

Enabling Technologies for Truck Automation

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SOUTHWEST RESEARCH INSTITUTE®



*Benefiting government, industry and
the public through innovative science
and technology*

Overview

- **Introduction to SwRI**
- **SwRI's Ranger Localization System**
- **Automated Truck Platooning**
- **Automated Trailer Docking (and other apps)**





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and the public through innovative
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Southwest Research Institute (SwRI)

- **Founded in 1947 by Tom Slick**
- **Currently ~2700 Employees**
- **Revenue: ~\$550M**
- **10 Technical Divisions**



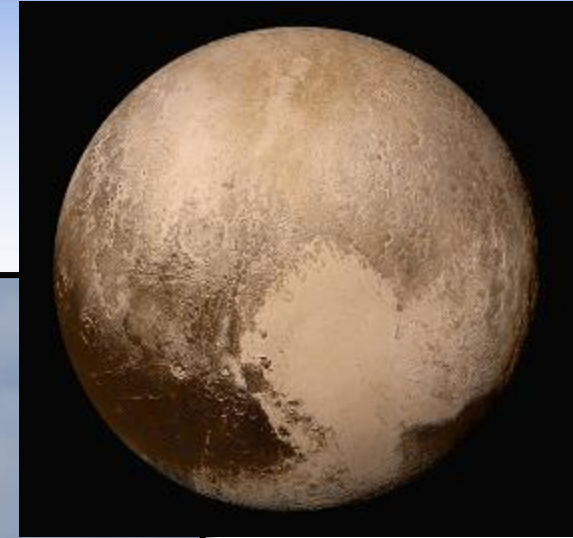
SwRI: From Deep Sea to Deep Space



**Alvin: New Deep Submergence
Research Vehicle**



New Horizons 2006 - Present



SwRI Automated Vehicle Technology

Since 2006



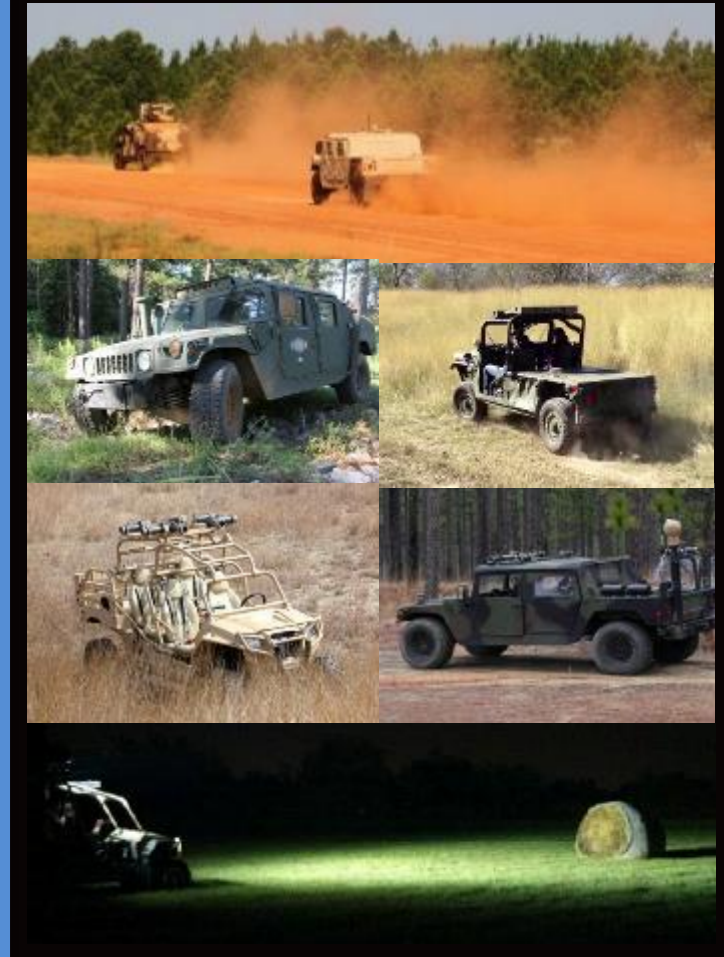
January 2017



On-Road

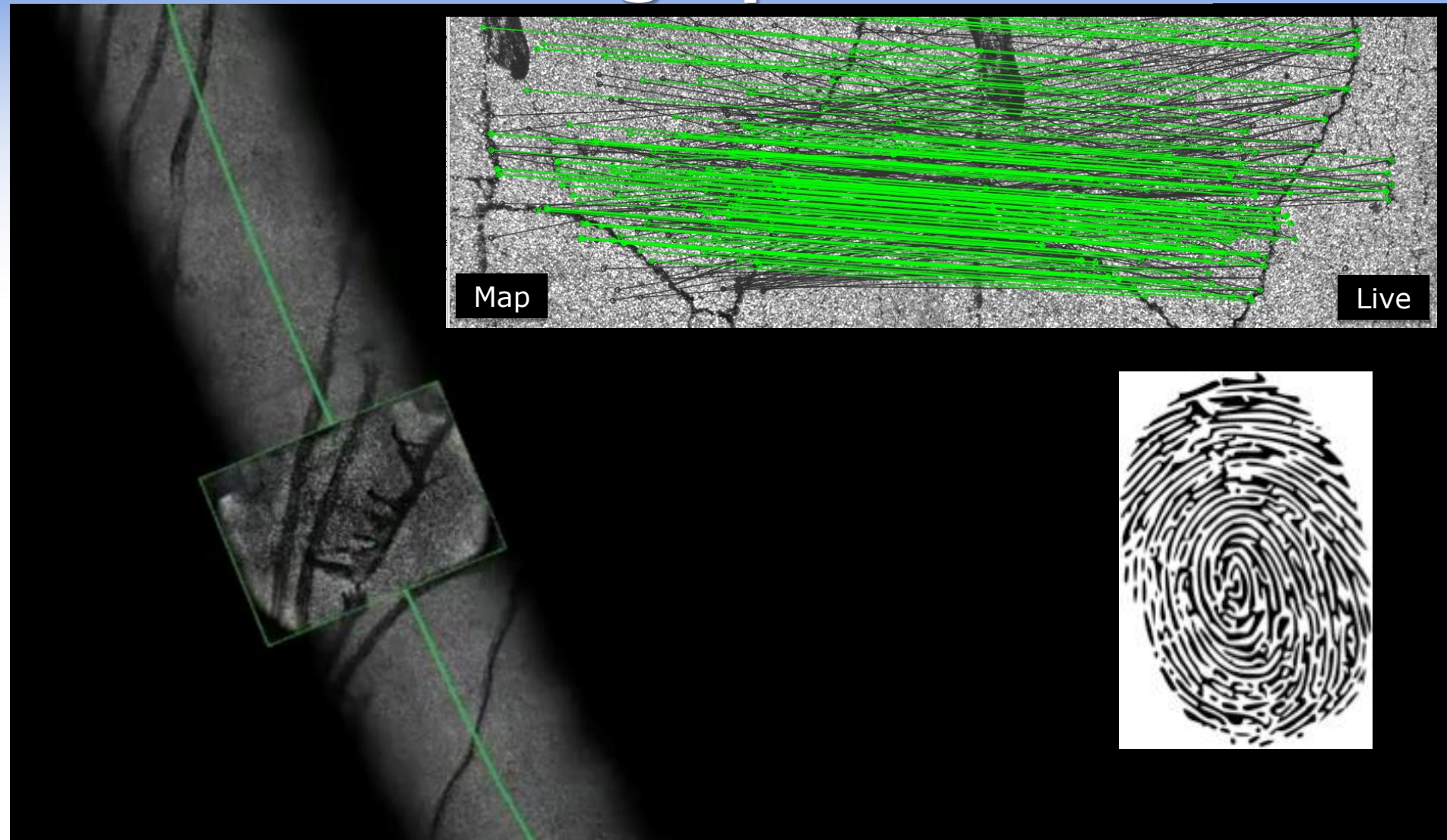


