

# Automated Micro-utility Devices

Update to Toronto Accessibility Advisory Committee

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# Outline

- Background
- MUDs Transportation Innovation Challenge
- Categories and applications of MUDs
- MUDs and Accessibility Learning to Date
- Research
- Next steps

# Background:

## Micro-Utility Devices (MUDs) in Toronto

- On the recommendation of TAAC, City Council prohibited the use, stopping, and storing of micro-utility devices (MUDs) in December 2021 until the details of the Ontario Ministry of Transportation pilot project are released, and City Council decides if Toronto will participate.
- City of Toronto, Transportation Services are consulting on the use of micro-utility devices (MUDs), also known as sidewalk robots.
  - Input is being requested from local entrepreneurs, BIAs, micro-utility devices (MUDs) manufacturers and operators, accessibility community members, law enforcement, and any other interested stakeholders and members of the public on the potential impacts and benefits
- City Council directed staff to issue a Transportation Innovation Challenge in the first half of 2022 to better understand the capabilities of micro-utility devices (MUDs) and their implications for accessibility, economic development, local businesses, and cybersecurity.

# Background: Transportation Innovation Zone

- In July 2020, Council directed staff to work with Exhibition Place to establish a Transportation Innovation Zone (TIZ) on the Exhibition Grounds.
- Transportation Innovation Challenges (TIC) will drive innovation to align with the City's transportation priorities, by setting outcome-oriented challenges, clearly articulating the City's needs, and inviting third-party innovators to apply to test solutions in the public right-of-way.



# Transportation Innovation Challenge

- The Challenge invited organizations developing new micro-utility device (MUD) technologies to apply to Trial their devices in Toronto's Transportation Innovation Zone. This gave staff the opportunity to observe the operations and functions of various MUD models.
  - Trial participants are not compared against each other.
  - The Challenge was about developing technology that supports the City's broader goals, including economic development, addressing security, accessibility concerns, any various other impacts and benefits.
- The outcome of the Challenge will be posted on the City's website and will profile each participant featuring their device(s) and will include key findings including economic impacts, environmental impacts, and navigation regarding detect and avoid.

# Transportation Innovation Challenge: Participants

- The Trials are now complete and took place April 4<sup>th</sup> until the 21<sup>st</sup> 2022.
  - Eight applications were received and the following 6 were successful and participated in the trials:
    - Quantum Robotic Systems Inc. (Toronto, EY)
    - LoopX Innovation Inc. (Waterloo, Shanghai)
    - Tiny Mile (Toronto, USA) – Ontario Vehicle Innovation Network (OVIN) WinterTech Development Program recipient
    - Apé Canada Corporation (Calgary)
    - InDro Robotics (Victoria BC, Ottawa ON)
    - Kevaris Autonomous Services (Toronto, Brazil)

# Categories of Micro-Utility Devices (MUDs)

**Micro-utility devices are defined as technologies that:**

1. Can operate using any kind of power other than solely muscular power;
2. Are automated or remotely controlled;
3. Can transport itself and/or conduct tasks including transporting goods or cargo, but not passengers; and
4. Have the ability to conduct dynamic driving tasks without direct human assistance.

**There are four Categories of MUDs:**

- A. Personal assistant devices
- B. Infrastructure maintenance devices
- C. Delivery devices
- D. Enforcement and surveillance devices



# MUD Applications: Personal Assistance

Challenge Participants: Apé Canada; Quantum Robotic Systems

- Assists individuals by moving items such as groceries from point A to point B, by moving items up and down stairs or by completing household tasks such as sweeping or vacuuming
- Compact devices that may be able to operate indoors and / or outdoors
- Can potentially support aging in place and reduce barriers for those with limited mobility
- Typically owned by (or possibly leased to) the end user
- Potential applications with Ontario's Assistive Devices Programs
- Pennsylvania legalized personal delivery devices (PDD) and considers them as 'pedestrians'





# MUD Applications: Infrastructure Maintenance

Challenge Participants: Kevaras Autonomous Services

- Robots that are designed to perform essential City services such as snow clearing, litter clearing, or lawn mowing
- Potential for greater efficiency, precision and reliability in delivering these services which could result in improved sidewalk conditions
- Innisfil has partnered with Swap Robotics to pilot winter maintenance in 2021-2022.



# MUD Applications: Delivery

Challenge Participants: TinyMile; InDro Robotics; LoopX

- Devices that transport goods to typically within a neighbourhood
- Potential to reduce the delivery cost for goods including essential goods such as groceries or medication
- Significant benefit for individuals who are unable to run errands due to mobility limitations
- Business models / applications considered include pharmaceutical to nursing home deliveries
- Electric devices with potential to remove car based delivery
- Approximately 20 states in the USA have bills regulating or permitting sidewalk robots



# MUD Applications: Enforcement and Surveillance

Challenge Participants: Quantum Robotic Systems; InDro Robotics; Kevares Autonomous Services

- Devices that scan and survey the physical area it operates within and collect and/or transmit data
- Potential to improve the efficiency of enforcement with respect to parking and noise bylaws
  - Includes potential to reduce illegal parking and stopping in designated accessible parking / loading areas
- Potential to improve the efficiency and precision of sidewalk assessments, resulting in less deficiencies
- Various municipalities in Ontario have already partnered with Swap Robotics to pilot sidewalk inspections including: Timmins; Stratford; Belleville; Niagara on the Lake; and Kitchener



# MUDs and Accessibility Learning to Date

## Concerns

## Supports

- Physical safety in the public right of way
- Privacy and data security
- Increased sidewalk congestion and conflict for those with accessibility needs
- Accountability regarding potential incidences
- Equity regarding affordability, access to, and use of devices

- Greater independence for those with limited mobility
- Greater ability to age in place
- Improved affordability for individuals relying on delivery of essential goods
- Better maintenance of sidewalk infrastructure
- Better enforcement of bylaws that protect accessible parking and loading



# Research

- A survey has been launched to gather input from stakeholders (including members of the accessibility community) regarding policy options
- Purpose: consult with interested stakeholders and members of the public on the potential impacts and benefits arising from the use of micro-utility devices and inform the report back to the Infrastructure and Environment Committee, Toronto City Council.
- Timing: April 20<sup>th</sup> until May 10<sup>th</sup> 2022
- Intended Audiences: Accessibility community, Industry, BIAs, Academia, Community Groups



# Additional Research

- The City is participating in the development of an international standard (ISO 4448) that will help governments regulate micro-utility devices (MUDs)
- The City is engaged with the University of Toronto on research related to micro-utility devices (MUDs) and testing insights
- City staff participated in the Institute of Governance virtual roundtable discussion on surface robotics, study funded by Transport Canada
- Staff are engaged with industry members, and are conducting one-on-one interviews
- The City is awaiting details on the province's pilot project framework before determining whether to opt into or out of the pilot project and how to tailor any pilot to the unique needs of Toronto.

# Next Steps

- City staff will be providing an update on the MUD trial to the Infrastructure and Environment Committee on May 25, 2022 and to Council on June 15-16, 2022
- TAC members are invited to participate in the survey which can be accessed at:  
<https://s.cotsurvey.chkmkt.com/MUDs>
  - TAC members can circulate the survey link to other individuals who are within the accessibility community
- City staff will share information on how to participate in workshops that may be held in late 2022
- City staff will continue to explore potential research partnership opportunities with Universities and other jurisdictions