

Progress Report

2020/2021



TeachingCity
Oshawa

Challenges


Solutions

Impacts



Table of Contents

Collaboration	2
About TeachingCity Oshawa	2
Messages from the Partners.....	2
Experiential Learning	4
Co-op/Placement Students.....	4
Interactive Wayfinding Tool – Waterfront Trail	4
Access to Justice Hub	5
Virtual Exhibits.....	6
City Idea Lab	7
Spotlight: Durham College.....	9
Spotlight: Ontario Tech University	10
Spotlight: Trent University Durham GTA.....	11
Applied Research	12
Asphalt Pavement Deterioration Curves	12
Bee City Challenges – Urban Bee Keeping and Pollinator Campaign.....	13
Data intelligence for the City of Oshawa	15
Development and Evaluation of Virtual Programs for Older Adults and Persons with Dementia to Combat Social Isolation in the Oshawa Community.....	16
Downtown Oshawa Air Quality and Traffic Monitoring Project	18
Enriching Firefighter Training Through the Development of a Novel Virtual Reality Training Simulation for Personalized, Precision Skill and Resilience Training	20
Fire Navigation Systems: Localization and Mapping for Structural Firefighters	21
Reanimation of the City’s Downtown	23
Seniors Cultural Competencies Game: An Innovative Virtual Learning Environment to Enhance Age-Friendly Cultural Competencies	25
Story-Sharing Chat-bot and Visualization to Address Working from Home Mental Health	26
Traffic Monitoring Project: Real Time Traffic Count and Classification	28



Collaboration

Collaboration

About TeachingCity Oshawa

TeachingCity Oshawa brings together the City of Oshawa and its education and research partners – the Canadian Urban Institute (CUI), Durham College, Ontario Tech University, Trent University Durham GTA (Trent Durham), and the University of Toronto's Faculty of Applied Science and Engineering.

The City and its partners focus on addressing Oshawa's urban issues through innovation, collaboration, applied research and shared experiential learning opportunities with the aim to position Oshawa as a local, national and global community of urban research and learning.

Messages from the Partners

Mayor Dan Carter and CAO Paul Ralph, City of Oshawa:

"The 2020-2021 Progress Report celebrates year four of the TeachingCity Oshawa collaboration with our post-secondary education and research partners. The City of Oshawa is amazed at the many successful TeachingCity projects that are complete and underway, which are bringing new ideas and creative solutions for the City and our community."

[Click to view message from Mayor Dan Carter](#)


Mary Rowe, President and CEO, Canadian Urban Institute:

"Canada needs initiatives like TeachingCity that bring together academia, local government, business and civil society to tackle urban challenges. This is even more true in cities like Oshawa that are undergoing significant transitions as the economy, climate and social structures are changing. The learning benefits of this program are only accruing to the students - we all need to learn from each other."

Don Lovisa, President, Durham College:

"It's been another successful year for the TeachingCity initiative" said Don Lovisa, president, Durham College. "Not only were our students involved in meaningful projects that continue to have a positive impact on the City of Oshawa and its residents, students are also able to put their new skills, knowledge and experiences into action. Durham College's involvement with TeachingCity is a testament to the value of transformative, innovative experiential learning opportunities and we're looking forward to its continued success."

[Click to view message from Don Lovisa](#)



Collaboration

Dr. Steven Murphy, President and Vice-Chancellor, Ontario Tech University:

“Over the past several years, TeachingCity has played a vital role in providing Ontario Tech University students with hands-on learning opportunities that prepare them for their future careers. Students develop in-demand skills as they work with City staff to address pressing local issues. Their innovative solutions continue to contribute to the health and prosperity of our community. Our partnership with the City of Oshawa and the organizations involved in TeachingCity projects, along with generous support from the RBC Foundation, is a tremendous example of the importance of collaboration in developing new ideas and insights.”

[Click to view message from Dr. Steven Murphy](#)

Dr. Scott Henderson, Dean and Head, Trent University Durham GTA:

“As we come to the end of another successful academic year in the TeachingCity partnership, I want to recognize the impact and contributions made by students as they participated in addressing a number of relevant social challenges,” said Dr. Scott Henderson, Dean and Head, Trent University Durham GTA. “The pandemic has certainly created a challenging environment to work in, but the students have not only excelled in finding innovative solutions and tangible outcomes, but they’ve gained valuable research experience along the way.”

[Click to view message from Dr. Scott Henderson](#)

Dr. Brent Sleep, Chair, Department of Civil and Mineral Engineering University of Toronto:

“U of T Engineering strives to develop the whole engineer – experiential learning is a significant part of that. By partnering with TeachingCity Oshawa, our students are able to understand the impacts of what they are learning. This past year, we have been proud to offer our expertise in asset management to benefit the community of Oshawa; we look forward to continued collaboration with TeachingCity Oshawa.”

Experiential Learning

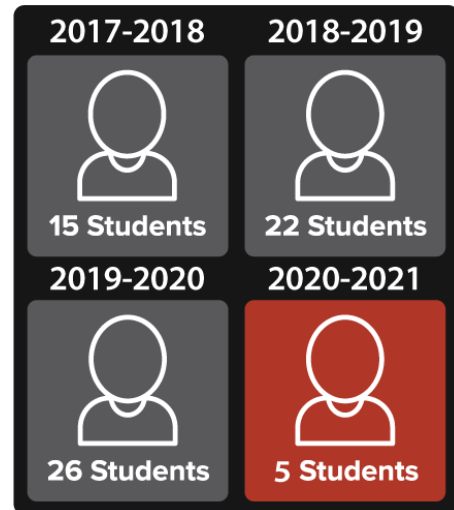
Experiential Learning

Co-op/Placement Students

Placement opportunities for students in 2020/2021 were completely virtual, due to public health restrictions during the pandemic. Despite this, the City was able to provide a small number of virtual co-operative education placements to post-secondary students.

This included students from:

- The Faculty of Social Sciences & Humanities (Ontario Tech University)
- The School of Media, Art & Design (Durham College)
- Human Resources Post Graduate Certificate Program (Durham College)



Caption: Placement students from 2017 to 2021.

Interactive Wayfinding Tool – Waterfront Trail



Caption: Scanning QR code at waterfront trail.

Durham College students from the School of Media, Art & Design, under the supervision of faculty member Linda Cheng, designed a new interactive wayfinding tool to enhance visitor experiences along the Waterfront Trail. This began as a City Idea Lab course in the winter 2021 semester and was further developed and prepared for launch during the spring and summer 2021 semesters by Durham College student Karan Bhandra through an RBC Future Launch Student Leader Award.

This technology builds on the success of a similar project at the Oshawa Valley Botanical Gardens that provides wayfinding and the ability for visitors to explore points of interest within the park.

The City looks forward to exploring further collaborations to develop interactive technology at additional locations in the future.

✓ Experiential Learning

Access to Justice Hub

The Access to Justice Hub is a collaboration between the Durham Community Legal Clinic (DCLC), Durham College, the Region of Durham and many other service providers, with a goal of expanding access to free legal services for Durham residents who do not qualify for Legal Aid Services provided by DCLC. The free legal services are provided by Durham College students enrolled in the School of Justice & Emergency Services' Paralegal program.

