

CSABE/ASABE Annual International Meeting  
Toronto, July 13-16, 2025  
CONTINUING PROFESSIONAL DEVELOPMENT COURSES

Continuing Professional Development courses are brought to AIM by ASABE member professionals in their field as an added value to the overall program. Each course is available to add on to your AIM registration prior to June 23. All qualify for professional development hour credits as well. Please note that these are on Sunday and at the same time.

## CPD2 Computational Fluid Dynamics Simulation and Controlled Environment Agriculture

Sunday, July 13      8:00am - 12:00pm

### Description:

This CPD course explores Computational Fluid Dynamics (CFD) as a tool for agricultural applications, with a focus on Controlled Environment Agriculture (CEA). Specifically, we will cover the different modes of energy transfer in CEA (conduction, convection, radiation, and evaporation), key CFD strategies for modeling CEA cases, and the fundamentals of CFD, including numerical simulation methods, their advantages, limitations, and challenges. Participants should bring a laptop. Learning outcomes: (1) Understand basic heat and mass transfer phenomena in the context of CEA (2) Learn the fundamental principles of CFD modeling and processes (3) Gain hands-on experience with CFD software through case examples. Sponsored by YPC.

### Target Audience:

Although the case studies will be on CEA, CFD can be useful in any Agricultural process. This course is intended for beginners who want to explore CFD as a tool in agricultural applications.

### Instructor:

[Hanwook Chung, Agricultural and Biosystems Engineering Department, Iowa State University](#)

LinkedIn Profile: <https://www.linkedin.com/in/hanwook-chung-016564248/>

Cost: \$ 25      Minimum required: 15

## CPD8 Develop Custom Autonomous UGVs & UAVs from the Ground Up for Hands-on Learning

Sunday, July 13      8:00am - 4:00pm

### Description:

With the increasing adoption of UGVs and UAVs in agriculture, professionals require hands-on expertise in UGV and UAV design, control, and autonomy to effectively address industry challenges. Often, existing UGV, especially UAV platforms present limitations in fundamental-level control, making certain autonomous operations difficult to implement. This session provides attendees with practical knowledge and technical skills to develop, deploy, and optimize custom UGVs and UAVs tailored for precision agriculture. Additionally, this session fosters collaboration between UGVs and UAVs for carrying out the mission. By integrating ROS2 and Software-In-The-Loop (SITL) simulations, participants gain real-world experience in developing and testing autonomous systems, ensuring they are well-prepared to implement these technologies in agricultural settings.

Outcome 1: Understand key UAV and UGV components, including hardware, sensors, and flight controllers.

Outcome 2: Learn to design, assemble, and program UAVs and UGVs for autonomous agricultural tasks.

Outcome 3: Learn to use Software-In-The-Loop (SITL) simulations for UAV testing.

Outcome 4: Integrate and utilize ROS2 for autonomous navigation and multi-robot coordination. Learn troubleshooting and optimization techniques for UAV and UGV performance.

Outcome 5: Explain applicability such as crop monitoring, field mapping, and cooperative autonomous ground and aerial navigation.

**Target Audience:**

This session is designed for professionals, researchers, engineers, and students interested in UGV and UAV technology for agriculture. It is particularly relevant for those in precision agriculture, agronomy, environmental monitoring, and automation in farming.

**Instructors:**

Krishna Muvva, University of Nebraska-Lincoln;

Dr. Nipuna Chamara, University of Nebraska-Lincoln;

Dr. Santosh Pitla, University of Nebraska-Lincoln

**Instructor Profiles:**

Krishna Muvva is a Ph.D. candidate at UNL specializing in aerial robotics and autonomous UAVs. His expertise lies in designing and implementing custom UAVs from scratch, integrating advanced perception and control systems to enable autonomous operation. His research has been published in leading aerospace and robotics conferences, and he has hands-on experience developing UAV solutions for real-world applications.

Dr. Nipuna Chamara is a faculty member at UNL with experience in artificial intelligence, IoT, and automation solution development for precision agricultural applications. This session will leverage their combined expertise to provide participants with a comprehensive understanding of UAV development, from hardware integration to autonomy.

Dr. Santosh Pitla is a faculty member at UNL with extensive experience in agricultural automation, robotics, and UAV applications in precision agriculture. His research focuses on developing autonomous systems for agricultural operations, integrating cutting-edge technology to enhance efficiency and sustainability.

**Cost:** \$125      **Minimum required:** 10