**Development of methods for road surface condition monitoring using vehicle inertial measurement unit**

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**Abstract:**  A systematic, continuous, and comprehensive monitoring of existing roads is becoming increasingly important. So far, current practice is laborious and time-consuming as most steps of the process are done manually.

This research proposes a robust road profile estimation method and a vehicle parameter identification method by using vehicle body responses measured by an inertial sensor (or by a smartphone sensors) and optimization conducted with an objective function and constraint condition on the estimated profiles.

The methods require only vehicle response measurements, enabling easy and inexpensive, yet effective, road condition monitoring through the automated processing of smartphone data as showed in figure below.