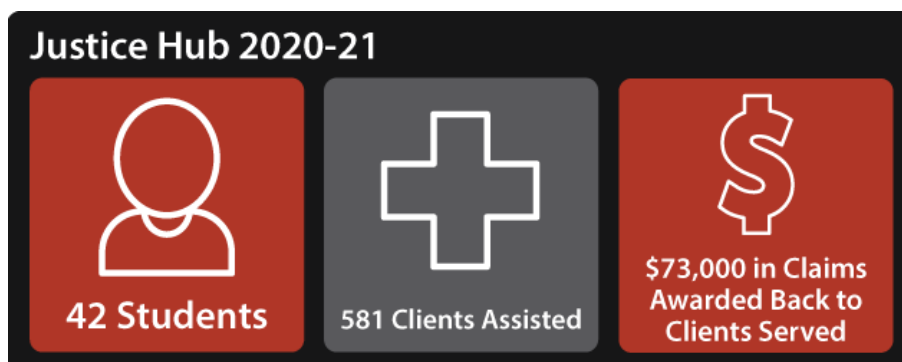
This experiential learning initiative provides students with an opportunity to use the skills learned in class, while also offering valuable services to local residents.

A future research project at the Access to Justice Hub around the areas of social equity and inclusion is also being planned by TeachingCity Oshawa partners Durham College, Ontario Tech University and Trent Durham.

In 2020/2021, the HUB hosted and provided the following support:



Caption: HUB student helping a client.



Caption: Justice Hub statistics from 2020-2021.

✓ Experiential Learning

Virtual Exhibits

Art in the Hall, artwork created by students in Durham College's Fine Arts – Advanced program, is exhibited at City Hall on an ongoing, rotating basis. Exhibits are designed and installed by student artists, with guidance from Cultural staff at the City of Oshawa. Due to the pandemic and closure of City Hall to the public, Art in the Hall pivoted and went virtual.

During the 2019-2020 academic year, students from the Journalism and Personal Support Worker programs at Durham College conducted interviews with a selection of older adults who were either members of the Oshawa Seniors Community Centres 55+ ([OSCC55+](#)) or living in residences in Oshawa. These stories were then interpreted by fellow Durham College students in the Fine Arts program through visual art.

Their pieces are featured in the [virtual gallery](#) on the City's website. Original artworks are also installed at the Delpark Homes Centre, Donevan Recreation Complex, Northview Community Centre and OSCC55+ John Street Branch.



Caption: Snapshot of virtual exhibit.

City Idea Lab

City Idea Lab

City Idea Lab is a course-based and experiential program within TeachingCity Oshawa that is offered to students at Durham College, Ontario Tech University and Trent University Durham. Through the semester, students collaborate with faculty and City staff to design solutions to challenge questions related to urban issues affecting the City of Oshawa.

What Happens at a City Idea Lab Course?

1. **Challenge questions:** Challenge questions are chosen by City staff and relate to a current urban issue/challenge. Challenge questions are embedded into both the academic curriculum and guide group assignments.
2. **City staff presentations:** City staff virtually presented an overview of local government and highlighted the role and responsibilities of the local, regional, provincial, and federal government, aimed at enhancing student's civic literacy. Additionally, the City staff presented Oshawa's changing economy and demographics, key issues facing the municipality, and relevant knowledge to frame the challenge questions.
3. **Co-designing solutions:** Students worked in groups to brainstorm ideas and prepare proposals for City staff. City staff attended several class sessions to connect with student groups, support the design process, and provide feedback and guidance.
4. **Final student presentations:** At the end of the semester, students presented their final proposals to City staff. The presentations provided overviews of the solutions and how they can be implemented by the City of Oshawa.
5. **Showcase of Student Ideas:** Please visit www.oshawacityidealab.squarespace.com for a complete summary of the challenge questions and student solutions.

Testimonials

"It was a really interesting way to do a course, which I loved because it made doing the work seem more enjoyable." – *City Idea Lab Student*

"I enjoyed this creative way to learn, and the opportunity to complete an assignment that has the potential to provide real-world change." - *City Idea Lab Student*

"This was a fantastic experience for our PSW students. They have found the TeachingCity - City Idea Lab projects to be a positive way to help older adults feel a little less isolated during this time." – *Kimberlee Neault, Durham College Faculty*

The TeachingCity Oshawa partners recognize the RBC Foundation (RBC Future Launch Program) for the generous gift in the amount of \$322,000, which is funding the City Idea Lab.

RBC FUTURE LAUNCH
RBC.COM/FUTURELAUNCH

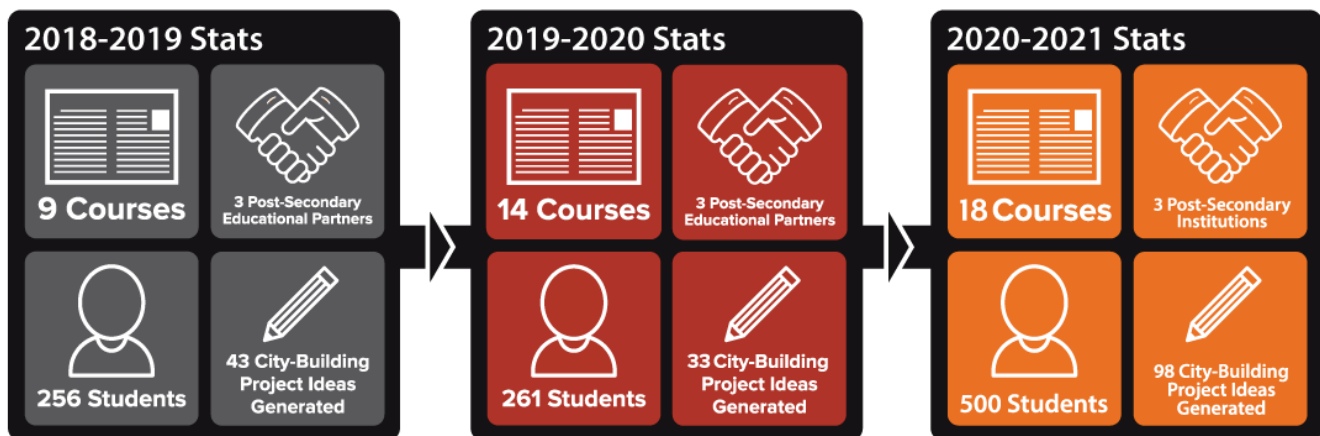


City Idea Lab

City Idea Lab Challenges 2020-2021

City Idea Lab courses covered a wide range of challenges this year, including:

- anti-racism and anti-Black racism,
- child and youth participation,
- health and well-being of community and pollinators,
- building innovative and sustainable communities,
- sharing community stories through public art,
- developing augmented reality platforms for public areas in Oshawa, and
- community development amid COVID-19.



Caption: City Idea Lab statistics since inception in 2018.

