplanter. Additionally, I conducted operational overturning and service life analyses. I also focused on creating a remote environment monitoring and control system for a smart greenhouse. My responsibilities included operating actuators to maintain optimal conditions for specific crops.

During my **undergraduate studies**, my research concentrated on the development of a smart evaporative cooling system for preserving fresh tomatoes. The primary objective was to monitor and maintain temperature and humidity levels inside storage using Internet of Things (IoT) technology. This system extended the freshness of tomatoes by two to three days compared to traditional storage methods, thereby potentially reducing post-harvest losses during transportation to consumers.

- **Teaching Experiences**

Co-instructor: Served as co-instructor for 'Applied Control for Automation and Robotics (ABE 6005)' during fall, 2024 and 'Instrumentation in Agricultural Engineering Research (ABE 6031)' during spring 2025 at the University of Florida. Taught theoretical concepts and guided students in hands-on projects, including path following, collision avoidance, object tracking, and path planning using the Boe-Bot robot. Mentored students in developing wireless sensor networks, cloud-based computing solutions, automation and control strategies, and decision support systems.

Teaching Assistant: I served as a teaching assistant for 'Measurement and Control of Biological Systems and Agricultural Processes (BAEN-370)' course in spring 2023 and 2024 at Texas A&M University. My responsibilities included syllabus design, developing, and modifying teaching materials, evaluating performance, and guiding students in the theory and practical use of sensors trough lecture, and system design for automatic control in biological systems and agriculture, covering sensor operation, signal processing, control techniques, and the incorporation of automation and robotics.

Lab Instructor: I served as a lab instructor in the 2022 Reuse Water Quality Research and Extension Experiences for Undergraduates (RWQ-REEU) program at Texas A&M University's RELLIS campus, where I explained the wastewater treatment plant process. I guided students in collecting and analyzing water samples from various treatment plants, covering parameters like pH, dissolved oxygen, conductivity, *E. coli*, biochemical oxygen demand, and more. I also instructed students in different onsite sensing techniques and lab determination methods during that time.

- **Graduate Intern:** Shenyang Agricultural University (Fall 2018, Summer 2019)

Analyzed the internal conditions of Chinese solar greenhouses during summer and winter and discovered energy-saving options for traditional greenhouses. Using a wireless sensor network, I collected continuous data on temperature, humidity, light intensity, CO_2 concentration, solar radiation, wind speed, and direction.

Certifications

- Academy for Future Faculty Fellow.
- RecurDyn (Multibody Dynamics Simulation Software) Professional Training.

Skills

- **Grant proposal writing**
  - A Smart Cotton Module Monitoring System for Sustainable Cotton Production (Submitted: 2022 Southern-SARE).
  - Assisted in:
    - o Machine Vision and Artificial Intelligence for Smart Farm Innovation and Technology Development (Submitted & accepted: Ministry of Agriculture, Food and Rural Affairs (MAFRA), Republic of Korea, 2018).
    - o Investigation of the Characteristics and Risk Factors Associated with Fatal Farm and Agricultural Injuries in Bangladesh (Submitted & accepted: University Grants Commission of Bangladesh, 2015).

- **Digital proficiency**
  - Python, C++, Machine Learning, Deep Learning, Convolutional Neural Network (CNN), Vision Transformer (ViT), Machine vision, Hyperspectral/Multispectral reflectance and fluorescence imaging and processing, OpenCV, TensorFlow, Signal processing.
  - SolidWorks, RecurDyn, LabVIEW, CATIA, MATLAB, Ansys, Proteus, KISSsoft, Shurfer, GS^+, ArcGIS, R.

- **Other skills**
  - Mechanistic and empirical modelling of Agricultural equipment, Electrical circuit design & simulation.
  - Wireless sensor networking and actuator controlling (temp, RH, wind, GNSS, CO_2, O_2, solar, light, radio communication, Wi-Fi communication, Arduino, Raspberry Pi, ESP32, XBee, LoRa, nRF24L01, RFID reader, camera).
  - Greenhouse environment monitoring and management.
  - Proficient in implementing various types of sensors, DAQs, and microcontrollers.

