

Ministry of Transportation

Vehicle Occupancy Detection Problem Statement – Small Business Innovation Challenge

Seeking Expressions of Interest for the Following Eligible Stages:

- Phase 1: Feasibility Stage
- Phase 2: Product Development and Demonstration Stage

Problem Statement:

As high-occupancy toll (HOT) lanes are implemented in Ontario and abroad, there is a growing need for the development of an enforceable means to determine if a vehicle in a specific lane should be billed and/or fined based on the number of individuals in the vehicle. This technology could be implemented in the delivery of managed lanes in Ontario (e.g. high-occupancy vehicle (HOV) and HOT lanes) or other jurisdictions and has other applications such as monitoring occupancy at border crossings.

Outcomes & Considerations

- Enforceable and secure: The technology must be defensible with enough supporting evidence to uphold the bill or fine.
 - Should be secure to avoid digital or other forms of fraud.
- Automated: The technology should have a high rate of automatic capture and not require significant manual post-processing (e.g. confirmation/reconciliation).
- Integration with other tolling technologies: The technology should be simple to integrate into a larger tolling system (e.g. vehicle/user identification, location tracking, back office, billing, etc.).
 - The tool will need to be able to provide real-time information in order to match records coming from identification and tracking tools.
- Safe and convenient: As little inconvenience to the users as possible.
 - Technology should not be cumbersome to install/use by the authorities or members of the public.
 - It should be a minimally intrusive and should protect user privacy.
 - It should be safe and not distracting to drivers.

- **Robust:** There are many different vehicle and driver types on GTHA highways and the technology should be able to provide accurate results from each in all weather and lighting conditions.

Background & Rationale

The 2015 Ontario Budget stated that the province would “continue to assess the feasibility of building new and converting select high-occupancy vehicle (HOV) lanes in the GTHA into high-occupancy toll (HOT) lanes, in which carpooling drivers would continue to drive for free, but other drivers could choose to use the lanes and pay a toll.”

The HOT Lane Pilot is the first step in Ontario’s plan to implement HOT lanes throughout the province in 2020/21. The pilot began on September 15, 2016 with the designating of a HOT lane on the QEW for 16 km from Trafalgar Road in Oakville, to Guelph Line in Burlington. An objective of the pilot is to use this section of the QEW to test innovative and new tolling technologies. Information gathered and lessons learned through the pilot will be used to inform long term planning for future HOT lanes including electronic tolling. The pilot is expected to operate between two to four years.

The current best practice for HOT/managed lane implementation in other jurisdictions (US and Israel) allows manual declaration of carpool status (i.e. single driver or 2/3+ occupants) and uses manual visual enforcement to determine if vehicles are compliant with required occupancy limits. Recent camera-based technologies have been tested and proven to be able to detect occupancy in vehicles in most cases but have yet to be deployed for automatic enforcement or tolling purposes.

Currently there are over 300 km of toll lanes in the US which provide occupancy-based discounts and more than 5,000 additional lane-kilometres of HOV lanes. All of these facilities can potentially benefit from a vehicle occupancy detection technology to automatically provide billing and enforcement support, reducing the need for manual enforcement.

Current State Challenges:

- ***Highly Manual Enforcement:*** To ensure consistently low rates of violation, manual visual enforcement by OPP officers is labour intensive. Manual enforcement also requires officers at each observation point, making it impossible to observe many locations simultaneously.
- ***Significant Infrastructure Requirements:*** Current camera-based systems require two or more angles and relatively unobstructed views to capture usable images. Weather and infrastructure costs for overhead and side view gantries make this method more infrastructure intensive.

- Reliant on Self-declaration of Occupancy: Systems reliant on self-declaration of vehicle occupancy status can be susceptible to human error (forget to adjust) or misuse.