Off-Road

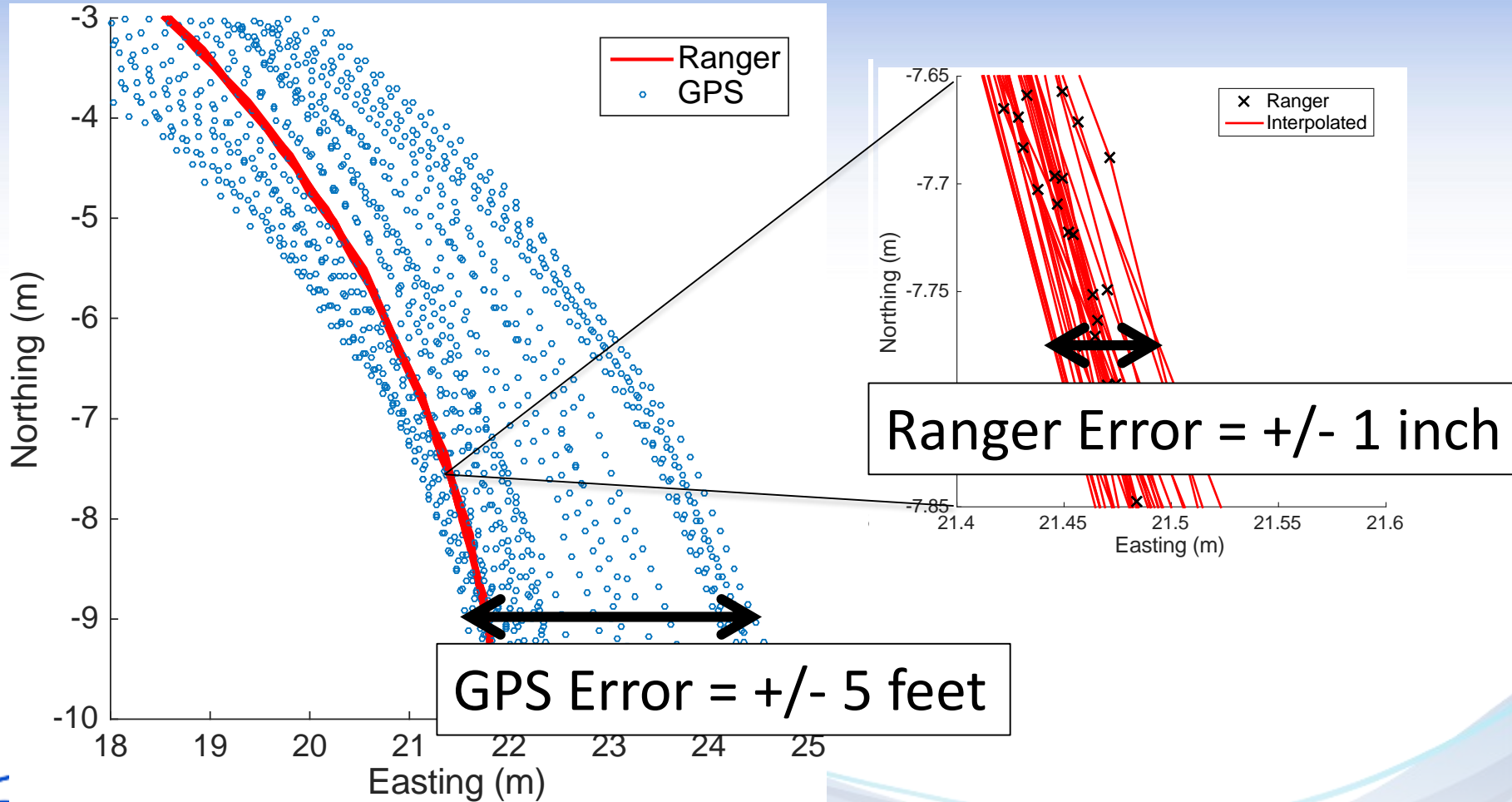


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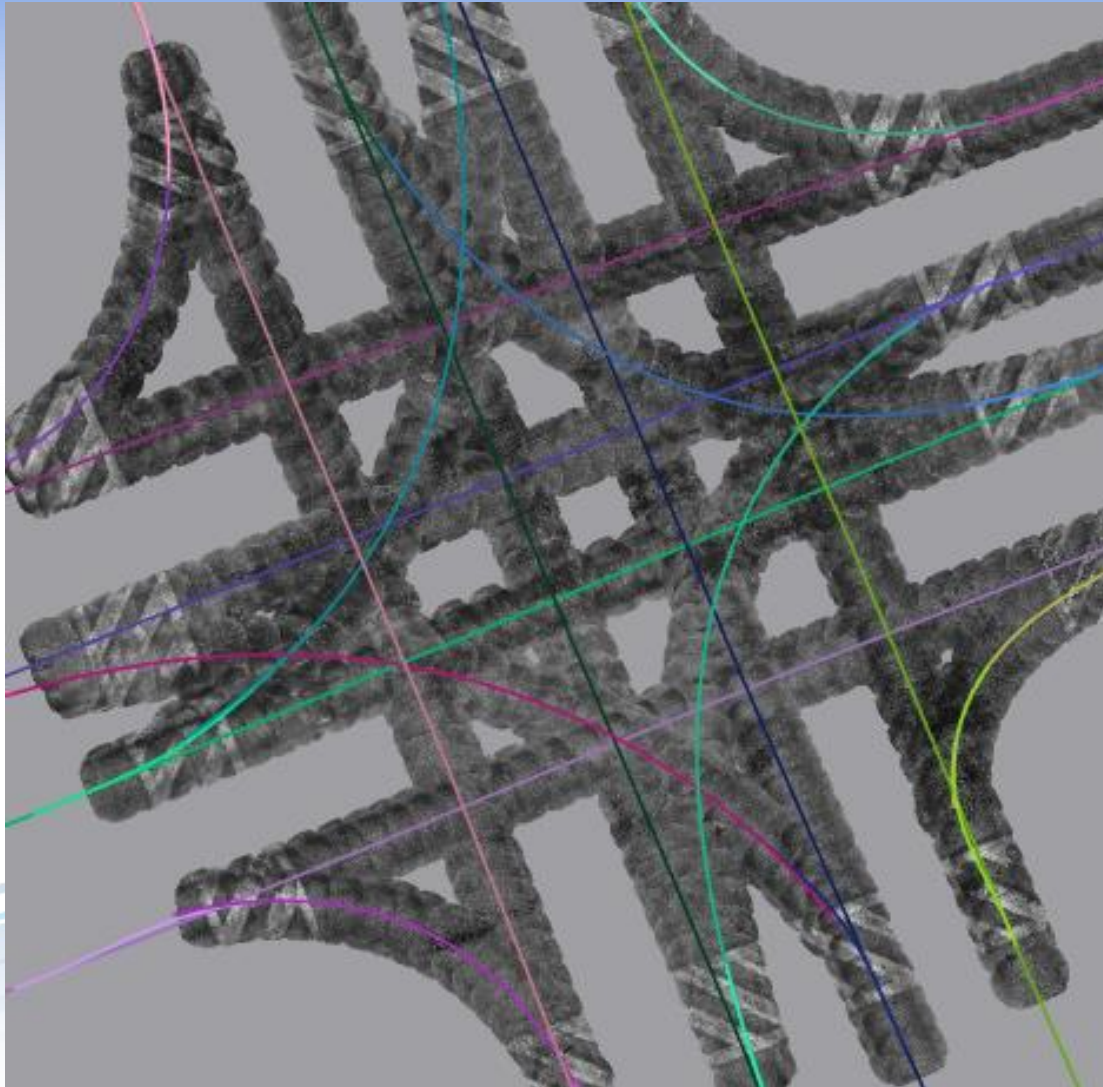
Ranger Matches Pavement “Fingerprints”



Ranger Works Like a Very High Precision GPS System



Mapping the World



SwRI Vehicles (All Use Ranger)



Automated!