Awards & Honors

[1]	Distinguished Graduate Student Award for Excellence in Research, Texas A&M University	2025
[2]	Travel Award from "BAEN Graduate Student Association, Texas A&M University	2024
[3]	Dr. Brock Faulkner '04 Memorial Scholarship, from Department of BAEN, Texas A&M University	2023
[4]	Travel Award from "BAEN Graduate Student Association, Texas A&M University	2023
[5]	Graduate Scholarship from "Department of BAEN, Texas A&M University	2023

[6]	Peary Wilemon scholarship awards from National Cotton Ginners Association, USA	2023
[7]	Travel Award from BAEN Graduate Student Association, Texas A&M University	2023
[8]	3rd place for oral presentation in Student Research Week, Texas A&M University, USA	2022
[9]	Graduate Scholarship from Department of BAEN, Texas A&M University	2022
[10]	1st place for oral presentation in Belt Wide Cotton Conferences, San Antonio, TX, USA	2022
[11]	Peary Wilemon scholarship awards from National Cotton Ginners Association, USA	2021
[12]	Graduate Scholarship from Department of BAEN, Texas A&M University	2021
[13]	Best 3rd oral presenter in China-South Korea Joint Academic conference, Shenyang, China	2019
[14]	Silver prize for oral presentation in Japan China Korea Graduate Student Forum, Tsukuba, Japan	2018
[15]	Best poster presenter in Spring conference on precision agriculture, Sangju, South Korea	2018

Services

- **Professional Memberships:**

[1] Society of Photo-Optical Instrumentation Engineers (SPIE)	2024- Present
[2] American Society of Agricultural and Biological Engineers (ASABE)	2018- Present
[3] Precision Cotton Research Group	2020-2024

- **Mentoring:**

Graduate students

[1] Satya Akash Obellaneni (Master's student)	2024 - Presernt

Disease detection in Fruits and leaves using Vision-Transformer and hyperspectral imagery.

[2] Quentin Frederick (PhD student)	2024 - 2025

Citrus disease classification using machine vision on hyperspectral imagery.

[3] Snehit Vaddi (Master's student)	2024 - 2025

Deep learning-assisted detection of *E. coli* using UV-C fluorescence imaging.

[4] Raul Sebestian (Master's student)	2022 - 2024

Machine learning-based cotton crop prediction utilizing historical data.

[5] Kyu Cheol Han (Master's student)	2018 - 2019

Smart IoT framework for greenhouse crop management and cultivation.

[6] Bo-Eun Jang (Master's student)	2018 - 2019

Design and development of a tractor-mounted seeding machine.

Undergrad research project groups

[1] Austin Tucek, Jaden Strong, and Porter Miller	2023 - 2024

IoT-Based Solution for Real-Time Tractor Wheel Lag Calculation.

[2] Tamim ul Hasan, Golam Saklain, and Muhaiminul Islam	2015 - 2017

Upgradation of an Evaporative cooling system for storing fresh tomatoes.

- **Guest Editor:**
  – Sensors: Spectroscopy and Sensing Technologies for Smart Agriculture.
  – AgriEngineering: Sensor-based technologies and machine learning in precision agriculture.

- **Peer Reviewer:** ASABE, COMPAG, Real-Time Image Processing, Smart Agriculture, Sensors, Sustainability, Scientific Reports, Applied Sciences, Agronomy, Water, Air, & Soil Pollution.

  Reviewed 21 different journal articles related to the use of engineering in agriculture. The topics included agricultural machine design and optimization, the application of artificial intelligence, machine vision, robotics, convolutional neural networks, and automation and control.

