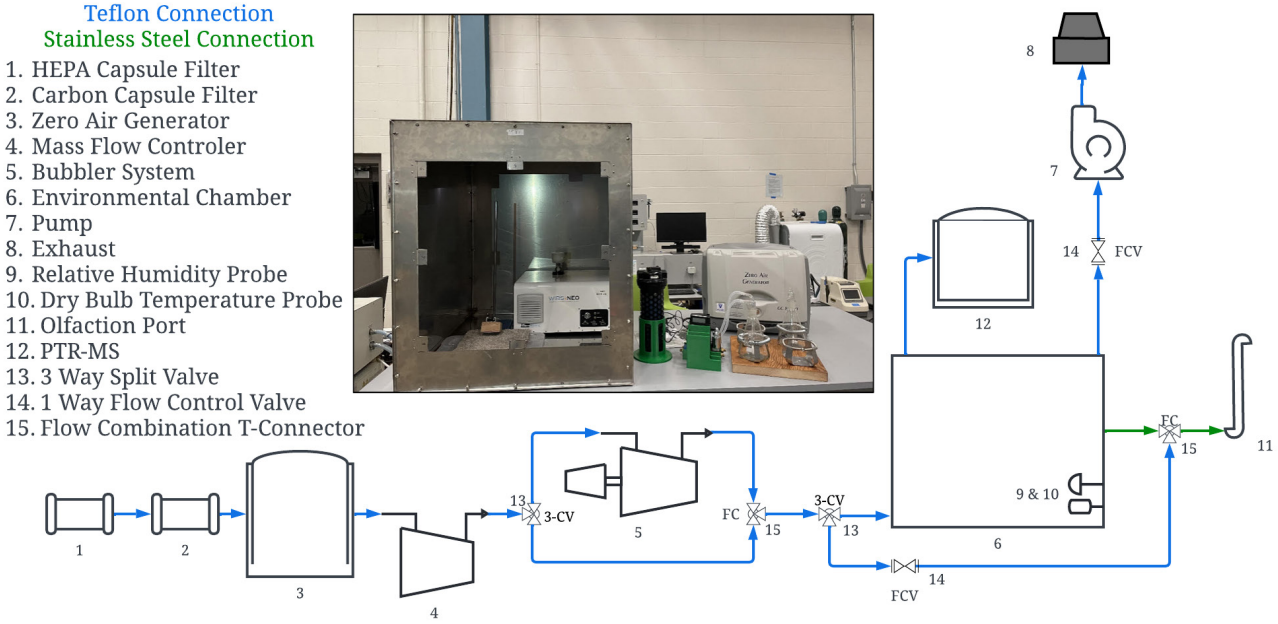

The constructed stainless-steel chamber and the components of the ventilation system are shown in the center above the ventilation system schematic. The ventilation system schematic illustrates the filtration, humidification, and data collection segments and the flow path throughout the chamber. The Wideband Integrated Bioaerosol Sensor (WIBS), which measures concentrations and size distributions of airborne fluorescent aerosol particles, is shown within the physical chamber.

environment, inert materials were exclusively selected to construct the chamber, specifically 316 and 18-8 stainless steel and polytetrafluorethylene (PTFE). Additionally, to preserve the interior environment and minimize the effective leakage area of the chamber, the stainless-steel body was tungsten inert gas (TIG) welded to create continuous seals along the chamber's edges, and PTFE gaskets were used as a seal between the body and the removable panels. The ICEC influent air is provided by a zero-air generator that removes gas- and particle-phase pollutants. A bubbler system is utilized to humidify the air to appropriate indoor conditions for experimentation. A network of mass flow controllers ensures the ICEC remains at a constant air exchange rate. This controlled environment allows for isolation of emission and resuspension experiments, including identifying VOCs emitted from volatile chemical products and measuring resuspended particle concentrations by disturbing settled dust samples. These and other potential experiments require a controlled atmosphere to isolate the pollutants from the event of interest, which cannot be guaranteed in an open-air environment, and to purge the chamber of residual contaminants from previous experiments.

Research advisor Nusrat Jung writes: "This highly sophisticated chamber provides us with the possibility of controlling indoor atmospheric conditions very precisely, thereby enabling us to conduct high-quality research on contaminant mass transport in buildings. The chamber is an exciting addition to our laboratory that will provide new experiential learning opportunities for students in the years to come."

Tree Localization in a Plantation Using Ultra Wideband Signals

Student researcher: *Akshat Verma, Junior*

Forest inventory is a task that requires many manual measurements. As a result, it is slow, labor-intensive, and prone to human errors. Our research team uses video images to collect data from standing timber for subsequent analysis. The purpose of our research is to expand upon our previously developed semi-automatic system for measuring trees. The goal of that research is to develop a fast and accurate method of estimating timber volume and calculating lumber value of logs. One

https://doi.org/10.7771/2158-4052.1657

Data collection with stereo depth camera at Martell Forest.

obstacle to automating the measurement of timber using video is tracking the location of individual trees within a forest or plantation. We can rapidly obtain video footage of large stands of trees; however, for our inventory to be precise and repeatable, we need to ensure that during each tree census the data we collect is compared with previously collected data from the same tree. We decided on identifying trees using positional data from UWB or RFID and corresponding the data to the local position of the camera at the time of data collection in the plantation as a possible way of tying video footage data to specific trees. We found that UWB requires very few transmitters/receivers while in an RFID system we would need to tag every tree. The current goal is to make measuring and data acquisition as simple and fast as possible with an automated UWB system that is accurate, precise, versatile, and resource/cost effective. The hope of the research is to create an automated system that can be implemented in the forestry industry to reduce time and resource loss while estimating the value and health of a plantation.

Research advisor Guofan Shao writes: "Akshat demonstrated his exceptional teamwork skills and positive attitude. He consistently attended weekly team meetings, either online or in person, and provided brilliant ideas to the group when other students struggled with their research. His efforts and contributions were crucial to the success of our project."

HEALTH AND HUMAN SCIENCES

Developmental Atrazine Exposure Modifies Expression of Synucleins

Student researcher: *Isabelle Akoro, Senior*

Atrazine is a herbicide used throughout the midwestern United States to prevent broadleaf weeds in crops. The U.S. EPA has set the maximum contaminant level at 3 ppb (µg/L) in drinking water. Atrazine is an endocrine disruptor that interferes with normal physiology and homeostasis throughout development and the life course.