A Robust, Economical, and Reliable technologies for Monitoring the Road Surface Conditions in South Korea

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ABSTRACT

Next ITS(Intelligent Transportation System) in South Korea is planned around the safety navigation service. In addition, together with the hosting of the 2018 Pyeong-Chang Winter Olympics, the road safety in winter has the most priority. But the road management capability of Korea for adverse weather is very insufficient. In this regard, this study directs its attention to road surface information as a technology to help road management capabilities. If the road surface condition is collected in real time, we are able to advance road management.

There have been many researches on the surface detection field. However, many technologies have not been applied for real roadways. In Japan, Serizawa had completed the relevant base technologies in road surface reflection in road lightening and others in 1967, and Imamura developed optical sensor for monitoring the road surface moisture using the reflection flux polarized in 1979. Keiji Fujimura developed the mobile-concept road surface sensor in 1988. In recent days, Isao Yamamoto developed the CCTV-based surface detection sensor. In Europe, there is an active researches on VTT's prototype stereo camera measuring polarization differences. In recent days, stereo vision and polarization imaging are used to apply in the Robot navigation.

But these technologies are currently introduced with high cost, difficulty of operating system in local area and limited reliability. In this regard, our study is aiming at devising a road surface condition detection system with low cost and robust accuracy. This is what we have firmly decided using the video image processing(VIP) technology because of low-cost and fast installation. VIP is expected to help implement the low-cost and high-efficiency detection system. VIP is based on the classification algorithm which discriminates the polarization images clusters by utilizing stereo cameras.

For this purpose, we have proposed the system integration of the Road Weather Information in combination with mobile-based surface detection data. In this paper, we introduce a mobile-based monitoring system installed on a series of service vehicles, capable of acquiring, elaborating and transmitting road surface condition data. And this concept will be upgraded in order to integrate different

technologies for the analysis of textures, crack detection, surface details such as grooving, and others.