- **Panelist:**

  [1] Poster Symposium, University of Florida — 2025
  [2] Capstone Project Competition, Texas A&M University — 2024
  [3] Capstone Project Competition, Texas A&M University — 2023
  [4] Student Research Week (SRW), Texas A&M University — 2023
  [5] 3MT presentation, Texas A&M university — 2023
  [6] ASABE conference, Houston, TX — 2022

- **Senator:** Graduate & Professional Student Government, Texas A&M University — 2021-2022

- **Secretary:** BAEN Graduate Student Association, Texas A&M University — 2021-2022

- **Organizing Secretary:** Bangladesh Student Association, Texas A&M University — 2020-2022

- **General Secretary:** Engineering Students' Association, Hajee Mohammad Danesh Science & Technology University, Bangladesh — 2015-2017

- **Community Service:** Volunteer at UF Organic Community Garden; maintained shared spaces, compost, walkways, and community beds to support sustainable campus agriculture. — 2025 - Present

Research Projects

[1] Embedded AI techniques for compact optical sensing systems for food safety and plant health applications, funded by USDA ARS. — 2024 - Present

[2] Autonomous Robotic Electric Powered 2-wheel Drive Articulated Platform for CEA, funded by USDA ARS. — 2024 - Present

[3] Cotton module handling logistics optimization and cover damage reduction, Supported by Cotton Incorporated, USA. — 2020 - 2024

[4] Development of high-tech machinery to improve mechanization on upland-field farming, funded by Ministry of Agriculture, Food and Rural Affairs (MAFRA), South Korea. — 2017 - 2019

[5] Industrialization of user comfort improvement technologies for smart greenhouse ICT equipment, supported by the Rural Development Administration, South Korea. — 2017 - 2019

[6] Development of remote monitoring sensor and control interface mechanical technology for IoT-based agricultural and livestock production for smart farms, funded by the Ministry of Agriculture, Food and Rural Affairs (MAFRA), South Korea. — 2017 - 2019

[7] Development of a low-cost smart evaporative cooling system for storing fresh tomatoes, supported by Hajee Mohammad Danesh Science & Technology University research fund, Bangladesh. — 2015 - 2017

[8] Investigation of the Characteristics and Risk Factors Associated with Fatal Farm and Agricultural Injuries in Bangladesh. Supported by the University Grants Commission of Bangladesh. — 2016 - 2017

Publications

Peer Reviewed

[1] S. Vaddi, T.F. Burks, **Z. Iqbal**, et al., (2025). Detecting *Escherichia coli* Contamination on Plant Leaf Surfaces Using UV-C Fluorescence Imaging and Deep Learning. *Plants*. https://www.mdpi.com/2223-7747/14/21/3352

[2] **M.Z. Iqbal,** R.G. Hardin, E.D. Barnes, et al., (2025). Cover Damage Detection in Round Cotton Modules using Convolutional Neural Networks (CNNs). *Computers and Electronics in Agriculture*. https://doi.org/10.1016/j.compag.2025.111023

[3] **M.Z. Iqbal,** T. Burks, P. Yadav, et al., (2025). A Robust Framework Combining Hyperspectral Imaging and Machine Learning for Assessing Sudden Death Syndrome (SDS) Severity in Soybean Foliage. *Journal of Biosystems Engineering*. https://doi.org/10.1007/s42853-025-00278-9

[4] M.N. Islam, M.N. Reza, **M.Z. Iqbal,** et al., (2025). Spatial and Temporal Variability of Environmental Variables in Chinese Solar Greenhouses in the Summer Season. Horticulture. https://doi.org/10.3390/horticulturae11040421

[5] **M.Z. Iqbal,** M.N. Islam, M.S.N. Kabir, et al., (2023). Comparison of heating modules for suspension-type multipoint temperature variability management in smart greenhouses. *Smart Agricultural Technology*. https://doi.org/10.1016/j.atech.2023.100296

