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Optimising road pavement maintenance using vibration monitoring

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Abstract: Road maintenance planning determines the type of maintenance and the timeframe for completion. Currently, road maintenance plans are mostly based on condition monitoring in fixed intervals. Mistakes in detection of pavement faults and wrong estimation of the maintenance time result in high maintenance costs. Therefore, there is a need to introduce a framework to predict the deterioration of road pavement using continuous pavement attributes and minimise the cost and time of road maintenance activities. Optimising pavement maintenance has sustainable benefits to the society and road organisations. Road pavement condition has direct influence on ride quality and passenger comfort. Thus, ride quality measures can be used to predict the pavement damage. To measure the ride quality, the use of a vibration monitoring system is comfortable, cheap and available in various models. Using ride quality measures is relatively cheap, accurate and less time consuming compared to manual inspections. This innovative method can bring direct benefits to the society and road authorities by minimising cost and saving time. Road surface monitoring and data collection with the proposed innovative method using a wireless vibration monitoring device and video cameras will be cheaper, more accurate and less time consuming compared to manual inspections which are currently practiced. For the first time, road pavement deterioration prediction models will be developed combining traditional variables (e.g. road geometry, traffic parameters) with ride quality measurements. This will provide the opportunity to predict the status of road pavement and potential maintenance activities through a more accurate and cost/ time efficient procedure.