Ontario Tech University and Trent Durham Collaborate on Virtual Summer Bi-Institutional City Idea Lab Courses

During the Summer 2020 semester, the first bi-institutional course between Ontario Tech University and Trent University Durham was taught by Dr. Alyson King and Brandon Tozzo. The course was titled “Strengths-Based and Cooperative Community Development During Extended Crises,” and it examined the economic and community impacts of the pandemic on the community, and public health measures.

This partnership continued in the Spring 2021 through a second bi-institutional course between Ontario Tech University and Trent University Durham. This course focused on the application of Crime Prevented Through Environmental Design (CPTED) Principles on several locations in the City of Oshawa.

City Idea Lab

Spotlight: Durham College

Pen Pals, Reading Buddies and Senior Hour Video Segment

Personal Support Worker students taking instructor Kimberlee Neault's Durham College course, Mental Health Challenges, studied the challenge of isolation in older adults during COVID-19. In particular, the students explored how to address the unique needs of older adults, as many do not have financial resources or the ability to use digital technology. In addition to working with the City of Oshawa, students also learned from the Oshawa Senior Community Centres (OSCC55+). Moving beyond designing ideas, they implemented specific programs including a pen pal initiative (cards and letters delivered to isolated seniors), reading buddies (phone calls were made to isolated seniors and students would read stories) and senior-hour video segments, which were made available to the OSCC55+ clients through their website.



Caption: ADP Client Carolyn Cuthbert receiving a pen pal letter from Juley Gaspar, OSCC 55+ Adult Day Program Coordinator.



Caption: A card for an isolated older adult made by Personal Support Worker student, Sara Almas.

Students from the Future Writing and Publishing Course at Durham College worked with City staff from Recreation and Culture Services. The students addressed the following challenge questions: How might the city tell stories of the impact of TeachingCity and City Idea Lab? How might the city tell good stories? To answer these questions, the students published an online media article and created a [Senior Hour Video Segment](#) to highlight the initiatives led by the students of the Personal Support Worker Program. More specifically, the stories were published in the Chronicle, and the video was also shared on the City Idea Lab's YouTube channel. The stories contributed a meaningful narrative of the work done to address senior isolation amid the pandemic while also providing students with an opportunity to sharpen their journalism skills.

City Idea Lab

Spotlight: Ontario Tech University

Mapping Cultural Legacies of Musical Expressions in Oshawa

Students from Dr. Gary Genosko's Special Topics – Popular Music in Oshawa, teamed up with the City's Recreation and Culture Services staff to explore how the City of Oshawa could best publically recognize the musical heritage of popular music in Oshawa from 1964-1979. Students came up with five creative recommendations:

1. **Fan Subscription Boxes** – created for monthly sale to men and women in the targeted demographic containing a variety of different merchandise and some special surprises that celebrate Oshawa bands from the 60s and 70s.
2. **Play.Pause.Rewind** – a Student-run celebration of Oshawa's musical heritage at Kop's Records (Oshawa) upstairs performance space by tribute bands and special guests, including original artists.
3. **Summer of Music** – an annual scavenger hunt in which participants gather selfies at significant musical locations marked with small signs, post these on designated social media, and compete for swag.
4. **Poshawa** – a large-scale concert to be held at the Oshawa Airport featuring current Oshawa musicians.
5. **Augmented Oshawa** – an Oshawa-based augmented reality musical experience, where permanent digitally enabled eco plaques of significant sites for tours; virtual, self-guided and by bus.



Caption: Word art depiction of students' recommendations.

City Idea Lab

Spotlight: Trent University Durham GTA

Using the Cultural Economy for Post-COVID Recovery

Students in Brandon Tozzo’s Communications and Critical Thinking Course at Trent University Durham GTA worked with City staff from Recreation and Cultural Services, Economic Development, and Innovation and Transformation. The aim of the course was to research a post-COVID-19 culture economy. Students explored how the City of Oshawa could maximize the “Buy Local” campaign while supporting and strengthening Oshawa’s cultural sector. Upper year students in this course learned the larger role of culture on a city’s economy, and had the opportunity to learn first-hand from Oshawa cultural business owners, who shared their experiences during the pandemic.

After thoughtful research, the students submitted project proposals that sought to address economic recovery in the cultural sector, including:

- a bike-share program,
- a campaign that promotes buying and supporting local initiatives,
- a COVID-reintegration program to address the increase of homelessness, and
- an internet hub that hosts job fairs.



Caption: Visual representation of student recommendations.

Encouraging Youth-led Engagement Opportunities

Students from Omar Lugan’s Child and Youth Studies course addressed the challenges the City faces in regards to inclusive youth engagement and civic participation. They explored how the City could effectively implement two age-based youth councils and also move forward in utilizing youth-centred social media accounts to promote engagement initiatives.

The current [Oshawa Youth Council](#) (OYC) has participants ranging from grade 7-12 and is experiencing gaps in age representation and thus this new model would aid in engaging more youth. Students proposed a group of Youth Leaders (grades 7-10) and Youth Mentors (grades 11-12) with Post-Secondary mentors in place.

Students’ social media strategies involved the possible creation of an OYC staff led Snapchat account, intended to break down barriers to engagement where youth may feel more inspired to discuss, share, voice opinions on various issues and topics of importance to them.

Applied Research

Applied Research

Asphalt Pavement Deterioration Curves

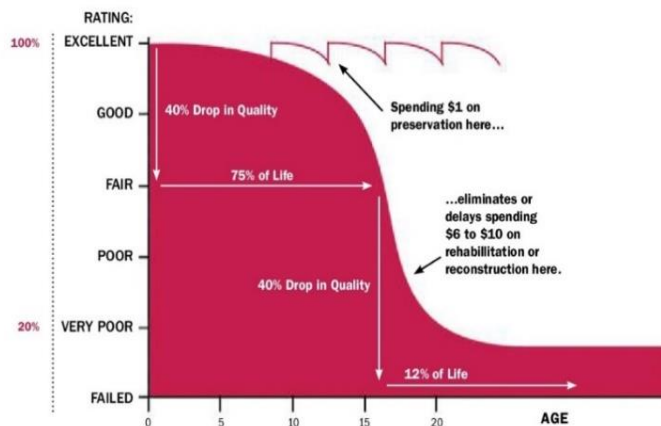
Research Project * University of Toronto * 1 Student * Completed

The Challenge

Engineering Services staff at the City of Oshawa rely on deterioration modelling through deterioration curves to track and monitor the potential for changes in roadway pavement conditions across the city over time. These models enable staff to forecast rehabilitation needs. Engineering Services staff were looking for an innovative way to update their existing pavement deterioration curves.

The Solution

The University of Toronto, Civil and Mineral Engineering Department partnered with the City to use data analytics and artificial intelligence algorithms to accurately predict conditions of roadways in the city. Through this model, the City can more accurately decide on when and how to rehabilitate city roads. The study compared several statistical and machine learning algorithms to a new and expanded dataset developed by the City. This was followed by contrasting the results of the analysis with the existing model for road deterioration prediction.



Caption: Benefits of Early Lifecycle Investments

Impact

The final model developed by the research project achieved an accuracy level of prediction of pavement deterioration of 80%, greatly improving on the 45% accuracy of the existing model. This model will enable the City to make better decisions regarding roadway rehabilitation projects. It provides a more accurate prediction of roadway deterioration, allowing the City to have a higher confidence and efficiency in rehabilitation decision making – not too fast, not too late. In the long term, continued use and update of the model can help the City incorporate elements of sustainable development in its decision making process.

