Black Ice Warning System through Optical Visualization of Road Condition for Unmanned Vehicle

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‘Black Ice’ is a road condition that the frozen road surface looks normal. It is very hard to identify the road condition during night driving, which can lead to numerous traffic accidents. Also, this problem must be solved to introduce unmanned driving. The purpose of this study is to develop ‘Black Ice’ warning system that optically visualizes road conditions and immediately gives and shares a warning with drivers or unmanned driving systems. An optical method to detect ‘Black Ice’ pattern was used in this study - the pattern of continuous surface reflection waves generated by line laser - that uniquely appears according to the characteristics of road material. To recognize the visualized ‘Black Ice’ pattern light, the system of detecting ‘Black Ice’ pattern which uses sensors and Arduino has been developed. To make ‘Black Ice’ warning system share and alert the ‘Black Ice’ pattern detected with each sensor, Arduino board for pattern detection was made combined with smartphone warning app, and warning light. Once ‘Black Ice’ pattern is detected, the system makes audible and visual warning for driver, for near vehicles, and saves GPS information for other vehicles approaching the relevant road at the same time. This gives a warning to the driver on the ‘Black Ice’ road and to near drivers at a low cost ($50), so it can greatly help prevent traffic accidents. The developed ‘Black Ice’ warning system will contribute to safe driving and be brought into spotlight with the development of unmanned driving system.

Awards Won: