The U.S. DOT Intersection Safety Challenge – Harnessing AV Adjacent Technologies including Sensing and AI

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Link: https://www.transportation.gov/arpa-i

INTERSECTION SAFETY CHALLENGE

Image Source: iStock/deberarr

Roadway intersection safety is a growing issue, especially for vulnerable road users.

Intersection Crashes

Each year, roughly one-quarter of traffic fatalities and about one-half of all traffic injuries in the United States are attributed to crashes at intersections.[1]

Rising Vulnerable Road User Deaths

Vulnerable road user fatalities have continued to rise from 2022 compared to 2021. In 2022, the number of pedestrians killed in traffic crashes (7,522) was the highest since 1981.[2]

[1] https://highways.dot.gov/safety/intersection-safety/about

[2] https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813560

Leverage emerging technologies to improve intersection safety at scale in a new way.

Data Fusion Utilizing Existing and Emerging Sensors

Emerging, low-cost sensors can be deployed at intersections for **improved sensing of vulnerable road users**. Data from these sensors can be fused and used in new ways by AI.

Artificial Intelligence /Machine Learning

AI/ML can fuse data from multiple machine vision sensing modalities rapidly to **improve situational awareness** and **anticipate potential conflicts**.

Low-Cost, High-Value Opportunity for Integration at Scale

These existing technologies have not been deployed together at intersections broadly, offering an opportunity ripe for **innovative collaboration.**

Image Source: U.S. DOT

Concept Illustration: Intersection Safety System (ISS)

- Deploy emerging, low-cost sensors (e.g., cameras, radar, LiDAR, infrared) at intersections to improve sensing.
- Use multi-sensor data fusion/analytics and AI to improve situational awareness and anticipate safety threats.
- Issue warnings and/or modify control settings to improve safety.

Image Source: U.S. DOT

Intersection Safety System – How does it work?