Testimonials

Being a part of this amazing project was a valuable experience. The City of Oshawa enjoys collaborating with professional experts who are dedicated to tracking the status of their assets



Applied Research

and monitoring their condition on a regular basis. I am confident that this project and the experiences that I received will pave my way of finding a job in my field after graduation. – *Amirreza Mahpour, University of Toronto Masters Student*

The project was a fascinating experience to me for several reasons. First, it is rare to find a qualified large dataset for road deterioration. The City made a very good decision by investing in developing a reliable dataset. This allowed us to really examine and advance knowledge in the area of using artificial intelligence methods in roadway asset management programs. Second, it was very intriguing to interact with City staff and engineers who showcased the way best practices in asset management are used in the City. – *Dr. Tamer El-Tiraby, Department of Civil & Mineral Engineering, University of Toronto.*

Bee City Challenges – Urban Bee Keeping and Pollinator Campaign

Research Project * Experiential Learning * Durham College * 25 Students * Completed

[Click to view message from the Bee City Challenges Team](#)

The Challenge

The City of Oshawa became a “Bee City” in 2018. Through this designation, the City committed to pollinator protection, increasing pollinator habitats on private and public lands, educating residents on actions to help pollinators in the community, and recognizing and celebrating pollinator initiatives in the community.

In early 2020, the City issued a Call for Interest for collaboration related to the Bee City commitment and posed these specific challenge questions:

- How can the City establish an urban beekeeping program that ensures the health and wellbeing of our community and pollinators?
- Can urban beekeeping be done in a way that does not have an impact on native pollinators?
- How might the City continue to support, educate and celebrate pollinator populations and health?

The Solution

An interdisciplinary Durham College team – consisting of School of Science & Engineering Technology faculty members; Architectural Technology and Environmental Technology students; as well as members from FastStartDC, the college’s extra-curricular entrepreneurship program – collaborated to investigate the potential for and impacts of introducing an urban beekeeping program in Oshawa. This included developing an awareness campaign educating residents around the importance of pollinators and celebrating pollinator initiatives in Oshawa. The project consisted of three components:

Applied Research

1. Through a City Idea Lab course in the winter semester, students worked in groups to research and investigate how the City could establish an urban beekeeping program. Students presented potential advantages and challenges related to establishing an urban beekeeping program, and considerations with regard to zoning and other regulations.
2. Student researchers examined the impacts of urban beekeeping on native pollinators. A literature review was completed to review impact studies of urban apiculture on the population of wild pollinators and their ecosystem specifically examining risks to native pollinators, benefits of urban bee conservation and mitigation measures.
3. FastStartDC member business 3eehive and a student project assistant supported the City in developing a social media marketing campaign that will help to advance the City's goals of advancing its Bee City designation. The educational campaign ran between April and June 2021 and celebrated pollinator initiatives, encouraging residents to sign the Pollinator Pledge. In addition, this collaboration saw the addition of an educational video about pollinators as part of the City's virtual Peony Festival celebrations.



Caption: Sample social media post developed by FastStartDC member 3eehive, in support of pollinators.

Impact

The City Idea Lab assignments, research and literature review portions of the project will help guide policy in the City with respect to urban beekeeping.



Caption: Snapshot of marketing campaign reach.

The marketing campaign helped raise awareness about pollinator issues locally and provided public education to Oshawa residents on what they can do to support and sustain native pollinators. The social media campaign included a total of 30 posts with a combined reach of 17,000 with 1100 total likes, 133 shares and 58 comments. Students distributed 85 seed packets to local residents and were able to increase the City's pollinator pledges by 28 residents. Their creation of a [Peony Festival video](#) for the celebration resulted in 68 online views.

Additionally, the engagement initiatives helped the City advance its Bee City designation goals and build support for future City initiatives supporting pollinators.



Applied Research

Testimonials

“The experience from the very start has been incredible. It is a joy to collaborate with such talented, passionate, and motivated people. The work that we are doing does not feel like work because of the environment that has been created. I am excited to watch this project come to fruition, and I am honoured and grateful to be a part of this experience.” - *Cullen Smith, Student Researcher, Durham College*

“I am grateful to have worked on a project of this nature – especially because it is such an important environmental issue. Having reviewed many articles during my research, I have learned a lot about what we can do as citizens to help encourage conservation. I've already begun to implement the tips I have learned to help protect pollinators.” - *Shane Kenyon, Student Researcher, Durham College*

“Thanks to the City of Oshawa, Durham College, and FastStartDC joining forces, we were able to tackle an issue from a variety of perspectives and develop creative solutions that not only positively impact the goals of the City, but provide for unique experiential learning opportunities for our students. It is experiences like these that set our students apart upon graduation.” – *Crystal Pollard, Manager, Entrepreneurship Services, Durham College*

“It has been exciting to work on this project. We are very hopeful that our work will have a positive impact on the City and its residents.” - *Dimitri Stathopoulos, Faculty, School of Science & Engineering Technology, Durham College*

Data intelligence for the City of Oshawa

Research Project * Ontario Tech University * 2 Students * In Progress

The Challenge

In early 2020, Oshawa Mayor Dan Carter announced the formation of the Mayor's Economic Recovery Task Force. The mandate of the Task Force is to assist Oshawa City Council and staff to better understand the impacts that the COVID-19 crisis is having on the local business community and to provide advice to City Council on issues and opportunities related to the full recovery and ongoing transformation of the City's economy.

As the impact of this pandemic is anticipated to have sustained and long-reaching effects on the local economy, there is the opportunity to use openly available data sets that can inform policy and decision-making related to economic recovery within the City of Oshawa.

The Solution

The Database Research Group at Ontario Tech University, under the leadership of Dr. Ken Pu from the Faculty of Science, set out to use open data sets to examine various economic



Applied Research

indicators and find appropriate metrics to track recovery. Working to identify data sets and variables that are relevant to the City from known open data repositories, the research group will determine feasibility of data sets to answer required questions, conduct data collection and analysis, and report its findings to the City. The project will also include the development of a preliminary dashboard of selected metrics.

Impact

This project will provide a platform for the City to access the expertise and resources of Ontario Tech University for the purpose of data collection, analytics and reporting. It is hoped that the City can use this data to make evidence-informed decisions and inform the development of policies or community programs that are directed towards economic recovery.