Automated!

Automated!



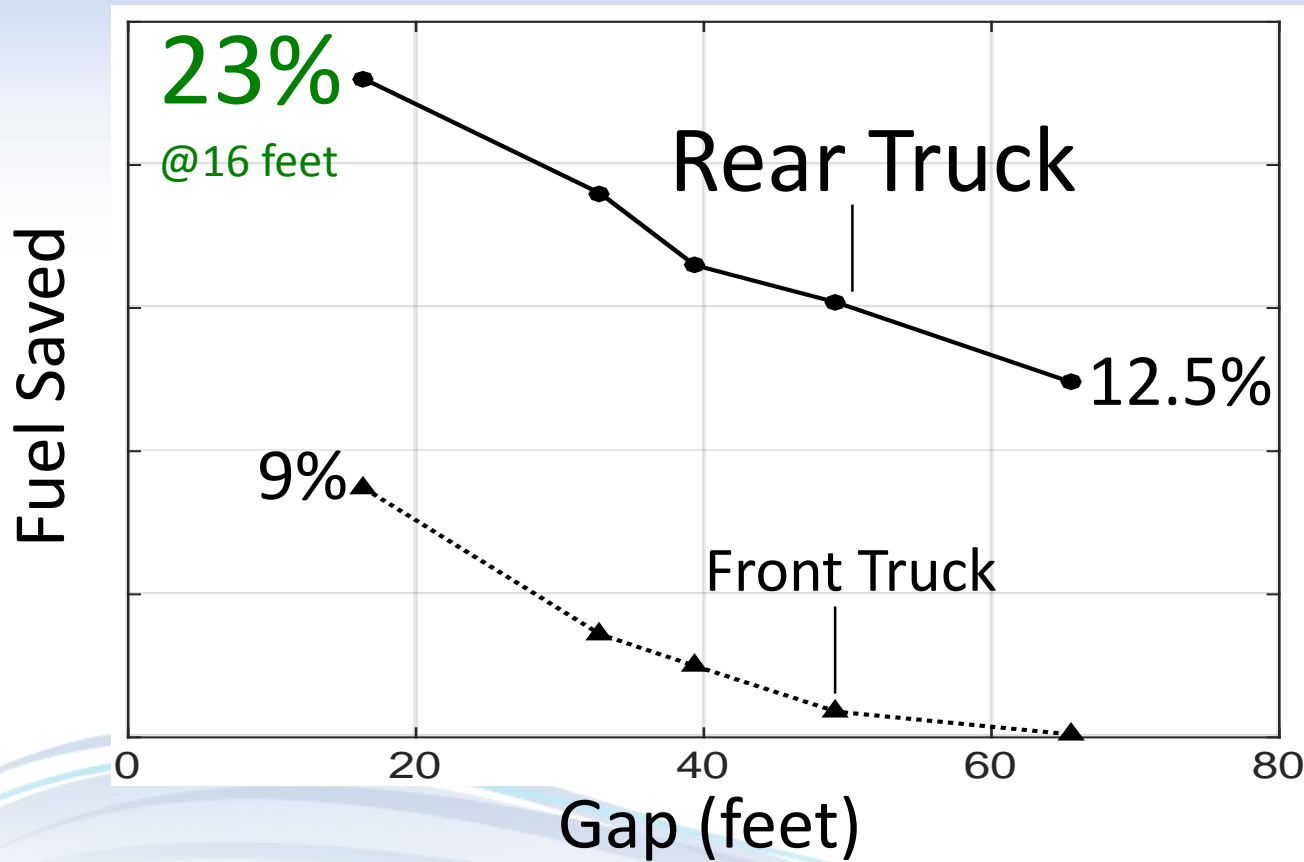
Enabling Technology: Precision Automated Following / Platooning



