

MTI Research Snaps presents:

Advanced Driver Assistance Systems & Automated Features: Are They Driving Us to Safety?

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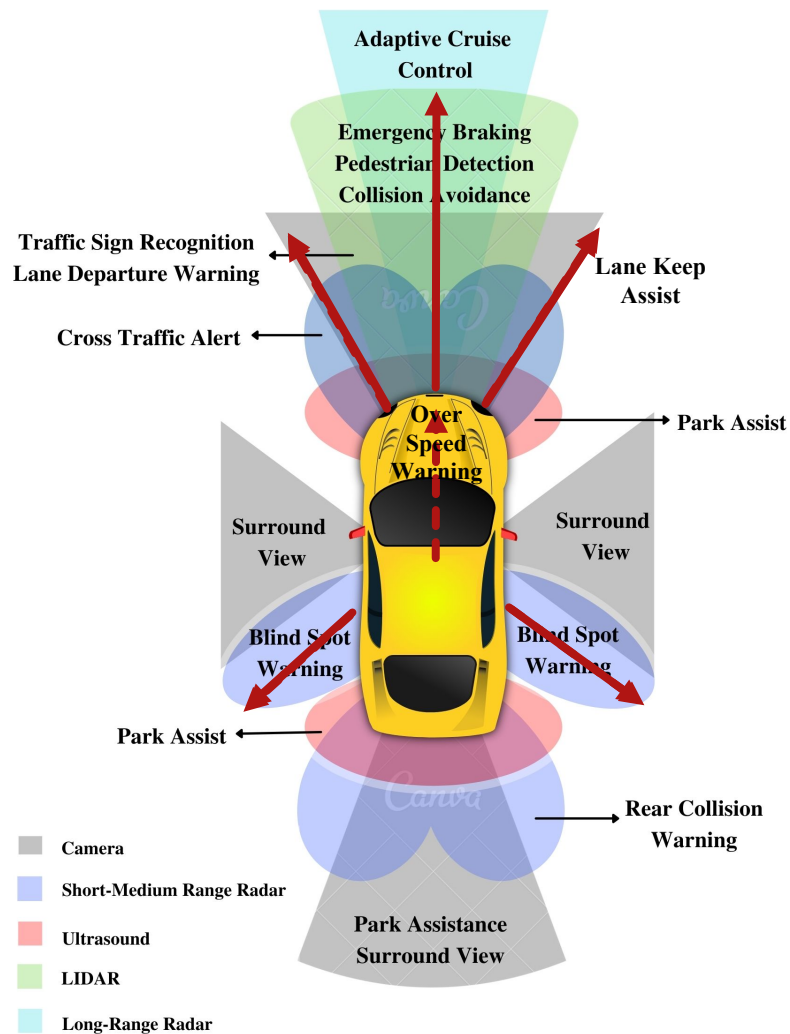
INTRODUCTION

- ▶ 36,000+ deaths, 2.7+ million injuries, and 6.7+ million traffic crashes annually
- ▶ Driver errors - cause 90-95% of crashes (NSC, 2020; Bellis & Page, 2008)
 - **Recognition errors – 41%**
 - **Decision errors – 34%**
 - **Performance errors – 10%**
 - Non-performance errors – 7%
- ▶ Vehicles with advanced features



Source:

<https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/81117>



ADVANCED FEATURES & SENSORS

NEED FOR RESEARCH



Understanding the functionality and limitations of advanced features



Low-level acceptance and confusion among drivers



Previous researchers tested ADAS and other advanced features in specific conditions



Driver behavior may vary based on road condition, weather condition, area type, demographic, driving history, and socio-economic characteristics



