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Results

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Yellow LED on Pedestrian
Signal

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Yellow LED on Pedestrian Signal

Pedestrian signals modified with actuated yellow LED borders provide notification to motorists and pedestrians that the traffic signal has received a call to serve a specific crosswalk.

WHAT WAS THE NEED?

The conflict between pedestrians using crosswalk and turning traffic at intersections poses a safety risk to pedestrians. To mitigate the risk, Caltrans engineers conceived a new safety feature for pedestrian signal – Yellow Pedestrian Border (YPB). YPB is a new feature that a yellow LED light border is added around the pedestrian signal (See Picture 1). YPB is a supplement to the existing standard pedestrian signal display, which provides a direct feedback to pedestrians who push the crosswalk button. Furthermore, YPB also makes the pedestrian signal more visible, which alerts drivers that the pedestrian signal is about to serve a crosswalk.

A preliminary study conducted in Redding, CA, demonstrated the benefits of YPB and its impact on pedestrian safety. This research is an extension to the preliminary study, which aims at testing and assessing the YPB safety benefits at different locations and traffic conditions.

WHAT WAS OUR GOAL?

This study was carried out following a previous study by in Redding, California, with a goal to evaluate the anticipated benefit of the yellow pedestrian border signal in a more diverse setting with five different locations around California. The study aims to determine whether the additional feature to the traditional pedestrian signal provides an overall benefit to both vehicular traffic and pedestrians, resulting in improved interactions between vehicles and pedestrians at intersection. The improvement is measured and evaluated by comparing different type of conflicts, violations, and extra-push events for before and after YPB installations.



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WHAT DID WE DO?

The Principal Investigator collected data before and after the YPB installation, about pedestrian and vehicle movements, and pedestrian and of YPB on pedestrian safety and compliance. Unlike the preliminary study, which has all the studied intersections in one city, the intersections selected in vehicle-pedestrian interactions were captured. The selected sites are located from Orange County in the south, to Humboldt County in the north. Different traffic, geometric, and environmental conditions were represented.

WHAT WAS THE OUTCOME?

Forty prototype YPB modules were manufactured to conduct the evaluations at the five intersections and data for each location was reviewed for before and after condition for seven consecutive days, 16 hours each day. The extent of learning period was two to eight weeks before the after-condition study to get the pedestrians and motorists accommodated with the features and purpose of YPB.

The experimental results showed that YPB is a positive addition to a standard pedestrian signal since it is very effective in enhancing safety by ensuring compliance of the pedestrians. Moreover, the bright LED border serves as an additional visual cue for the motorist maneuvering any turning movement at the urban signalized intersection. Moreover, the visibility of the border will aid pedestrians and motorists during low light or inclement weather conditions when there is a high potential for conflict.

WHAT IS THE BENEFIT?

The five locations around California studied as part of this study presented a unique opportunity to record and observe a variety of pedestrian and vehicle interaction situations while determining the effectiveness of the YPB module. From traditional

four-way intersection to a T-intersection in a tourist spot, the study locations were selected based on their maintenance under Caltrans and potential for pedestrian-vehicle conflicts that could benefit from the experimental device.

The YPB signals had more cumulative impact on the pedestrians' behavior by reducing the overall no-push, extra-push, and violation events. The cumulative average of no-push, extra-push, and violation with respect to pedestrian volume showed a decrease of 21.563%, 34.4% and 45.08%, respectively. Though the expected benefit is related to the increment of vehicle yielding to the pedestrians for safe interactions, the study results showed a minor decrease. However, this is not a major issue since in all the study locations except one, the vehicles yielded more than 85% of the time for all the conflicting situations recorded during the study period. Thus, from the pedestrian safety perspective, addition of YPB significantly improves the pedestrian behavior.

The installation of YPB would be most beneficial on the coordinated urban corridor, where the main goal is to maximize the traffic throughput for mainline traffic; incurring delays for side street traffic and pedestrians waiting to cross. In this situation pedestrians may get impatient for extended waiting period and become confused whether the pedestrian signal/call button is operational, especially when there is little traffic on the mainline. This behavioral feature may lead to pedestrian signal violation, which can be mitigated or more likely controlled by installing the YPB.

LEARN MORE

<http://www.dot.ca.gov/trafficops/ctcdc/docs/ypb-final-report-nov-2014-b.pdf>

Caltrans News Flash #57 - New Crosswalk Safety Signal (<https://www.youtube.com/watch?v=v36WqQFiTpQ>)

IMAGES

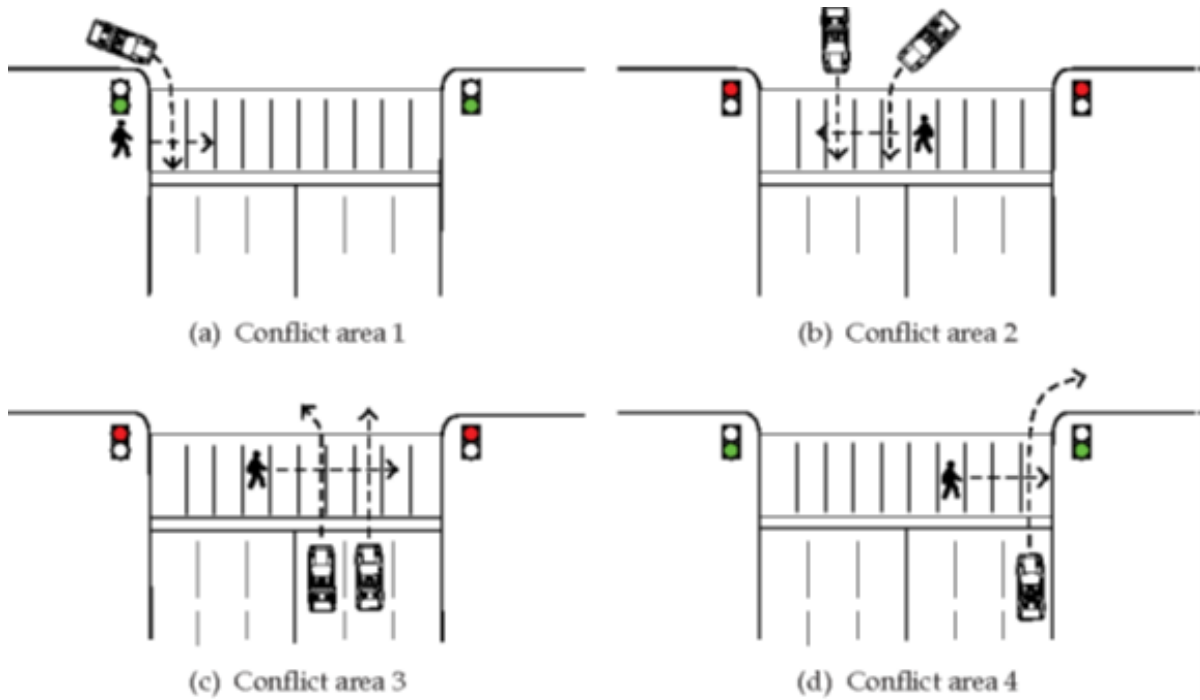


Image 1: Conflict between Pedestrian and motorist at Signalized Intersection (2).



Image 2: Working Cycle of the Yellow LED Border on Pedestrian Signal

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