[6] M.N. Reza, M.N. Islam, **M.Z. Iqbal,** et al., (2023). Spatial, Temporal, and Vertical Variability of Ambient Environmental Conditions in Chinese Solar Greenhouses during Winter, *Applied Sciences*. https://doi.org/10.3390/app13179835

[7] M.N. Islam, **M.Z. Iqbal,** M. Ali, et al., (2023). Evaluation of a 0.7 kW Suspension-Type Dehumidifier Module in a Closed Chamber and in a Small Greenhouse, *Sustainability*. https://doi.org/10.3390/su15065236

[8] M.N. Islam, **M.Z. Iqbal,** M. Ali, et al., (2022). Theoretical transmission analysis to optimize Gearbox for a 2.6 kW automatic pepper transplanter, *Journal of Agricultural Engineering*. https://doi.org/10.4081/jae.2022.1254

[9] **M.Z. Iqbal,** M.N. Islam, M. Ali, et al., (2022). Theoretical Overturning Analysis of a 2.6-kW Two-Row Walking-Type Automatic Pepper Transplanter. *Journal of Biosystems Engineering*. https://doi.org/10.1007/s42853-022-00129-x

[10] M.N. Islam, **M.Z. Iqbal,** M. Ali, et al., (2021). Evaluation of pepper seedling growth according to the growing period and tray for automatic transplanting, *Korean Journal of Agricultural Science*. doi: 10.7744/kjoas.20210080

[11] **M.Z. Iqbal,** M.N. Islam, M.S.N. Kabir, et al., (2021). Kinematic analysis of a hopper-type dibbling mechanism for a 2.6 kW two-row pepper transplanter, *Journal of Mechanical Science and Technology*. https://doi.org/10.1007/s12206-021-0531-2

[12] M.N. Islam, **M.Z. Iqbal,** M. Chowdhury, et al., (2021). Stress and fatigue analysis of picking device gears for a 2.6 kW automatic pepper transplanter, *Applied Sciences*. https://doi.org/10.3390/app11052241

[13] **M.Z. Iqbal,** M.N. Islam, M. Chowdhury, et al., (2021). Working speed analysis of the gear-driven dibbling mechanism of a 2.6 kW walking-type automatic pepper transplanter, *Machines*. https://doi.org/10.3390/machines9010006

[14] M.N. Islam, **M.Z. Iqbal,** M. Ali, et al., (2020). Kinematic analysis of a clamp-type picking device for an automatic pepper transplanter, *Agriculture*. https://doi.org/10.3390/agriculture10120627

[15] M. Chowdhury, M.N. Islam, **M.Z. Iqbal,** et al., (2020). Analysis of overturning and vibration during field operation of a tractor-mounted 4-row radish collector toward ensuring user safety, *Machines*. https://doi.org/10.3390/machines8040077

[16] M.N. Islam, **M.Z. Iqbal,** M. Ali, et al., (2020). Performance Evaluation of a Suspension-Type Dehumidifier with a Heating Module for Smart Greenhouses, *Journal of Biosystems Engineering*. https://doi.org/10.1007/s42853-020-00055-w

[17] **Z. Iqbal,** N. Islam, B.E. Jang, M. Ali, et al., (2019). Monitoring the Operating Status of an Automatic Harmful Fly Collector for Smart Greenhouses, *Journal of Biosystems Engineering*. https://doi.org/10.1007/s42853-019-00036-8

[18] M.N. Islam, **M.Z. Iqbal,** M.S.N. Kabir, et al., (2019). Performance Evaluation of Trenchless Subsurface Drainage Piping Machine, *Journal of Biosystems Engineering*. https://doi.org/10.1007/s42853-019-00032-y

Manuscripts Under Review

[1] Q. Frederick , T.F. Burks, **M.Z. Iqbal**, et al. Multiclass Citrus Leaf Disease Inspection with Region Classification and Hyperspectral Imagery. *Journal of the ASABE.*