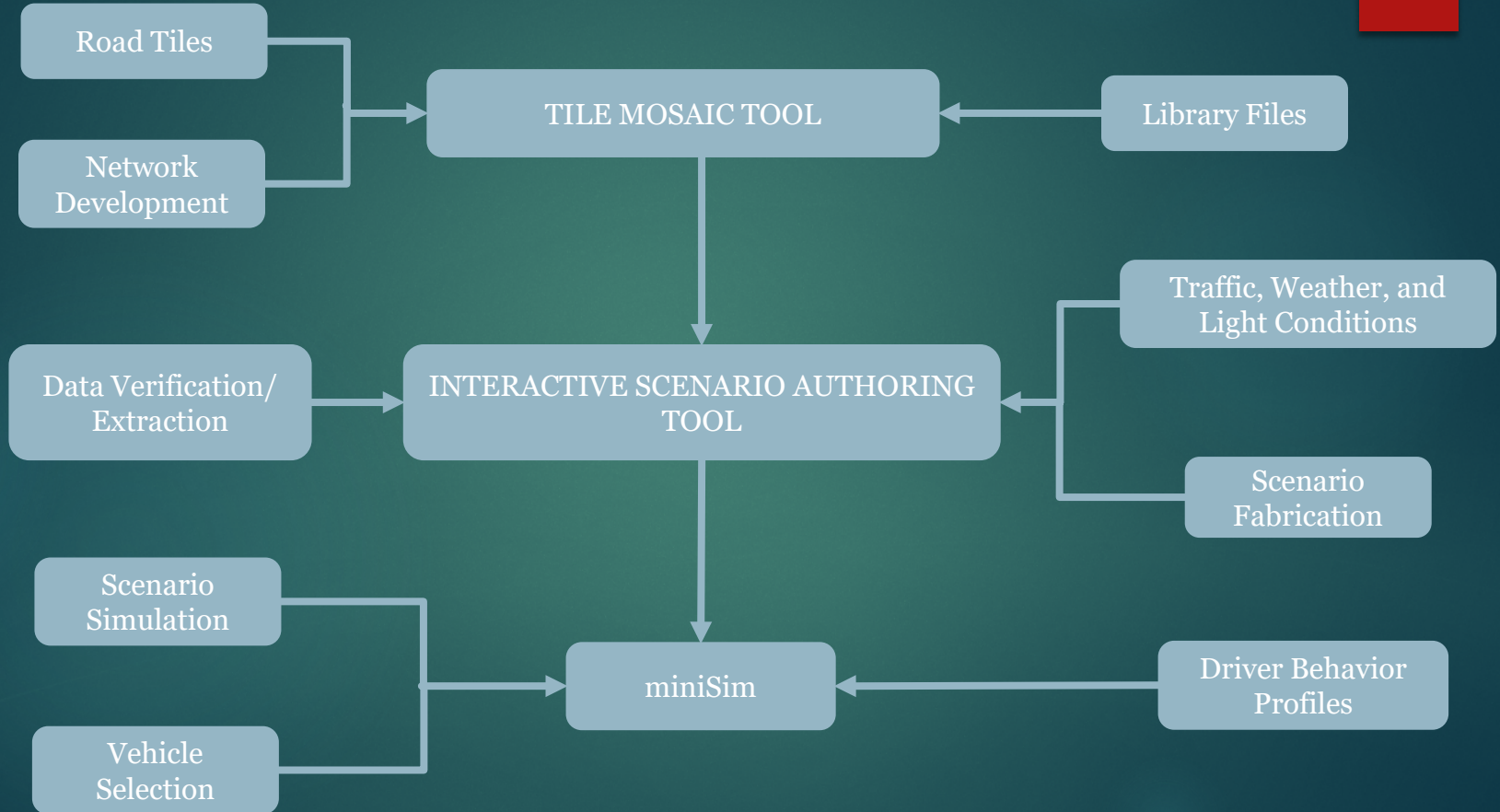
Mandates the need to perform an in-depth analysis of advanced features and compare for various driving conditions

RESEARCH OBJECTIVES

To explore and assess the effects of advanced features on driver behavior

- Different classes of roads (rural highways, freeways, and urban arterials)
- Different weather and lighting conditions
- Age and gender
- Driving history and familiarity

DRIVER SIMULATOR



Driver Simulator (contd..)

Scenario Fabrication

Three scenario types

- Urban
- Rural
- Freeway

Weather conditions

- Rain
- Clear weather

Lighting conditions

- Daylight
- Nighttime

Warning Features

- Lane departure warning (LDW)
- Blind spot warning (BSW)
- Over speed warning (OSW)

Automated Features

- Adaptive cruise control (ACC)
- Lane keep assist (LKA)



DATA COLLECTION

- 51 participants
- 62% males and 38% females
- 46% young (16-25 years) drivers & 54% adult (>25 years) drivers
- A vehicle without ADAS, with ADAS, and with automated features was randomly assigned
- Lighting and weather condition were randomly assigned
- Each participant was tested in all three scenarios

RESULTS SUMMARY: WARNING FEATURES



Driving behavior varied with type of driving scenario and warning features in the vehicle

Longer headways but more lane departures observed at nighttime

Longer headway and less aggressive lane-changing, braking and turning maneuvers observed during rain

Driver above 25 years and male drivers showed aggressive driving behaviors (braking and speeding)

Warning features effected braking, lane-changing, and turning behaviors in addition to serving their intended purpose

RESULTS SUMMARY: AUTOMATED FEATURES



Improved braking, lane-following, and vehicle handling in all three driving scenarios

Lane keep assist improves braking and lane-following behavior compared to lane departure warning

Adaptive cruise control improves braking behavior compared to both blind spot warning and over speed warning

More aggressive car-following behavior observed with automated features

Variation in driver behaviors reduced by over 50% compared to both warning features and no ADAS

Automated features > Warning features > No ADAS

Thank you for joining us for:

Advanced Driver Assistance Systems & Automated Features:
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