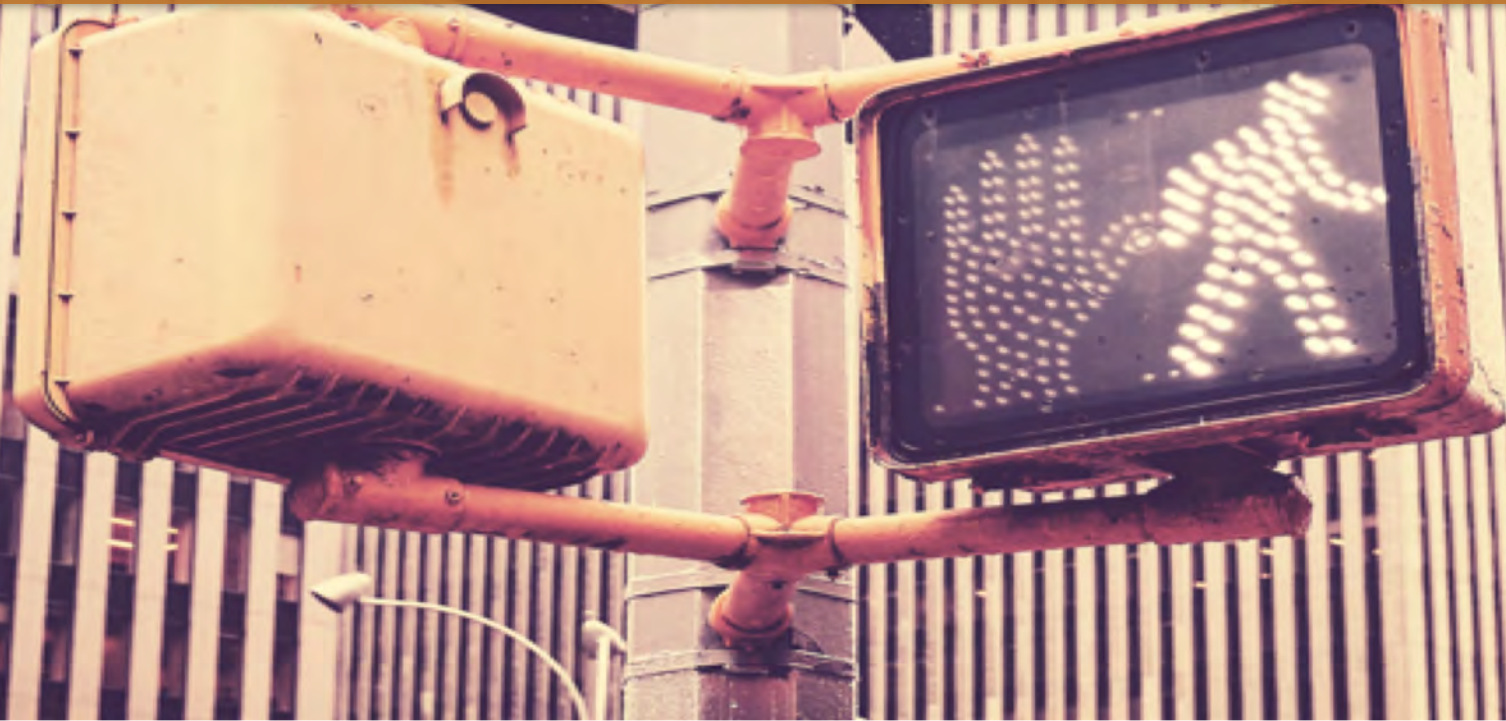


Addressing The Needs of Visual Impaired & Special Needs Pedestrian



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kapsch >>>
challenging limits

>>> 6,000 Pedestrians were killed in 2016

12%

Increase in pedestrian fatalities
since 2006 (overall traffic
fatalities have **decreased** by
18%)

70,000

Pedestrians were injured in
2015

76%

Pedestrian fatalities occurring in
urban environments

80+

Age group with highest
pedestrian fatalities



Source: NHTSA

Getting Through An Intersection



>>> Visually Impaired Pedestrian Challenges



Visually impaired and disabled pedestrians need extra help at intersections

1. Difficult to navigate intersection and find crosswalks.
2. Cannot find the pedestrian crossing actuation button.
3. Do not have any information about the status of the signal.
4. Do not know when is safe to start walking.
5. Difficulty staying within the crosswalk

>>> Pedestrian Assistant in Intersections



**Pedestrian Signal
Heads**



**Accessible Pedestrian
Signals (APS)**



Addressing Needs of Visually Impaired People

Needs of visually impaired people at signalized intersections

- Not enough information about the geometry of the intersection and signal timing.
- Need to listen to traffic flow.
- Difficulties finding the pedestrian crossing actuation button.
- Challenging to remain in alignment with crosswalk.
- Lack of uniformity in the APS messaging and operations.

