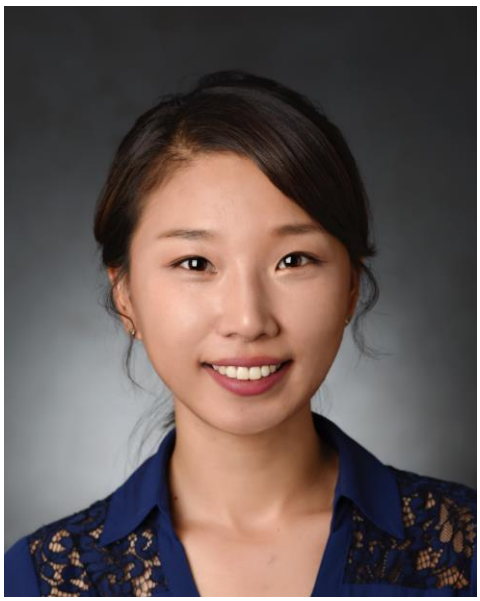
Enhancing Sustainable Crop Production with Machine Learning, Synthetic Data, and Digital Twin for Strawberry

Abstract

The advancement of farming technologies, including the transition from conventional farming practices to mechanization, automation, and robotics, has been critical for precise and scientific farming techniques. However, the development of new precision farming technologies requires substantial resources due to the limited timeframe of the crop growing season for data collection, method validation, and hardware testing. During this talk, we will discuss how digital twin and synthetic data can be powerful tools for shortening the development time of machine vision and robotics applications. The presentation will cover the following topics: •The challenges of implementing precision agriculture technologies, such as the need for reliable data collection and the high cost of equipment. •The use of synthetic data to train machine learning models when real-world data is scarce or expensive to collect. •The benefits of digital twins for simulating crop growth and development, and for testing new agricultural practices. The presentation will conclude with a discussion of the future of precision agriculture and the potential of these technologies to improve the sustainability of crop production.



Assistant Professor Daeun "Dana" Choi
Department of Agricultural and Biological Engineering
University of Florida, United States

RESEARCH AREAS AND EXPERTISE

- General area: Agricultural Automation
- Specific area: Robotics Applications for Specialty Crop

AWARDS AND RECOGNITION

- Rain Bird Engineering Concept of the Year award, ASABE, 2022
- Invited Participant, Next Leader Program, CIGR, 2019
- Recipient, New Faces of ASABE, ASABE, 2019
- First Place, Giuseppe Pellizzi Prize, The Club of Bologna, 2018

Dr. Daeun (Dana) Choi is an Assistant Professor of Agricultural and Biological Engineering at the University of Florida in the United States. She received her B.S. in Bio-mechatronics Engineering and Economics from Sungkyunkwan University, South Korea, in 2011, followed by M.S. and Ph.D. degrees in Agricultural and Biological Engineering from the University of Florida in 2013 and 2017, respectively. Her research interests lie in the field of precision agriculture, with a focus on the use of machine learning, synthetic data, and digital twins to improve crop production. She is particularly interested in the development of intelligent sensors to accurately monitor agricultural variables, and the automation of multi-robot systems using an array of technologies such as drones, robotics, and data analytics. She aims to design low-cost field devices and machines using the newest data processing and automation techniques to make them accessible to all growers. She has worked on a variety of projects, including the development of machine learning algorithms for crop identification and yield prediction, the creation of synthetic data sets for training machine learning models, and the use of digital twins to simulate agricultural field and hardware development.