



## Reference

8810-7336

## Patent status

PCT patent application filed nationally in Europe

## Stage of development

Prototype ready, being improved for medium scale deployment amongst interested municipalities  
Departments of Transportation.  
Algorithm and GUI being constantly improved

## Contact

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## Machine Vision Assisted Winter Road Condition Monitoring

### Background

Monitoring of winter road surface conditions during and after snowstorms is essential for most transportation agencies to assess the need for maintenance service, compare the effectiveness of different treatment methods, and evaluate the quality of the maintenance services delivered by contractors across different maintenance yards. Real-time information on road surface conditions is also invaluable to the road users who can use the information to improve their travel and driving decisions such as where, when, and in what mode to travel.

### Description of the invention

University of Waterloo researchers have developed and demonstrated a computer vision and artificial intelligence aided winter road condition monitoring system that will allow the use of inexpensive, non-dedicated hardware, such as machine vision cameras and temperature sensors, to collect, process, and transmit road condition data in real time. In comparison to the existing solutions, the proposed system can be installed on any vehicle, provide more objective assessment of road condition, and deliver better spatial and temporal coverage of condition monitoring.

The initial development focus was towards testing the developed algorithms on secondary image data collected for other research projects. In the last two years, a purpose built in-vehicle data collection system has been developed and is being improved upon. On the server end, an image processing application has been developed to communicate with in-vehicle units, store and process image data, and show live status updated on the computed road condition status. With the help and support of the Ministry of Transportation of Ontario, the system has been deployed and tested on actual patrol vehicles and over 10,000 data points have been processed with promising results.

### Advantages

- Extremely low cost solution.
- Provides high spatial and temporal coverage.
- Can cover multiple lanes in a single pass.

### Potential applications

- Road condition monitoring.
- Winter road maintenance optimization.
- Public information systems.