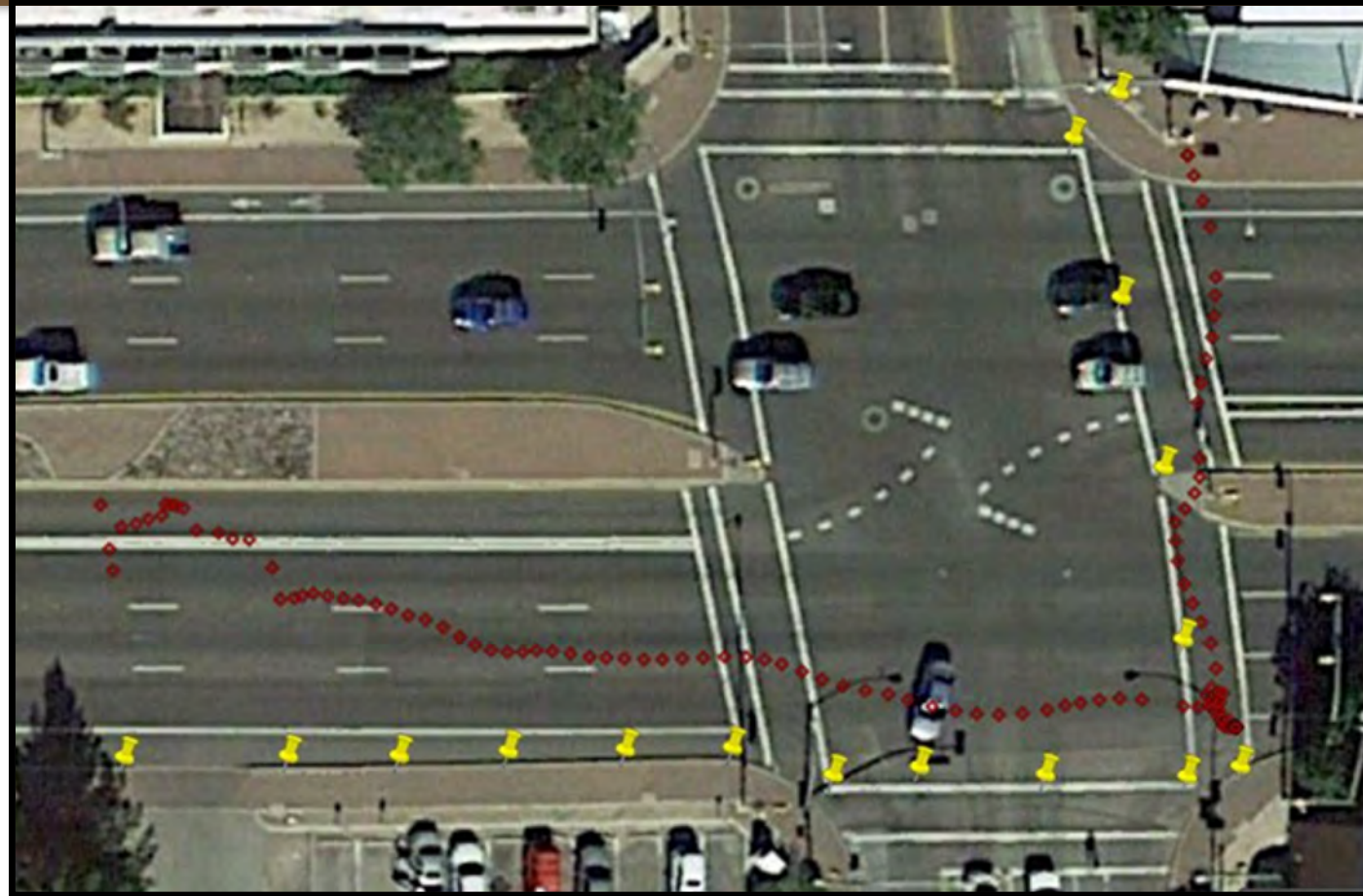
Solutions Need To

- ✓ Provide intersection navigation and signal timing via smartphone.
- ✓ Brief and clear auditory messages as well as tactile feedback (vibration).
- ✓ Initiate crossing actuation from smartphone.
- ✓ Provide tactile feedback to help them to be aligned with the crosswalk.
- ✓ Uses a uniform functionality on the smartphone.

>>> GPS and INS are not Enough

Wireless sensor networks and mobile devices equipped with a global positioning system (GPS) and an Inertial Navigation Systems (INS) provides opportunities to assist visually impaired pedestrians.

