

Cost Effective Roughness Computation Method Using Smart Phones

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Abstract

Road roughness is a representation of its surface condition and is resulted of the irregularities in the pavement surface such as potholes, depressions, cracking, rutting, ravelling etc. International Roughness Index (IRI) is the globally accepted indicator to measure the road surface condition.

The main problem- associated with low volume roads in Sri Lanka is lack of funding for maintenance and resources. Unfortunately in many developing countries like Sri Lanka planning decisions on maintenance are mostly taken based on subjective judgment/ad-hoc decisions without a consistent objective basis due to significant political and other interferences. Fund allocation can be optimized if the decision making can be supported by up to date information of the road network condition.

Road Roughness information is very useful for road agencies because it can be used to assess the road condition and be used in decision making process for maintenance planning and programming. In addition, the information is very important for road users because using such information, road users can avoid the bad roads ahead. But existing measurement technologies used in Sri Lanka like Profilometer are very expensive. It also has limitations in accessing narrow roads though it can provide accurate information. Therefore it is necessary to investigate low cost, practical methods to evaluate roughness which can be used in maintenance planning and programming of low volume roads.

Today smart phones have the capability of collecting information related to variation in road surface level which can be converted to road roughness measured as IRI (International Roughness Index). - number of smart phone applications are available but it is necessary to calibrate such models to suit local condition and vehicle used for data collection. The results of these can be considered as adequate for comparison of relative levels of road roughness which will be useful for maintenance decision making.

In this research regression analysis was used to - find a relationship between roughness value (IRI) obtained from profilometer and resultant acceleration obtained from an android application called Androsensor. Engineers can use that relationship to estimate road surface condition based on accelerometer readings. It can be expected to have more than 60% savings by using this smart phone application for roughness computation of roads.

Key words: Roughness, Low volume roads, Maintenance, Smart phone

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