Stage 1A: Concept Assessment

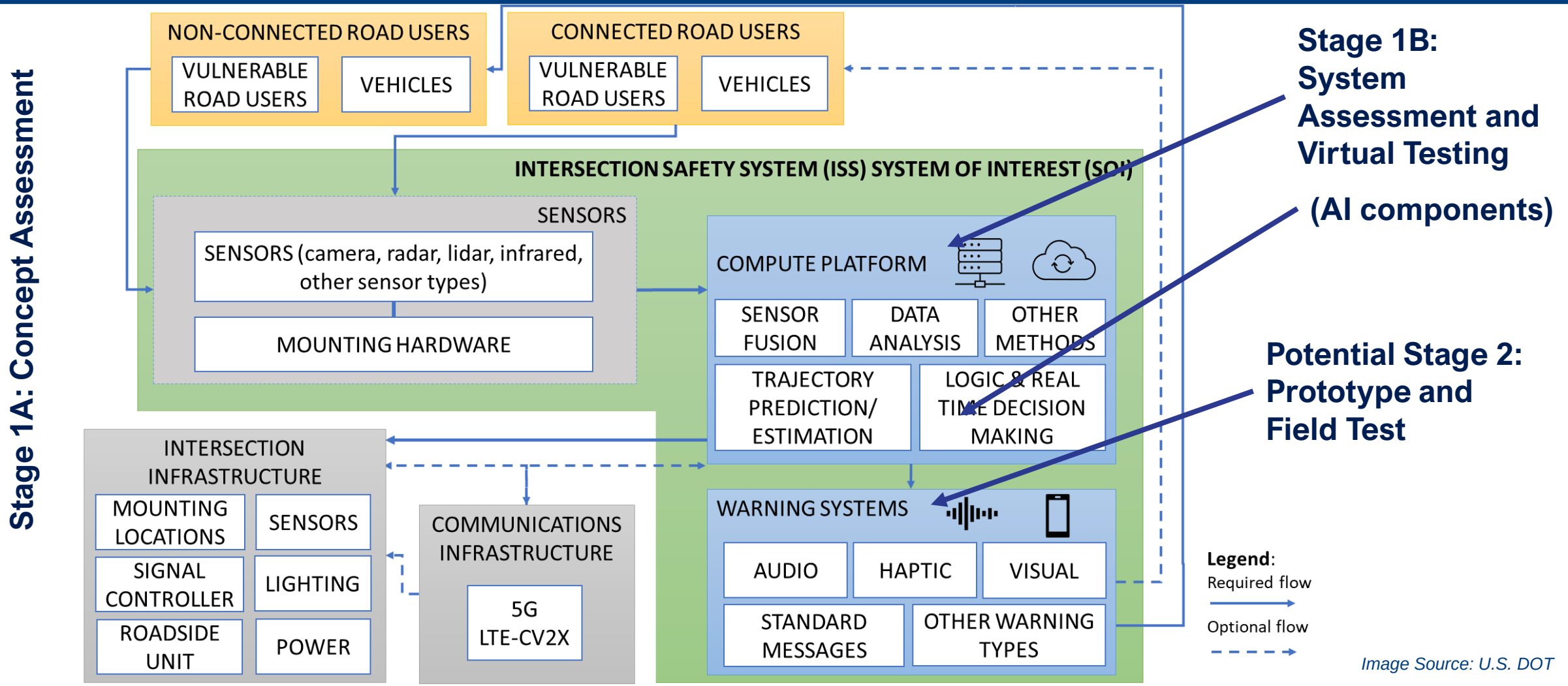


Image Source: U.S. DOT

The U.S. DOT Intersection Safety Challenge in Context

- The Challenge aligns with the National Roadway Safety Strategy (NRSS) and supplements current and existing U.S. DOT safety and equity efforts (e.g., FHWA Complete Streets, Proven Safety Countermeasures).
- A technology-based approach is one of many potentially cost-effective approaches for improving safety at intersections.
  - Cost-effective approaches are *critical* to support equity and accessibility considerations.
- The innovations sought in the Challenge operating in a real-time context are intended to augment (but not substitute for) a comprehensive suite of intersection safety considerations.
  - Data from an ISS can support designing tailored improvements to intersection geometry and local intersection safety policy.

U.S. DOT Intersection Safety Challenge Overview

- **VISION: Transform intersection safety** through the innovative application of emerging technologies including machine vision, sensor fusion, and real-time decision-making to identify and mitigate unsafe conditions involving vehicles and vulnerable road users.