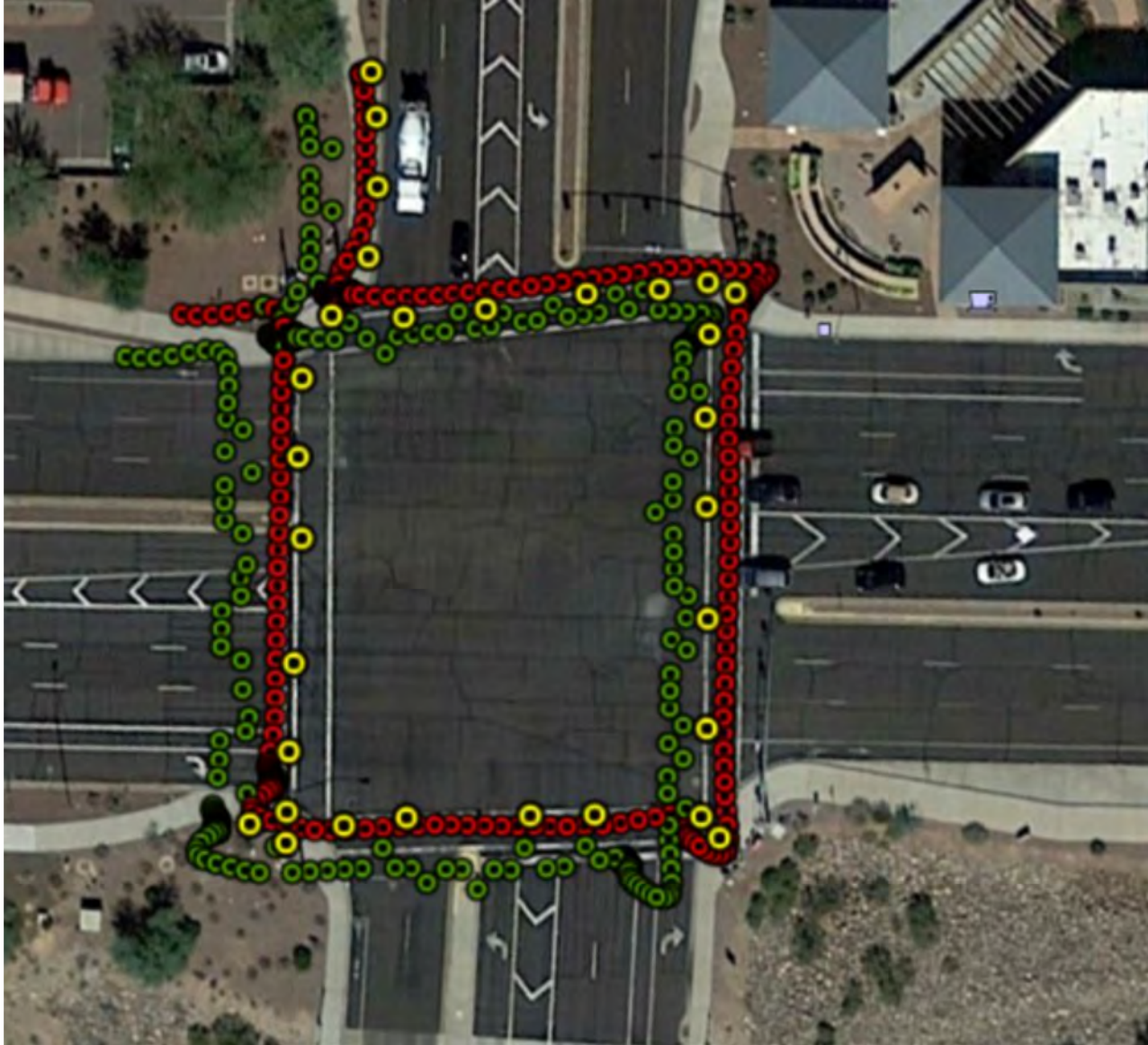
These systems do not address all the needs of visually impaired people to navigate and cross intersections.