Highway Automation for Fuel Savings



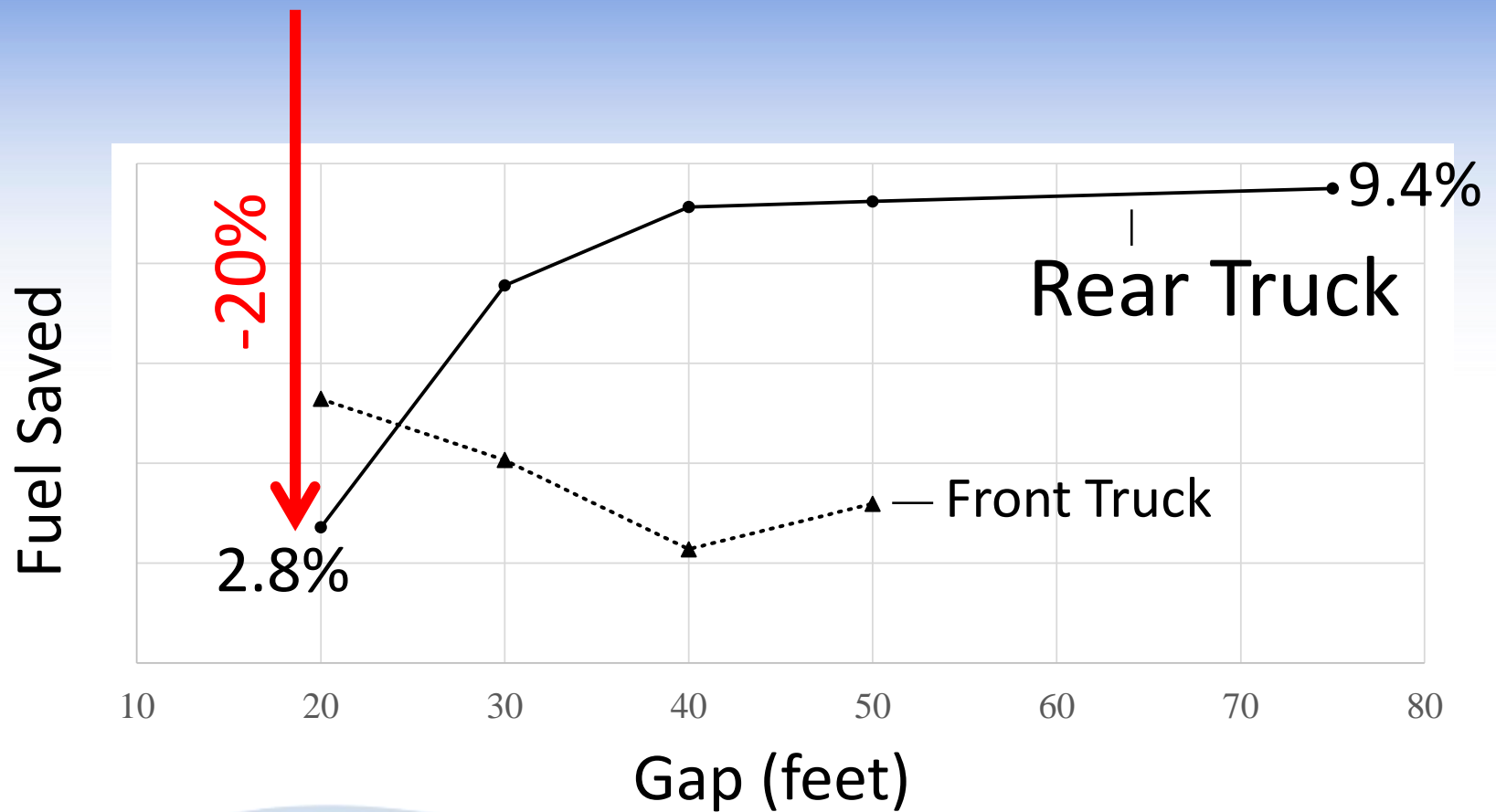
Platooning Can Greatly Improve Fuel Economy (in theory)



• From: Humphreys, Hugh Luke, et al. *An evaluation of the fuel economy benefits of a driver assistive truck platooning prototype using simulation*. No. 2016-01-0167. SAE Technical Paper, 2016.



