

ABSTRACT

HAUL ROAD CONDITION MONITORING USING ACCELEROMETERS IN IOT-BASED DATA ACQUISITION SYSTEMS INSTALLED ON HAUL TRUCKS

By

Muhammad Taufik Rahman

Dr. Ir. Tutuko Prajogo, M.S.Mfg.E., Advisor

Ir. Invanos Tertiana, M.B.A., Co-advisor

The objectives of this thesis are to create a data acquisition system (DAQ) for haul trucks that can send data on haul road conditions remotely, to find a metric that can describe road roughness based on data gathered by the DAQ, and to find out whether the DAQ can accurately describe actual haul road conditions. A certain mine operating company in Indonesia needed a DAQ that can measure haul road roughness effectively and efficiently to provide data on the condition of their haul road network for monitoring and road maintenance purposes. For this purpose, an IoT-capable DAQ was developed comprising an accelerometer and a GPS receiver among other sensors. The International Roughness Index (IRI) was used as a metric to describe road roughness based on the data gathered by the DAQ. It was found that the DAQ was able to distinguish different road conditions on the test route. Furthermore, the travel speed of the truck affects the IRI measurement results from the DAQ. It was concluded that the DAQ provided correct IRI measurements at travel speeds above 8 km/h. Further tests should focus on investigating how travel speed variation affects IRI measurement results. Furthermore, the accuracy of the IRI measurements from the DAQ should be tested on roads with known IRI values.

Keywords: Accelerometer, Haul Road, International Roughness Index (IRI), Internet of Things (IoT), Road Condition Monitoring.