
Abstract

The Hyundai Mobis suggested a cooperative technical development proposal to the Gyeonggi Research Institute (GRI) in September 2020, which is to develop bus driver supporting safety system by using brain waves. Gyeonggi-Do, the GRI and the Hyundai Mobis made an business agreement to carry related technical development for safe public bus services.

Gyeonggi-Do pursued a polit project on the public bus drivers to introduce the Embrain of the Hyundai Mobis. The Embrain is a bus driver supporting safety system of the Hyundai Mobis which warns driver's operational carelessness or errors including drowsiness through ear-set type brain wave information analysis.

The standard equipments are composed of ear-set type brain wave sensor, controller/mobile device(replacement of smartphone application), optional DSM(camera type), and various printing devices. The pilot project confirmed that the average level of attention of bus drivers is increased and the level of carelessness is diminished. Comparing the frequency of carelessness during the bus operation times, 25.3% of carelessness is decreased when the alarm system is on. Especially 29.7% of decrease is detected during operation time after meal.

Comparing the level of attention and carelessness over the time section of bus operation, the level of attention increases only 0.04% on the highways and 0.05% on the local roads, while the level of carelessness decreases 24.2% on the highways and 20.4% on the local roads. When comparing before and after the generation of carelessness, the time of return to attention with alarm systems is faster by 6.7 second than that without one. Also the time of return to the attention in 1 second is 53.5%

with alarm system than 51.8% without one. The satisfaction score of the pilot project for the public bus drivers is 4.5, which suggests the need of improvement in timing of warning, loudness of alarm sound, duration time of alarm, and overall effectiveness.

The Embrain of Hyundai Mobis is more cost effective system which manages and warns errors directly than the prophylactic alternatives such as labor hour curtailment. A phase in is suggested with the improvement of convenience of wearing the equipment and structural enhancement which are suggested through the pilot project. It is expected that the bus driver safety supporting stem of the Hyundai Mobis Embrain can prevent accidents caused by bus driver's drowsiness. It is also expected that the bus driver's self management and trust of bus users are improved and bus use rate would be increased as a result.

Keyword Bus Driver, ADAS(Advanced Driver Assistance Systems), Brain Waves, Attention Score