Real-World Performance



• From: Humphreys, Hugh Luke, et al. *An evaluation of the fuel economy benefits of a driver assistive truck platooning prototype using simulation*. No. 2016-01-0167. SAE Technical Paper, 2016.

Why The Difference?

Significant Culprit: Lateral Offset

Luke Humpreys (Auburn)



Ranger → very precise lateral control

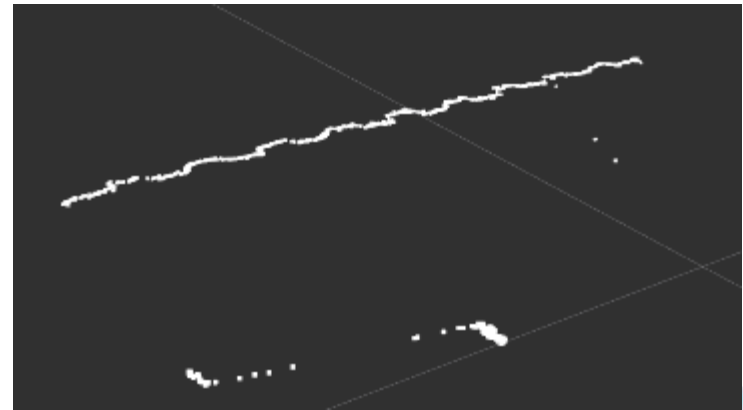
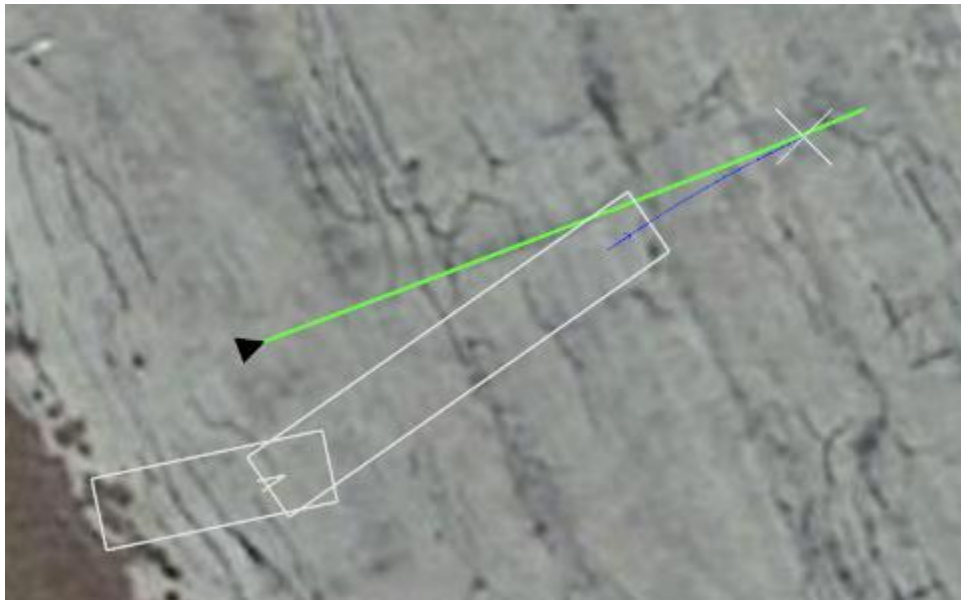
Low Speed Automation

- **Yard Navigation**
- **Truck Backing**
 - Trailer Docking
 - Trailer Parking



Trailer Angle Measurement

Laser Scanner



Automated Trailer Docking



Automated Trailer Spotting

- **SwRI is actively developing enabling technologies relevant for automated trailer spotting**
 - Precision automated docking
 - Complex path planning for vehicle with a trailer
 - Precise and Robust Localization
 - High-reliability object detection



Thank You!

