Non-Confidential Description - PSU No. 4584
“Electronic Beacon to Guide Autonomous Vehicles through Work Zones”

Keywords:
Autonomous vehicle, electronic beacon, work zone, traffic management, transportation

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Background
Although autonomous vehicles (AVs) have collectively driven millions of miles under ideal conditions with relatively few incidents, problematic areas such as work zones continue to present a large barrier to the widespread adoption of AVs. Since AVs heavily rely on visual cues, such as pavement markings, for navigation, work zones can be confusing to AVs since old pavement markings may still be present and conflict with the intended traffic pattern. Existing work zone traffic control devices, such as traffic drums and temporary overlay markers (TOMs), are inadequate as these devices are prone to displacement and damage by human drivers. Furthermore, their retroreflectivity and visibility can be impacted by snow, dirt, dust, or normal wear and tear, which can render these devices invisible to AVs. There exists a need for a more reliable method to guide AVs through work zones before the use of AVs can be expanded.

Invention Description
The disclosed invention is directed to an electronic beacon that direct AVs through work zones with missing, illegible, non-reflective, or conflicting pavement markings. Placement and spacing of the beacons are adjusted based on the length and geometry of the work zone, thereby defining a travel path for the AVs. Additionally, the beacons can be used to alert AVs to work zone boundaries and lane closures to modify driving behavior (e.g. adjusting speed, increasing the spacing between vehicles, preparing for merging). It is anticipated that this invention can be further employed to collect and report traffic information, where such information allows local traffic agencies to assist operations management.

Advantages/Applications
• Improved method for guiding AVs through work zones
• Effectiveness is not affected by environmental condition
• Durable, easily installed/removed, and reusable
• Can be used collect and report vehicular data
• Contractors can be alerted of beacon displacement
• Possible widespread adaptation for use outside of work zones

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{DATE}>July 17