Testimonials

“Having a practical project like collecting open data for the City has helped me to understand many of the challenges in data science. I'm looking forward to shaping my research to help the City and their needs in data science.” - *Limin Ma, Ontario Tech University graduate student*

“Being a senior graduate student, I am grateful to participate in the TeachingCity project with Dr. Pu. It gives me a chance to utilize my Ontario Tech training and contribute to the City's cause. Furthermore, I am very motivated to do a good job and use the final product as a centrepiece for my job search portfolio in data science and web technologies.” - *Michael Valdrón, Ontario Tech University graduate student*

“We believe that a mature and efficient data analytics pipeline will enable the City to gain insights into the economic, demographic and other key metrics of the City and its residents. Through my research group, I am motivated to contribute to the City's economic development and planning by providing data intelligence based on various open data repositories on the economic impact of COVID-19 on Oshawa and related businesses that will translate into new programs and policies.” – *Dr. Ken Pu, Faculty of Science, Ontario Tech University*

Development and Evaluation of Virtual Programs for Older Adults and Persons with Dementia to Combat Social Isolation in the Oshawa Community

Research Project * Ontario Tech University * Oshawa Seniors Community Centres * 2 Students
* In Progress

The Challenge

The City of Oshawa and the Oshawa Senior Community Centres 55+ (OSCC55+) are actively working to implement the Oshawa Age-Friendly Strategy. Fundamental to this strategy is to effectively address the needs of older adults. As residents age and cognitive abilities decline, often these members of the community become isolated and decreasingly engaged in their

The logo for 'Applied Research' features the words 'Applied' and 'Research' in a white, handwritten-style font. To the left of the text is a white circle containing a checkmark. The entire logo is set against a black background that has a white, torn-paper-like edge at the bottom. In the upper right corner of the black background, there are several glowing string lights.

communities. In 2020, as a result of public-health measures taken in response to the pandemic, this situation was exasperated. The OSCC55+ moved all of their programming directly aimed at older adults online. In addition, City customer-service staff often interacted with members of the community with cognitive impairments regularly, and many interactions were shifted to virtual means (e.g. online chat, phone inquiries) during the pandemic. It is unknown how effective the City's and the OSCC55+'s virtual efforts are in engaging and addressing the needs of older adults with dementia and other cognitive impairments and in reducing the negative consequences of social isolation.

The Solution

A research team at Ontario Tech University has launched this project, which is expected to be completed in 2022. The primary goal of the project is to evaluate the effectiveness of OSCC55+'s virtual and online programs in addressing the needs for social connection and interaction for older adults with dementia and their caregivers during the COVID-19 pandemic. In addition, the project will also evaluate the effectiveness of online or virtual interactions between the City's customer-service staff and this population.

Following the evaluation, the research team will identify gaps and provide recommendations to both the OSCC55+ and City on how they can better engage, communicate and deliver services and programs to older adults with cognitive impairments.

Impact

Project insights will have an impact on the improved use of digital technology, as well as building the capacity of the volunteer workforce and community partnerships to support social connectedness of older adults with cognitive impairment in Oshawa.

Testimonials

"I am delighted to be a part of this wonderful research project. It allows me to work closely with OSCC55+ members and Oshawa City staff and learn from their experiences. I am looking forward to the next steps of the project." - *Rabia Akhter, Ontario Tech University graduate student*

"I am excited to work with OSCC55+ members and Oshawa City staff. It not only helps me to expand my expertise but also to contribute to the betterment of society." - *Farzana Rahman, Ontario Tech University graduate student*

"I am very pleased for having the opportunity to work with TeachingCity Oshawa to establish meaningful partnerships and collaborations with the diverse groups of stakeholders in Oshawa. These partnerships allow me to utilize my research expertise in gerontology, and to offer my insights into the implementation of community-based projects focusing on the needs of older adults with cognitive impairment, with the goal of contributing to the development of an age-friendly city in Oshawa." - *Dr. Winnie Sun, Faculty of Health Sciences, Ontario Tech University*



Applied Research

Downtown Oshawa Air Quality and Traffic Monitoring Project

Research Project * University of Toronto, A.U.G. Signals, North Line Canada Inc. * 2 Students * Completed

The Challenge

A.U.G. Signals Ltd. (AUG) and the Southern Ontario Centre for Atmospheric Aerosol Research (SOCAAR) at the University of Toronto, along with North Line Canada Ltd (North Line), worked with the City of Oshawa to assess the impact of traffic on air quality in the City's downtown core.

The Solution

SOCAAR and AUG developed a compact air pollutant monitoring technology called AirSENCE and four of these units were installed around a city block in downtown Oshawa. Co-located with these devices were four North Line FOX radar systems to quantify passing vehicles and characterize them based on length. The project was conducted from mid-August 2019 to late July 2020.

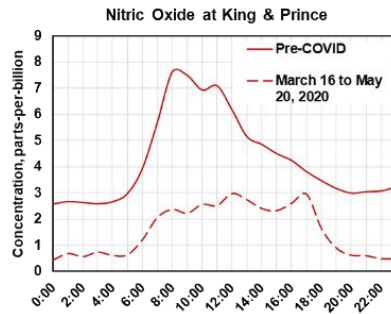
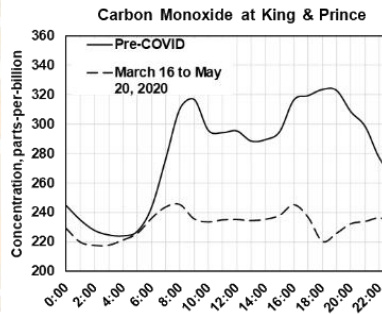
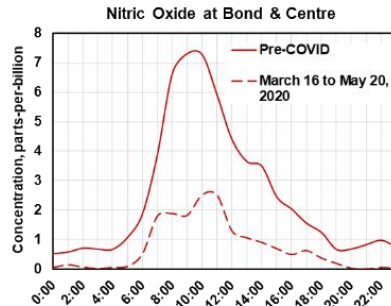
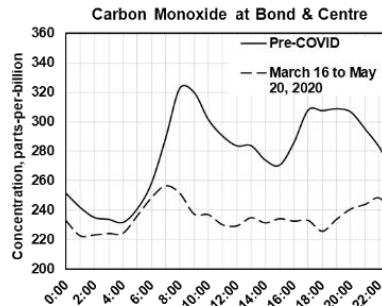
The AirSENCE sensors measured air pollutants associated with vehicle emissions including carbon monoxide (CO), carbon dioxide (CO₂), nitric oxide (NO), and nitrogen dioxide (NO₂) and were measured against vehicular traffic volume. In general, the study substantiated higher rates of these emissions during typical rush hour periods.

Since the study occurred during the public health restrictions due to COVID-19 in 2020, the placement of AirSENCE sensors alongside traffic counters provided an unprecedented opportunity to assess the impacts of changes in traffic volume on air quality in the downtown Oshawa core.

Starting in mid-March 2020, the four AirSENCE devices detected significant decreases in average concentrations of air pollutants associated with vehicle emissions. This observation concurred with the improved air quality reported around the world and serves as a powerful illustration of the strong relationship between vehicle traffic and air pollutant levels in urban areas.

The study also captured a slight increase in pollutants during a period of road construction along King Street in June 2020. This demonstrates that while vehicular traffic is a major contributor to urban air pollution, its sources are in fact diverse.

Applied Research



Caption: Findings from the Air Quality sensors located in Oshawa's downtown core.

Impact

This study demonstrates the valuable information that can be collected from localized, real-time air quality sensors. Further, the valuable information can aid in decision-making for projects that involve public health considerations such as traffic mitigation, heavy construction, and urban renewal efforts.

