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Tackling a 'silent killer:' Laurier researcher partnering with City of Kitchener to address air pollution at local schools

WATERLOO – A researcher from Wilfrid Laurier University was recently awarded $50,000 from the federal government to lead an innovative air pollution study in collaboration with the City of Kitchener and Hemmera Envirochem Inc. The research team will install air-quality monitoring systems at Kitchener public schools to collect real-time air pollution data that will be used to inform the city's climate action plan and protect vulnerable young people.

"Air pollution is a major public health issue. The World Health Organization calls it a 'silent killer' because approximately seven million people around the world die from air pollution exposure annually," said Hind Al-Abadleh, professor of Chemistry and Biochemistry at Laurier and primary investigator for the study. "Kitchener is a rapidly growing city and yet it only has one air-monitoring station, less than most Ontario cities of a similar size. The city is looking for science-based recommendations to improve air quality, but first we need to collect the data."

To make widespread air monitoring scalable, the research team will be using low-cost sensor systems made by Ambilabs, an air-quality solution provider, that measure properties such as carbon dioxide and nitrogen oxide.

"We identified children as one of the most vulnerable populations to air pollution exposure, so schools seemed like a logical tracking location for maximum impact," said Al-Abadleh. "Now that schools are temporarily closed, we are collecting as much data as possible so that once students are hopefully back in September, we can see if the resumption of traffic and activity leads to a significant change in air quality."

Based on the results, the City of Kitchener will consider revising vehicle idling bylaws and will be developing new practices and programming with regional partners. Air quality can differ dramatically depending on specific location and time of day, so there is an opportunity to make changes that will minimize students' exposure to pollutants.

In the long term, Al-Abadleh hopes to combine sensor technology with "citizen science" to create a network of backyard air-monitoring stations. The location-specific data could be used to create real-time pollutant maps, enabling people to make decisions about their outdoor activities based on pollution levels at specific times and locations. This model has been adopted in major international cities including London, Paris and San Francisco, but never in Canada.

"This partnership brings together local government, academia and the private sector to assist the city in achieving its community climate action planning goals by generating science-based, real-time climate data that community members can visualize and interact with as we work toward building a healthier community for all residents," said Claire Bennett, corporate sustainability officer at the City of Kitchener.

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Though the pilot project was in development before the COVID-19 pandemic began, Al-Abadleh's study was accelerated due to the public's renewed focus on air pollution and a timely $50,000 grant from the Natural Sciences and Engineering Research Council of Canada (NSERC).

"We have seen a dramatic improvement in air quality while Ontario has been shut down, so people are extra conscious of how our carbon-intensive lifestyle impacts the air we breathe," said Al-Abadleh. "This gave us momentum and NSERC gave us a very generous financial contribution to make the study possible. Their quick response time is key for this type of research."

Through their Alliance Grants program, NSERC is providing up to $15 million to stimulate collaborations between academic researchers, the public and not-for-profit sectors, and industry to address pandemic-related research and technical challenges. Al-Abadleh sees great value in this cross-sector approach.

"This is a beautiful team," said Al-Abadleh. "Academics are experts at designing studies and analyzing data, but it is so helpful to have a partner like Hemmera, which is up-to-date with the latest air-quality technologies. And I'm very keen to continue collaborating with the City of Kitchener and to know that the knowledge we gather in the lab will directly influence public policy."

The team at Hemmera is equally enthusiastic about the collaboration.

"We are excited to be partnering with Wilfrid Laurier University and the City of Kitchener to study air pollution across the city using low-cost sensors," said Lucas Neil, project manager in Air Quality Services at Hemmera. "These particular sensors allow for the creation of dense monitoring networks that will map large spatial areas. Municipal governments can use these networks in their planning of transportation, industry and residential developments to ensure citizens are adequately protected from the harmful effects of air pollution."

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