



INNOVATION / TECHNOLOGY DEPLOYMENT SUMMARY

# Traffic Sign Identification and Location Extraction from Roadway Images

## CHALLENGE

San Angelo District staff have been developing and using a nighttime sign inspection tool. The software application runs while a crew of several people riding in a van visually evaluates signs at night. While in motion, the crew updates a database to indicate signs needing attention. The challenge for the crew was knowing what upcoming sign to expect and where.

## SOLUTION

This innovation develops a method to economically create a sign database (inventory) for use with the inspection tool and other applications. TxDOT has video coverage of district roadways via the PathWeb platform. The project uses PathWeb content as input and artificial intelligence (AI)/machine learning (ML) techniques to identify traffic signs, capturing images and location coordinates for each.

## PROACTIVE APPROACH

This project pairs cutting-edge technology with an existing resource (PathWeb) to produce additional valuable tools and information. The innovation has the potential to be useful to all TxDOT districts.

## BENEFITS

The innovation allows the district to apply AI and ML techniques to capture video of sign installations, identify individual signs, document their location, and create input for a district sign inventory.

Compared to current manual data collection methods, using automated video and AI tools to capture, process, and place data into a sign inventory will be more consistent, efficient, and cost-effective, with equal or greater accuracy. Data in a sign inventory database will also be easier to reference than traditional data sources (archived plan sets, manual notes, etc.) during inspection, maintenance, planning, and other tasks.

## KEY TASKS

- Identify a nonproprietary ML model appropriate for sign detection and prepare for use.
- Define a small subset of traffic signs for the model to identify and begin gathering training content for the model.

### TxDOT GOALS



Deliver the right projects



Focus on the customer



Foster stewardship



Optimize system performance



Preserve our assets



Promote safety



Value our employees

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- Mark up images from Texas A&M Transportation Institute (TTI) camera video and PathWeb images, which include the signs to be identified, to be used as model training material (Figure 1).
- Introduce new, unseen images extracted from PathWeb as input to the model to test its performance.
- Develop a sign location database to manage the model output, which consists of the PathWeb images marked up with all signs in view (Figure 2) as well as individual sign clips and location data from the PathWeb source image.



Figure 1. PathWeb source image with navigation sign identified.



Figure 2. Stop sign identification at a rural intersection.

## DATA SOURCES

Data includes image content from the TxDOT PathWeb resource, a very large collection of dashcam-like videos and images of roadways throughout the state.

### Resources

[San Angelo District \(txdot.gov\)](https://www.txdot.gov)

[Deploying AI Applications for Asset Management \(trb.org\)](https://www.trb.org)

[Mobile Phone-Based Artificial Intelligence Development for Maintenance Asset Management \(bts.gov\)](https://www.bts.gov)

[Nighttime Visibility \(dot.gov\)](https://www.dot.gov)

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