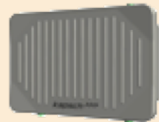
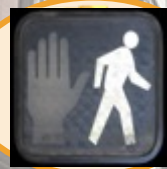
>>> MAP Structure



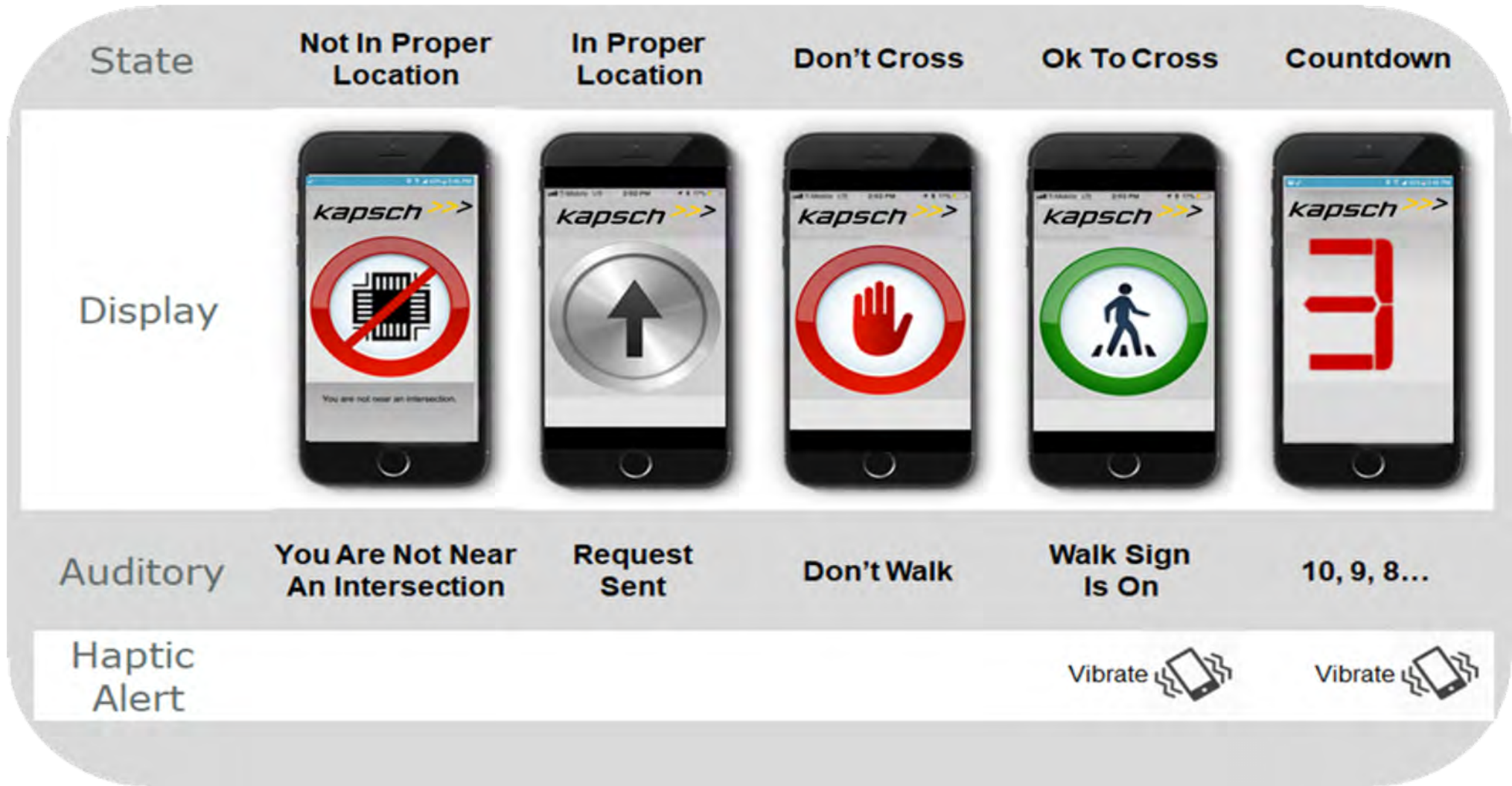
>>> Test Scenario & Results



- Yellow = true path needed to be followed
- Green = GPS path
- Red = adjusted path with algorithm applied



1. Pedestrian connects to eWalk controller via cellular connection with eWalk Smartphone App.
2. App communicates through the server with RSU that interacts with traffic controller to change light in intersection.
3. When light changes, pedestrian is notified via App
4. App uses special algorithm that identifies true location of crosswalk.

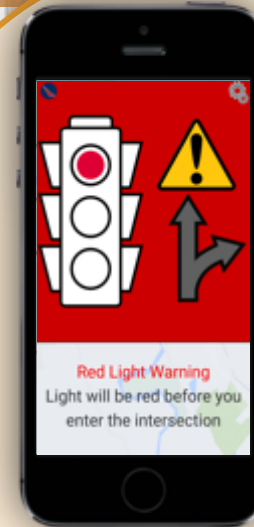


>>> Notification to Vehicles



Notifications to vehicles are also presented via DSRC PSM (Personal Safety Messages)

1. eWalk communicates to RSU that pedestrian is in the area
2. RSU creates and sends a Personal Safety Message about that Pedestrian as well as updates SPaT data.



Questions?



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