The researchers are now exploring the introduction of air quality monitoring data into a technical course curriculum, either as course material, a practical/lab exercise, or the topic of a capstone design project.

Testimonials

"This project provided a good example of the potential benefits of directly engaging communities in air quality research." – *Dr. Greg Evans, Faculty of Chemical Engineering & Applied Chemistry, University of Toronto*



Applied Research

Enriching Firefighter Training Through the Development of a Novel Virtual Reality Training Simulation for Personalized, Precision Skill and Resilience Training

Research Project * Durham College * 2 Students * In Progress

The Challenge

Firefighters undertake significant and ongoing training to ensure their readiness to respond to emergencies. The cost of training in real-life fire scenarios is extremely high requiring substantial resources and poses great personal risk to individuals. Many firefighters who are unable to train in real-life scenarios due to the uncontrollable conditions suffer from a variety of natural but adverse reactions when they are exposed to the real situation.

The Solution

A research team, under the supervision of Dr. Michael Williams-Bell, is undertaking the introduction of a highly innovative project using virtual reality to simulate uncontrolled fire scenarios and improve training for firefighters using immersive lifelike, experiential learning.

The project is currently in its beginning stages and initial data collection is ongoing. The anticipated results are to develop a virtual reality training simulation of an uncontrolled environment (i.e. building collapse) that can improve the resiliency of firefighters so that the mastering of the required skills and abilities are transferable to real-world scenarios.

The main objectives of this project include determining the specific scenarios encountered by firefighters under uncontrollable conditions and integrating the virtual reality simulation hardware with wearable technologies to measure physiological responses for real-time data monitoring and analytics, as a method to assess resiliency during the virtual reality simulation.

This project has evolved since the initial idea as a result of several grants, including a federal Natural Sciences and Engineering Research Council of Canada (NSERC), College and Community Social Innovation Fund (CCSIF) grant and a Mitacs Accelerate grant.

Impact

Through this partnership, Oshawa Fire Services will gain access to a state-of-the-art training simulation that can complement the real-life training scenarios that are currently conducted as part of ongoing training in the fire service.

Thanks to the technology being used, it is anticipated that firefighters training in an immersive environment will be better equipped in the field as they learn to manage the stressors in real-life, finding ways to optimize performance and well-being, thus enabling them to perform better on the job. Ultimately, this means saved lives, a reduced number of injuries, and less incidences of Post-Traumatic Stress Injuries.

Testimonials

“This particular project has been in the works since December 2016 through a partnership with Oshawa Fire Services. Durham College collaborating with the City of Oshawa has provided a unique applied research opportunity to enhance the training of firefighter personnel within the local community, as well as throughout the province, while improving our understanding of the physiological impacts of firefighting.” – *Dr. Michael Williams-Bell, Durham College*

Fire Navigation Systems: Localization and Mapping for Structural Firefighters

Research Project * Ontario Tech University * 17 Students * In Progress

[Click to view message from the Fire Navigation Systems Team](#)

The Challenge

Structural firefighting is a dangerous profession. At times, firefighters inside unknown structures can become disoriented due to heavy smoke and a potentially changing environment in the event of a ceiling or wall collapse. Currently, no technology exists to assist firefighters with navigating unfamiliar surroundings during an emergency call.

The Solution

Students from a variety of engineering disciplines are developing a smart helmet that builds a dynamic map of the smoky environment as a firefighter enters the structure. The map, like a floorplan, is then used to localize the firefighters within the structure and send information about their location to an Incident Commander (IC). This allows the IC to always know the exact location of each firefighter inside a structure, even in previously unknown environments. In the event of a firefighter mayday, since the exact location of the firefighter will now be known, rescue measures will be optimized to bring that firefighter back to safety as quickly as possible.



Caption: Imaging of kitchen and helmet.

This project began in 2018, originally through a capstone project, and has involved 17 students to date, resulting in the development of a fully functional prototype.

The logo for 'Applied Research' features the words 'Applied' and 'Research' in a white, handwritten-style font. To the left of the text is a white circle containing a checkmark. The entire logo is set against a black background that has a torn-paper edge at the bottom. Above the logo, several warm-toned string lights are visible against a dark background.

Applied Research

Over the past year, the project has seen significant growth. During the Fall 2020 semester, two students (Tyler Paquette and Samuel Lovett) formed the FireNav team and participated in the Brilliant Catalyst start-up incubator program.

Brilliant Catalyst is a start-up incubator based at Ontario Tech University that focuses on helping founders develop their venture and expand their entrepreneurial skills. Throughout the program participants attend lectures, receive mentorship, meet with industry experts, and compete in two pitch competitions. FireNav placed first in both competitions. Using the knowledge and skills developed during the incubator, it is the FireNav team's goal to commercialize this life-saving technology. Through attendance in this program alone, the team has been able to transform FireNav into a four-person start-up in only four months.

While the FireNav team was working with the Brilliant Catalyst, the capstone group spent the school year investigating how new sensing technology could augment the helmet's mapping. Thanks to their findings, the FireNav team has plans to build a new prototype this summer.

Finally, FireNav's most recent achievement has been the development of a virtual simulation environment in which to test the helmet. This is a major milestone as it allows for fast and accurate testing of the helmet software, no matter what the conditions outside. This allows work to be done more efficiently and it is also a huge cost-saving measure. Now testing of the new helmet designs can be completed without needing to purchase expensive sensors.

Impact

The collaboration between the City of Oshawa and Ontario Tech University on this project is resulting in the development of an innovative, student-led start-up business and is contributing to the commercialization of a new life-saving technology for firefighters. Once this technology goes to market, the risk of disorientation diminished due to heavy smoke or a changing environment. Through the power of information and technology, FireNav will allow firefighters to work safer, bringing peace of mind to those working in these hazardous situations.

The City looks forward to further testing and piloting this new technology in the not-so-distant future.

This project is a great example of the objectives of TeachingCity Oshawa, providing an environment for innovation, where ideas can be conceptualized, designed, developed and launched here in Oshawa.

Testimonials

"This project allowed me to use my creativity to make something that could make a difference in our community. Solving important problems like the ones tasked in this project summons an engineer's utmost effort and commitment to learn. Working on this project jumpstarted my career as an engineer and gave me tools that I will never put down! This project has helped



Applied Research

develop technology that will allow the heroes of our community to be safe and help more people.” – *Karl Kanmaz, Ontario Tech University student*

“The FireNav project is an interesting feat of engineering with many technical angles. As an engineer in training, there are a few projects that I can reflect on that act as the foundation for my current skill set. This project is one of them. The combination of the engineering challenges, whether it be hardware or software, provided an engaging opportunity for me to step out of my comfort zone. In my experience, it is in these moments where most of the real learning occurs.” – *Brayden DeBoon, Ontario Tech University student*

“The project offered these students the opportunity to work closely with firefighters to find solutions that make interventions safer and more efficient. At the same time, this type of collaboration is a great benefit to students as a way for them to apply the concepts learned in class to real-world problems. The impact of this initiative goes far beyond the classroom: it inspires students to engage in social issues, promotes community involvement, and leverages the expertise of different community actors for the greater good, creating an important sense of belonging and collaboration.” – *Dr. Carlos Rossa, Faculty of Engineering and Applied Science, Ontario Tech University*