[2] **M.Z. Iqbal**, T.F. Burks, et al. Integration of Vision Transformer and Hyperspectral Reflectance Imaging for Citrus Leaf Disease Classification. *Computers and Electronics in Agriculture.*

[3] **M.Z. Iqbal**, T.F. Burks, S. Vaddi, et al. Detecting *Escherichia coli* on Conventional Food Processing Surfaces Using UV-C Fluorescence Imaging and Deep Learning. *Applied Sciences.*

[4] **M.Z. Iqbal**, R.G. Hardin, E.D. Barnes, et al. A Smart Moisture Monitoring System for Round Cotton Modules. *Journal of the ASABE.*

[5] **M.Z. Iqbal**, R.G. Hardin, R. Robinson, et al. Smart Cotton Module Tracking and Monitoring System (SCMTM 2.0): An Upgraded SCMTM With Comprehensive Logistics and Economic Analysis. *Journal of Cotton Science.*

Other Publications

[1] **M.Z. Iqbal**, T.F. Burks, P.K. Yadav, et al., (2025). Hyperspectral imaging and machine learning for soybean SDS severity classification. In Proc. of SPIE Defense + Commercial Sensing, Orlando, FL. https://doi.org/10.1117/12.3054913

[2] Q. Frederick , T.F. Burks, **M.Z. Iqbal**, et al., (2025). Multiclass citrus leaf disease inspection with region classification and hyperspectral imagery. In Proc. of SPIE Defense + Commercial Sensing, Orlando, FL. https://doi.org/10.1117/12.3054678

[3] T.F. Burks, S. Vaddi, **M.Z. Iqbal**, et al., (2025). Improved E. coli concentration levels detection on citrus leaf using CSI-D+ UV-C fluorescence imaging and custom deep learning using YOLOv11 architecture. https://doi.org/10.1117/12.3054911

[4] Q. Frederick , T.F. Burks, **M.Z. Iqbal**, et al., (2025). Investigating feature types for automated multiclass citrus peel disease detection. In Proc. of SPIE Defense + Commercial Sensing, Orlando, FL. https://doi.org/10.1117/12.3054673

[5] T.F. Burks, S. Vaddi, **M.Z. Iqbal**, et al., (2025). Detecting E. coli concentration levels on various surfaces using UV-C fluorescence imaging and YOLO11 deep learning. https://doi.org/10.1117/12.3054912

[6] **M.Z. Iqbal**, R.G. Hardin, J.K. Ward, et al., (2023). Development of a Moisture and Temperature Monitoring System for Round Cotton Modules. In proc. of 2023 Beltwide Cotton Conferences. New Orleans, LA. https://www.cotton.org/beltwide/proceedings/

[7] **M.Z. Iqbal**, R.G. Hardin, J.K. Ward, et al., (2022). Round Modules: Handling Logistics and Cover Damage, 3rd Year. In proc. of 2022 ASABE Annual International Meeting. Houston, TX. https://doi.org/10.13031/aim.202200300

[8] **M.Z. Iqbal**, R.G. Hardin, J.K. Ward, et al., (2022). A CNN-based Approach to Detect Cover Damage of Round Cotton Modules. In proc. of 2022 Beltwide Cotton Conferences. SanAntonio, TX. https://www.cotton.org/beltwide/proceedings/2005-2022/index.htm

[9] **M.Z. Iqbal**, R.G. Hardin, J.K. Ward, et al., (2021). Round modules: Handling logistics and cover damage, 2nd year. In proc. of 2021 Beltwide Cotton Conferences. https://www.cotton.org/beltwide/proceedings/2005-2022/index.htm

Invited Talks

[1] *Emerging Research Trends in Smart Agricultural Machinery and Precision Technologies*, presented at the Seminar on Innovations in Smart Agriculture: Trends in Controlled Environment Agriculture and Mechanization 2025, organized by the Department of Agricultural and Industrial Engineering, Hajee Mohammad Danesh Science and Technology University, Bangladesh.

