Characterization of Road Surface Defects Using Multiple Nondestructive Evaluation Technologies

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1. Introduction

Various types of new transportation systems are being developed in accordance with the increase in public transportation demand and the improvement of the welfare of the people. Particularly, interests in autonomous driving have been rising since the era of the fourth industrial revolution, and there are growing interests in the development of autonomous driving technology for public transportation. The bimodal tram is a system that combines the usefulness of buses and railroads, and is increasingly interested in the development of related technologies as well as the integration of autonomous driving technology. Since the Bimodal Tram, a self-driving public transportation vehicle, is operated on a dedicated route, road damage due to the heavy axle weight and repeated road driving is expected.

It is necessary to develop the sensing technology and maintenance technique to prevent such problems in advance, and to manage road infrastructure efficiently.

Therefore, in this study, the design of multi-sensing road defect scanning system, the introduction of various technologies of various sensing systems, and finally, various multi-sensing technologies are used to improve the reliability of defect detection using infrared thermal imaging and line laser scanning technology. For the successful implementation of this research, we have developed a signal analysis algorithm to scan road surface, algorithm performance evaluation, signal algorithm analysis through artificial specimen, and performance evaluation on actual road.

2. Development of the sensing system

Figures 1 to 4 show the defect detection algorithm and the experimental results.

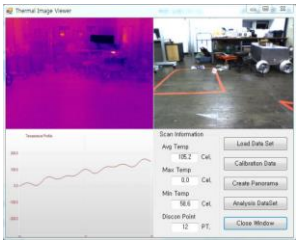

Fig.1 A new s/w for infrared thermographic signal analysis

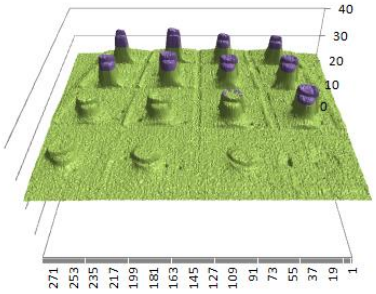

Fig.2 The analysis results of infrared thermographic signal with temperature measurement

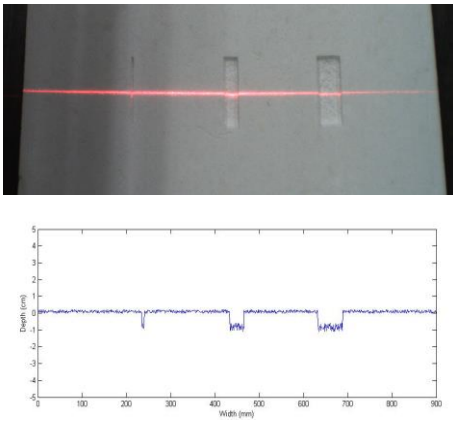

Fig.3 The analysis results of laser/vision signal with laser profile measurement

3. Summary

In this study, we have developed a scanning system for diagnosis of road condition and defect detection by using multiple sensing technology such as infrared thermal imaging and laser scanning. As a first step, we have developed a scanning system using thermal imaging and laser/vision system. The system was verified through basic experiment at laboratory scale.

References

[1] J. Kim, Development of Road Scanning System Using Multiple Sensing Technologies, *Proc. of KSME Spring Conference*, (2018) 283-284.