Reanimation of the City’s Downtown

Experiential Learning Project * Ontario Tech University: Brilliant Catalyst * 6 Students * Completed

The Challenge

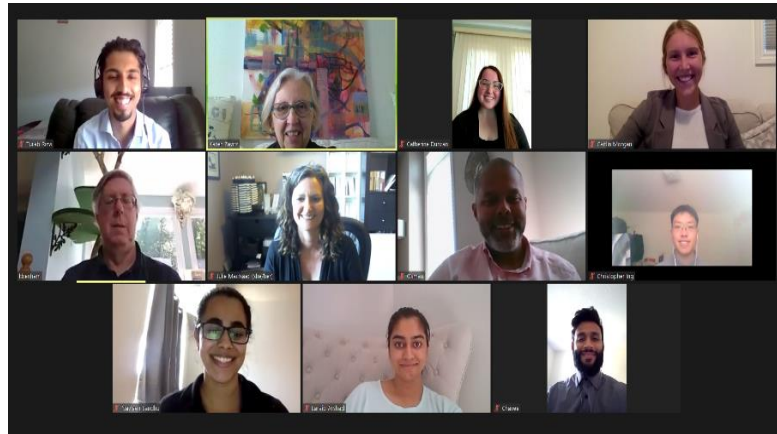
Public-health measures taken in response to the COVID-19 pandemic have impacted local businesses across a variety of sectors and economic recovery is top of mind for the City of Oshawa.

The City, through the Mayor’s Economic Recovery Task Force, issued a Call for Interest for TeachingCity projects to help support economic recovery in the city. The challenge for this project was to create a set of recommendations aimed at helping to reanimate Oshawa’s downtown core and increase consumer confidence once the COVID-19 public-health restrictions are lifted.

Applied Research

The Solution

Students worked over a one-month period to conduct research around best practices in other cities across Canada and conducted various virtual stakeholder interviews with business owners and City officials. The students identified 12 recommended actions and ideas within three strategic areas: Beautification, Reputation & Safety, and Increasing Downtown Visitation. The students ranked the ideas using considerations such as duration, cost analysis, effort and impact.



Caption: The Ontario Tech Brilliant Solutions team and City staff.

Beautification	Reputation & Safety	Increasing Downtown Visitation
<ul style="list-style-type: none"> • Addition of street furniture • Addition of green space • Addition of banners/signs • Continuation of streetscape enhancements 	<ul style="list-style-type: none"> • Increase safety lighting • Introduction of emergency stands • Introduction of year-round decorative lighting • Continuation of the Welcoming Streets Program 	<ul style="list-style-type: none"> • Introduction of scavenger hunt event featuring local landmarks • Introduction of street market/event such as “Oshawa Eats” • Introduction of an e-Sports event at Tribute Communities Centre • Expanded Fiesta Week events

Caption: Student’s 12 recommendations for re-animating downtown.

Impact

The research and ideas will help form an action plan for the City to consider after COVID-19 public-health restrictions are lifted and businesses start to reopen. The intent is to bring vibrancy to downtown Oshawa.



Applied Research

Testimonials

“I had the opportunity to work with a fantastic team of fellow students. Within a few short weeks, we collected data from various municipalities across Canada and reached out to community stakeholders, all before critically evaluating the options available to deliver as recommendations. Moving forward, I hope that the City of Oshawa is able to find value in our research and recommendations to revitalize the downtown core.”- *Catherine Duncan, Ontario Tech University student*

“Working on a one-month project with other students to have an impact on reanimating Downtown Oshawa, and being able to work in a changing environment while adapting together with co-workers to create the best possible outcome was a great learning experience.”- *Navleen Sandu, Ontario Tech University student*

“COVID-19 has brought forward a unique set of challenges impacting local communities. Through this Brilliant Solutions project, Ontario Tech students and faculty members worked with the City of Oshawa and the Downtown Oshawa Business Improvement Area, providing substantial recommendations that will assist policy makers in their economic recovery process.”
- *Osman Hamid, Brilliant Catalyst, Ontario Tech University*

Seniors Cultural Competencies Game: An Innovative Virtual Learning Environment to Enhance Age-Friendly Cultural Competencies

Research Project * Ontario Tech University * Oshawa Seniors Community Centres (OSCC55+)
* 3 Students * In Progress

[Click to view message from the Seniors Cultural Competencies Game Team](#)

The Challenge

The City of Oshawa and the Oshawa Senior Community Centres (OSCC55+) partnered to develop an Age-Friendly Strategy in 2019. To truly become an age-friendly community, it is imperative that City and OSCC55+ staff deliver programs and services with an age-friendly lens. Currently, no standard training and assessment program exists for this competency.

The Solution

Students and researchers from two faculties at Ontario Tech University (Faculty of Business and IT and Faculty of Health Sciences) are collaborating with the City and the OSCC55+ to develop the Seniors Cultural Competencies Game (SCCG), an age-friendly cultural competencies training and assessment mechanism. The SCCG is organized into six modules adapted from both the World Health Organization’s international age-friendly framework and the Oshawa Age-Friendly Strategy. The SCCG is being built into an immersive virtual environment (IVE) that couples serious gaming with a gamified educational network (GEN) learning



Applied Research

management system. IVE will enable staff to virtually interact with an older adult putting into practice the learnings from the six modules.

Impact

Upon completion, the SCCG will provide an online interactive and engaging teaching and learning experience. Staff at the City and OSCC55+ will be trained on age-friendly cultural competencies and will be able to practice and assess their age-friendly cultural skills acquired throughout the training in a safe virtual environment. The SCCG will assist in implementing the City's Age-Friendly Strategy by enhancing an age-friendly competency among staff members to provide services and programs that meet the needs of Oshawa's older adults. This will reinforce the City's commitment to promoting healthy, active ageing and good quality of life for older residents.

Testimonials

"I am fortunate to be part of this exciting project. The collaboration with the City of Oshawa and OSCC55+ is enriching, enabling respect, trust and knowledge exchange among institutions." - *Pam Mutombo- Ontario Tech University graduate student*

"This project has benefited my research work in two ways. First, this project pivoted the scope of my research to include development and implementation of educational technologies and methods to support affective domains of learning such as verbal and nonverbal communication, cultural awareness, and ageism. Second, working with the City of Oshawa and OSCC55+ stakeholders was an eye-opening experience in how to employ scientific methods to create meaningful solutions to real-life issues." - *Dr. Adam Dubrowski, Faculty of Health Sciences, Ontario Tech University*

Story-Sharing Chat-bot and Visualization to Address Working from Home Mental Health

Research Project * Ontario Tech University * Ontario Shores Centre for Mental Health Sciences (Ontario Shores) * 2 Students * In Progress

The Challenge

With prolonged physical distancing, self-isolation, and stay-at-home orders, evidence of the mental-health effects of the pandemic is mounting. Many workers across Oshawa, Ontario and Canada transitioned to working from home during 2020 and 2021. Many individuals have experienced challenges maintaining strong connections and sound mental health. Mental health and wellness is key to ensuring employee satisfaction and productivity.