Conferences

Oral Presentations

[1] M.Z. Iqbal, T.F. Burks, et al. (2025). Hyperspectral imaging and machine learning for soybean SDS severity classification. Presented at the Sensing for Agriculture and Food Quality and Safety XVII, Orlando, FL, USA.

[2] T.F. Burks, S. Vaddi, M.Z. Iqbal, et al. (2025). Detecting E. coli concentration levels on various surfaces using UV-C fluorescence imaging and YOLO11 deep learning. Presented at the Sensing for Agriculture and Food Quality and Safety XVII, Orlando, FL, USA.

[3] M.Z. Iqbal, R.G. Hardin, J.K. Ward, et al. (2024). Smart Moisture Monitoring for Round Cotton Modules: Development and Testing. Presented at the 2024 American Society of Agricultural and Biological Engineers Annual International meeting, Anaheim, CA, USA.

[4] M.Z. Iqbal, R.G. Hardin, J.K. Ward, et al. (2024). Strategic Implementation of Convolutional Neural Networks for Simplified Wrap Damage Detection in Round Cotton Modules. Presented at the 2024 Beltwide Cotton Conference, Fort Worth, TX, USA.

[5] M.Z. Iqbal, R.G. Hardin, J.K. Ward, et al. (2023). A Smart Monitoring System for Quality Cotton Production. Presented at the 2023 American Society of Agricultural and Biological Engineers Annual International meeting, Omaha, NE, USA.

[6] M.Z. Iqbal, R.G. Hardin, J.K. Ward, et al. (2023). Development of a moisture and temperature monitoring system for round cotton modules. Presented at the 2023 Beltwide Cotton Conference, New Orleans, LA, USA.

[7] M.Z. Iqbal, R.G. Hardin (2022). A CNN-based Approach to Detect Cover Damage of Round Cotton Modules. Presented in Texas A&M University Student Research Week, College Station, TX, USA.

[8] M.Z. Iqbal, R.G. Hardin, J.K. Ward, et al. (2022). Round Modules: Handling Logistics and Cover Damage, 3rd Year. Presented at the 2022 American Society of Agricultural and Biological Engineers Annual International meeting, Houston, TX, USA.

[9] M.Z. Iqbal, R.G. Hardin, J.K. Ward, et al. (2022). Round Modules Monitoring System: A Smart Solution for Quality Cotton Production. Presented at the 3rd Annual Paper Meet of Agricultural Engineering Division of Institution of Engineers. Dhaka, Bangladesh.

[10] M.Z. Iqbal, R.G. Hardin, J.K. Ward, et al. (2022). A CNN-Based Approach to Detect Cover Damage of Round Cotton Modules. Presented at the 2022 Beltwide Cotton Conference, San Antonio, TX, USA.

[11] M.Z. Iqbal, R.G. Hardin, J.K. Ward, et al. (2021). Development of an Automatic Machine-vision Guided Cover Damage Detection System for Round Cotton Modules. Presented at the 2021 American Society of Agricultural and Biological Engineers Annual International meeting, virtual.

[12] <u>M.Z. Iqbal</u>, R.G. Hardin, J.K. Ward, et al. (2021). Round modules: Handling logistics and cover damage, 2nd year. Presented at the 2021 Beltwide Cotton Conference, virtual.

[13] <u>M.Z. Iqbal</u>, B. E. Jang, S.O. Chung, et al. (2019). Monitoring the operating status of an automatic harmful fly collector for smart greenhouses. Presented at the Asian Australasian Conference on Precision Agriculture. Punjab, India.

[14] <u>M.Z. Iqbal</u>, B. E. Jang, S.O. Chung, et al. (2019). Monitoring the operating status of an automatic harmful fly collector for smart greenhouses. Presented at the China-South Korea Joint Academic conference. Shenyang, China.

