Smart Road Signs: The Bluetooth LE-Based Safety System for Pedestrians

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Every year, more than 270,000 pedestrians lose their lives worldwide and the number of pedestrian fatalities in the U.S has increased by 25% from 2010 to 2015. The major factor contributing to this increase is the growing use of smartphones while walking or driving. This prompted the question: Can road signs become smart enough to actively improve road safety? The goal of this project was to explore the effectiveness of Bluetooth-LE embedded road signs (SRS: Smart-Road-Sign) at improving the awareness of distracted pedestrians and drivers. The pedestrian awareness test was conducted by producing an alarm when a pedestrian came within a specific distance of a SRS through the use of a cell phone app. During the test, over 83.3% of participants not using the app failed to stop before the target line but the proportion was reduced to 33.3% when the app was activated. The driver awareness test was to verify whether SRS signals could be reliably received inside a car traveling at 40 mph at its stopping-distance of 36meters away from a SRS. The experiments showed that the SRS could consistently notify drivers. And the average Received Signal Strength Indicator value was -93.9dBm. This project showed that the awareness of distracted pedestrians can be significantly improved by the SRS, and also that the SRS can be used to improve awareness of drivers in fast moving cars at a sufficient distance to prevent collisions with pedestrians in a crosswalk. The second finding could help accelerate the adoption and safety of autonomous vehicles.

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