Applied Research

The Solution

Prior research has shown that sharing through peer-based systems can be helpful. Peer sharing is often preferred over formal therapy as it is perceived as more relatable and less stigmatizing. In this project, the research team set out to create a chat-bot system for people to anonymously share stories of challenges and successes related to the pandemic and to read the stories submitted by others.

The data collected by the app was used to create a visualization system to allow users to “find themselves” in the data, to see the stories shared by others and help people feel a sense of solidarity and community.



Caption: Screenshot of the mental health chat-bot prototype

The research team at Ontario Tech University has partnered with both Ontario Shores Centre for Mental Health Sciences and the City of Oshawa on this project, and it is financially supported by the Natural Sciences and Engineering Research Council of Canada (NSERC) Alliance Grant Program in response to COVID-19. The easy-to-use chat-bot-based technology to allow anonymous sharing of the struggles and triumphs of the COVID-19 pandemic will be piloted and tested by employees at Ontario Shores and the City.

Impact

The technology created by this project will allow people to express their feelings and feel less alone while dealing with the challenges of the pandemic. The technology developed in this work may be possible to repurpose for other targeted areas in the future.

In addition, the anonymous data collected through the technology will result in a public data set that can be used to study the immediate and ongoing effects of the pandemic on mental health.

Testimonials

“Designing the bubble exploration and the menus accompanying it greatly challenged my user interface (UI), user experience (UX) and web development skills. I can now say that I am capable of creating novel websites.” – *Shawn Yama, Ontario Tech University graduate student*



Applied Research

“We have felt very well supported by the City of Oshawa. HR professionals gave us excellent insight into the challenges faced by people working from home, which we used to guide the chat script development. This project is incredibly rewarding to work on as we hope it can make a real difference for the people of Oshawa and beyond.” – *Dr. Christopher Collins, Faculty of Science, Ontario Tech University*

Traffic Monitoring Project: Real Time Traffic Count and Classification

Research Project * Ontario Tech University * 15 Students * In Progress

[Click to view message from the Traffic Monitoring Project Team](#)

The Challenge

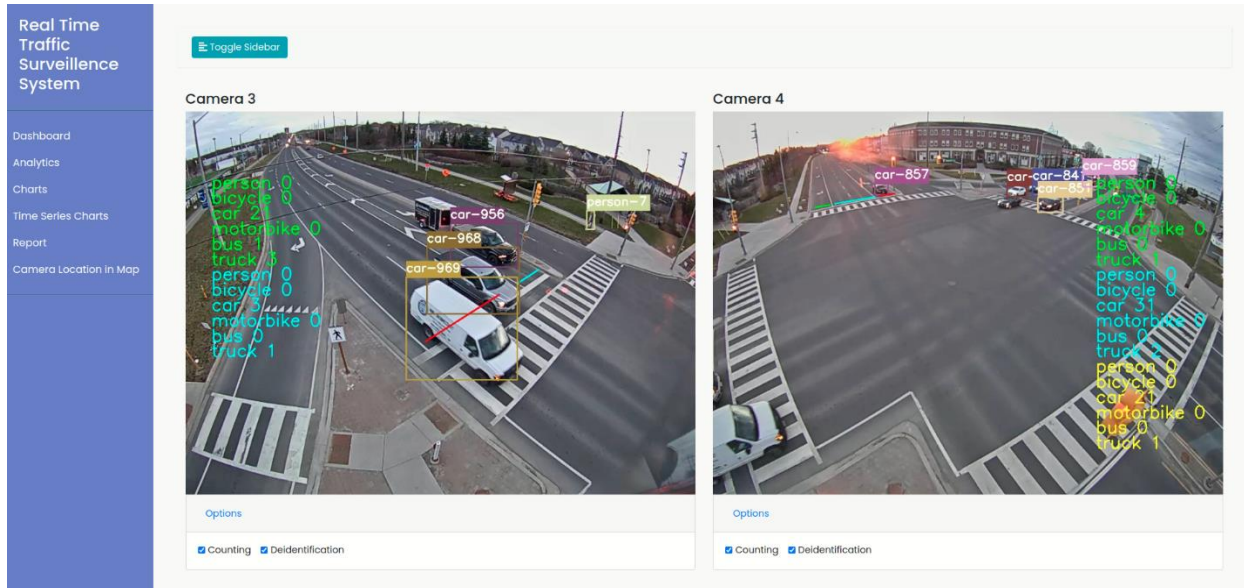
Road safety for both vehicles and pedestrians is of utmost concern to the City of Oshawa. One area of interest is the area in the vicinity of Durham College and Ontario Tech University. In 2018, the City created a Community Safety Zone along Conlin Road. The City saw an opportunity to utilize sensors and other monitors to study the traffic/pedestrian patterns at the intersection of Simcoe Street and Conlin Road to assist in developing new and innovative safety measures for pedestrian safety.

The Solution

A research team at Ontario Tech University, under the supervision of Dr. Khalid Elgazzar, took on this challenge and are endeavoring to build a resilient cyber-physical infrastructure that collects, stores and manages traffic information from live video feeds. The project relies on the development of intelligent traffic analysis algorithms that transform traffic data into useful information to help local governments better respond to emergencies, manage resources, improve planning, and make more informed decisions on real-time traffic status and events. These algorithms include pedestrian counting, vehicle counting and classification. The project deploys four HD cameras to monitor the vehicular and pedestrian traffic around the Ontario Tech campus.

In 2020/2021, two master’s students and one postdoctoral student worked on different parts of the project. The project was also the main focus of one graduate course including 12 graduate students. To date, the research team has developed a number of intelligent traffic analysis algorithms to classify and count vehicles and count pedestrians crossing intersections. The team is also developing an algorithm to detect jaywalking and store these incidences for playback. Human faces and car plates are masked to preserve the privacy of entities.

Applied Research



Caption: Traffic surveillance snapshot of Simcoe and Conlin.

Impact

Through this project, regular reports will be generated showing some statistical analysis (e.g., traffic and pedestrian count) to inform the City of incidences of interest. These reports will provide a better understanding of the traffic flow and patterns of pedestrian crossing around the Ontario Tech campus to support the City in making the roads safer for both vehicles and pedestrians.

Testimonials

“I am very happy to be part of this interesting project. It’s my first time to participate in building a practical project that applies the concepts we learn from the computer engineering and software design books to benefit the community.” – *Aida Vatankhan, Ontario Tech University graduate student*

“The project helped me to engage with more industrial partners and collaborate on applying the deep learning technology to develop advanced data analytics techniques in their products. The funding I received from the City in this project supported me to apply for further funding and I received two grants, one from NorthLine Canada Ltd. and one from Natural Sciences and Engineering Research Council of Canada.” *Dr. Khalid Elgazzar, Faculty of Engineering and Applied Science, Ontario Tech University*



TeachingCity Oshawa



TeachingCityOshawa.ca - #OshTeachingCity
905-436-3311 - email: TeachingCity@Oshawa.ca

If this information is required in an accessible format, please contact Service Oshawa at:
905-436-3311 or email: service@oshawa.ca.