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The connected vehicles experimentation dedicated to road weather

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Since several years and their emergence, Internet of Things (IoT) has become a new source of data for many activities, especially for meteorology. Among these many different kind of IoT, the vehicle might be considered as an information vector with very high potential, firstly because of the considerable quantity of connected vehicle expected in next years, and secondly thanks to the many informations which might be source of add-value for meteorological observation (temperature, pressure, wipers for precipitation, lights for visibility, braking systems for road surface conditions...).

Within the scope of a partnership between Météo-France and the Continental company, an experimentation concerning vehicles as IoT was undertaken during the 2016/2017 winter. For this experimentation, 200 vehicles covering the whole French territory were equipped with an embedded system (constituted with a dongle plugged on vehicle and a smartphone for real-time data tranfer). The aim of this experimentation was to evaluate the quality and the potential of different parameters from vehicles and to test embedded short-term alarms for impacting phenomena (freezing rain, snow, intense precipitation...) based on nowcasting Météo-France products.

This experiment permitted to confirm the potential of the use of vehicle as meteorological sensor. Indeed, the quality of air temperature measurement was relativley statisfactory with for example a very good detection of negative temperatures (detection ratio of 90% and false alarm ratio of 10%). This experiment permitted to show the potential of use of indirect data (wipers, lights...), but it was shown that the use of this kind of data requires further research to extract the whole add-value (for example the comparison of wiper triggering with radar data showed a very high amount of false alarm).

The next step of this project will be to improve methodology for using indirect data (wipers, beams, braking systemes). The considered approach is first to set up a new experimentation with very high time and space density of vehicles, in aim to study the multi-vehicle approach to extract weather data, and secondly to introduce vehicle data within observation products based on data fusion approach (combination of vehicle data with remote sensing, NWP forecast and analysis...). Then, it will be possible to consider new alarm products using in real-time the data of all vehicles.