- **PROGRAM STRUCTURE:**

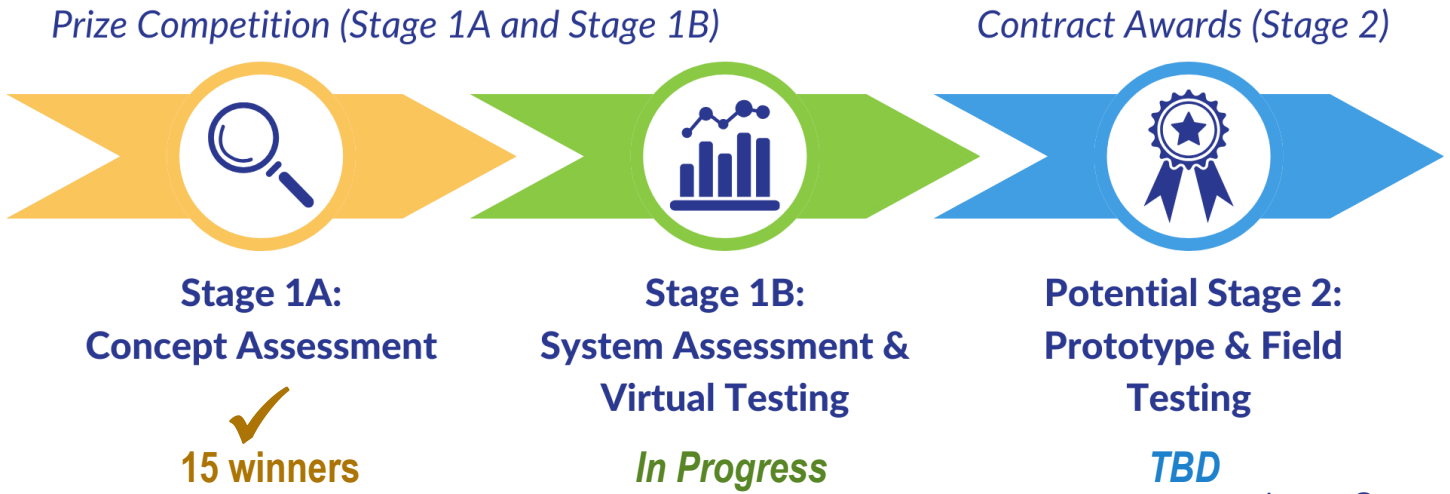
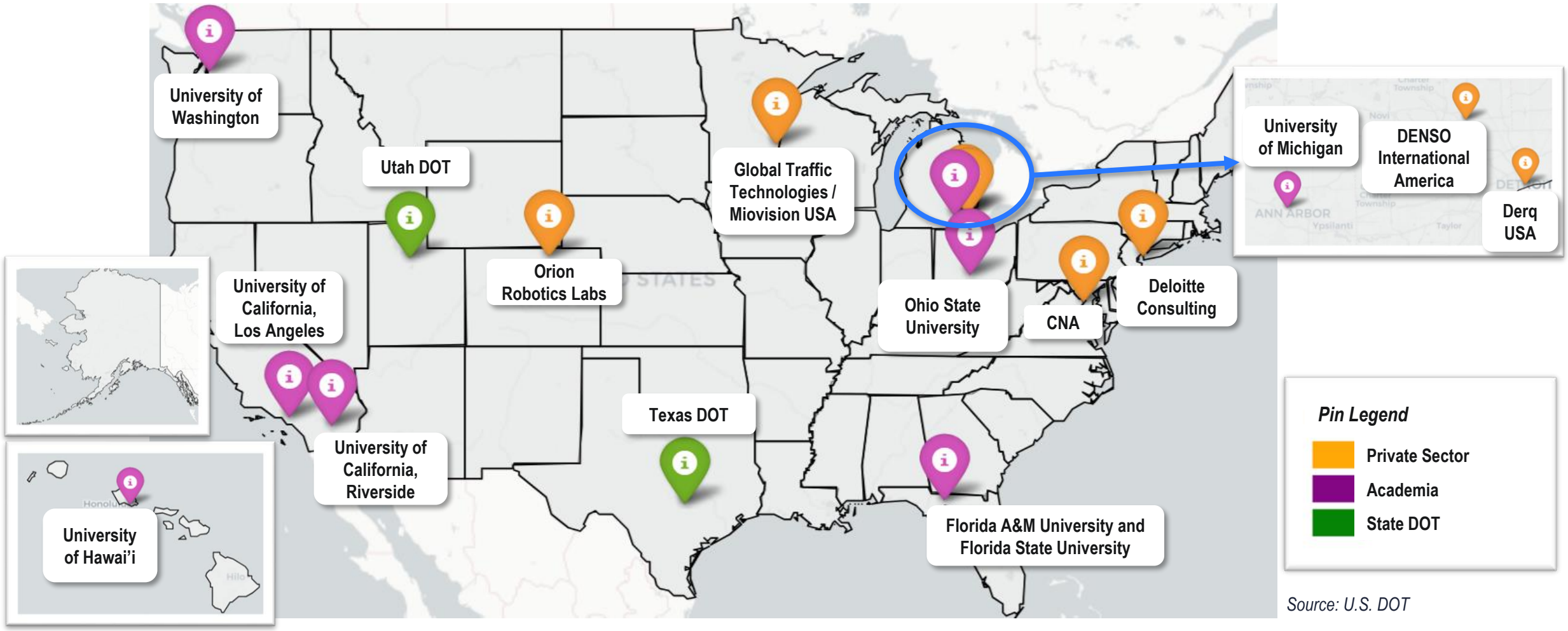


Image Source: U.S. DOT

- **PRIZE COMPETITION:** Encourage teams of innovators and end-users to develop and virtually test their intersection safety systems to compete for prizes.