[15] <u>M.Z. Iqbal</u>, Y.J. kim, S.O. Chung, et al. (2019). Humidity response and variability during operation of dehumidifier module in a closed chamber and small greenhouse. Korean Society of Bio Environment conference. Jinju, South Korea.

[16] <u>M.Z. Iqbal</u>, T.G. Kang, S.O. Chung, et al. (2018). Vector loop analysis for a dibbling mechanism of an automatic transplanter. The 8th Joint Symposium between Chungnum National University and Shenyang Agricultural University Conference. Deajeon, South Korea.

[17] <u>M.Z. Iqbal</u>, Y.S. Lee, S.O. Chung, et al. (2018). Dynamic stability analysis of a 2.7 kW walking type pepper transplanter. International Symposium on Agricultural, Food, Environmental and Life Sciences in Asia (AFELiSA). Chuncheon, South Korea.

[18] <u>M.Z. Iqbal</u>, M.N. Islam, S.O. Chung, et al. (2018). Stability analysis of a two-row automatic pepper transplanter. 11th Japan-China-Korea Graduate Student Forum. Tsukuba, Japan.

[19] <u>M.Z. Iqbal</u>, M.S.N. Kabir, S.O. Chung, et al. (2018). Kinematic analysis of a hopper type dibbling mechanism for a pepper transplanter. 6th IFAC Conference on Bio-Robotics (BIOROBOTICS 2018). Beijing, China.

[20] <u>M.Z. Iqbal</u>, M.N. Islam, S.O. Chung, et al. (2018). Working speed analysis of a gear-driven hopper type dibbling mechanism for a two-row pepper transplanter. 9th International Symposium on Machinery and Mechatronics for Agricultural and Biosystems Engineering (ISMAB). Jeju. South Korea.

Upcoming Oral Presentations

[1] <u>M.Z. Iqbal</u>, T.F. Burks, S. Obellaneni (2026). Integration of vision transformer and hyperspectral reflectance imaging for citrus leaf disease classification. Conference on Sensing for Agriculture and Food Quality and Safety XVIII, part of SPIE Defense + Security. National Harbor, MD, USA.

[2] T.F. Burks, <u>M.Z. Iqbal</u>, S. Vaddi (2026). Enhanced E. coli concentration level detection on multiple produce surfaces using CSI-D+ UV-C fluorescence imaging and custom deep learning architecture. Conference on Sensing for Agriculture and Food Quality and Safety XVIII, part of SPIE Defense + Security. National Harbor, MD, USA.

[3] T.F. Burks, <u>M.Z. Iqbal</u>, S. Vaddi (2026). AI-based detection of E. coli concentration levels on diverse food-contact surfaces using UV-C fluorescence-based CSI-D+ Handheld and Yolov11 deep learning. Conference on Sensing for Agriculture and Food Quality and Safety XVIII, part of SPIE Defense + Security. National Harbor, MD, USA.

Poster presentations

[4] <u>M.Z. Iqbal</u>, R.G. Hardin, J.K. Ward, et al. (2024). Wrap Damage Detection: Convolutional Neural Network (CNN) Implementation for Round Cotton Modules. Presentaed at the Data-Driven Intelligent Agricultural Systems Symposium. College Station, TX, USA.

[5] <u>M.Z. Iqbal</u>, R.G. Hardin, J.K. Ward, et al. (2022). Round Cotton Modules: Cover Damage Detection Using YOLOv5 Algorithm. Presented at the Envisioning 2050 in the Southeast: AI-Driven Innovations in Agriculture. Auburn, AL, USA.

[6] <u>M.Z. Iqbal</u>, Y.J. Kim, S.O. Chung, et al. (2018). Kinematic analysis of transplanting mechanism for a two-row automatic pepper transplanter. Presented at the Spring conference of Korean society of precision agricultural. Sangju, South Korea.

References

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