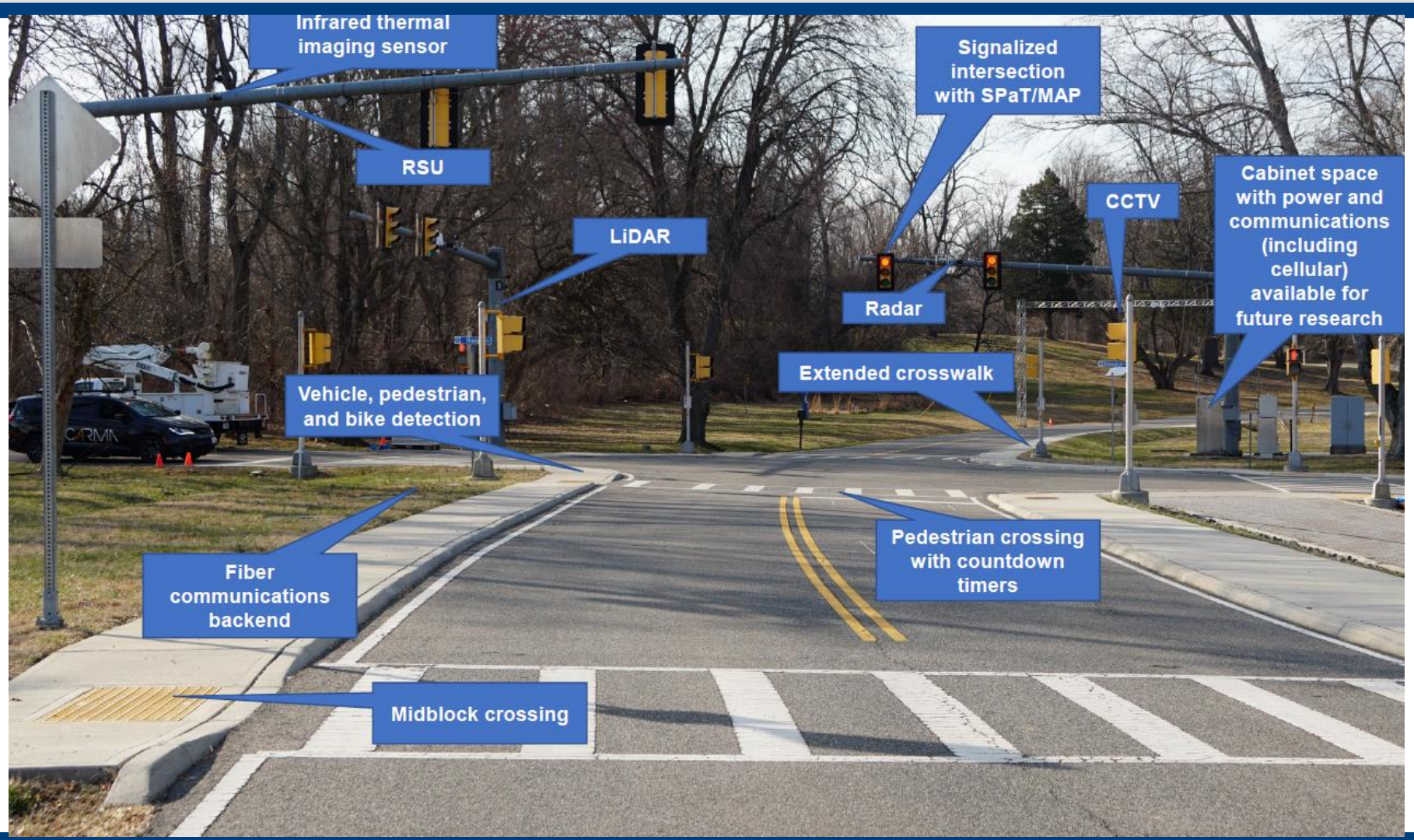
Stage 1A Winners*

** Names represent Concept Paper submission Lead Entities that may be part of a larger team*



Source: U.S. DOT

FHWA Smart Intersection Sensor Types



LiDAR	Laser imaging, detection, and ranging
SPaT	Signal phase and timing
CCTV	Closed Circuit Television
RSU	Roadside Unit

Source: FHWA

Potential Stage 2: Prototype & Field Test

- Potential Broad Agency Announcement (BAA) Solicitation – To develop, test, and demonstrate one or more prototype intersection safety systems (ISS) in a real-world environment. A decision to proceed to Stage 2 will be made after Stage 1B.
  - **Prototype Test**
    - Prototype systems assessed at a controlled environment (e.g., U.S. DOT facility).
    - Limited, closed-course testing based on simple use cases at intersections.
  - **Field Test and Demonstration**
    - Develop, test, and demonstrate Minimum Viable Product (MVP) capability.
    - Conduct more complex field testing at site-identified test bed(s).
    - Prepare MVP for real-world demo leading to commercialization and deployment.
- It is anticipated to be a full and open competition to all eligible entities regardless of prizes won in either Stage 1A or Stage 1B.

Stay Connected!

Have questions?
Feel free to email:
safeintersections@dot.gov.

- Go to the **Intersection Safety Challenge (ISC)** website for more information:
  - https://its.dot.gov/isc/
- Watch video link on the ISC **Stage 1B Data Collection** here:
  - https://www.youtube.com/watch?v=csirVHFa2Cc
- Visit the For more information about the **U.S. DOT ITS Joint Program Office (JPO)**:
  - https://www.its.dot.gov/
- Visit our program partner website for the Advanced Research Projects Agency - Infrastructure (**ARPA-I**):
  - https://www.transportation.gov/arpa-i

Thank you!

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