

Constructing a Distracted Driving Dataset

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Advancing Transportation Through Innovation



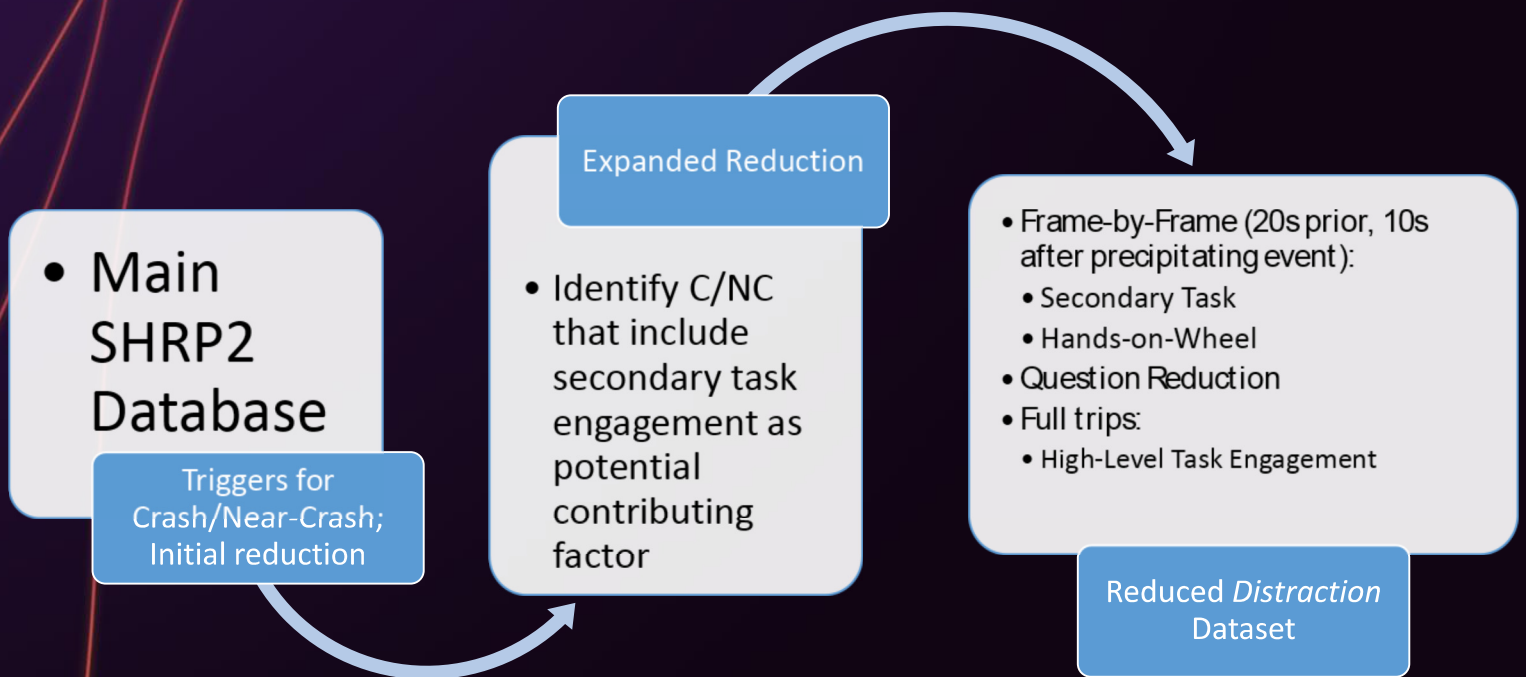
Research Problem

- Driver distraction is a topic of significant interest to the research community
- Large SHRP2 dataset -> lots of secondary task engagement. But...
 - Non-trivial to ID, extract & reduce relevant epochs
 - Current reductions limited in scope
- Project goal: Create a dataset of *reduced* C/NC events that include secondary task engagement
 - + Baselines

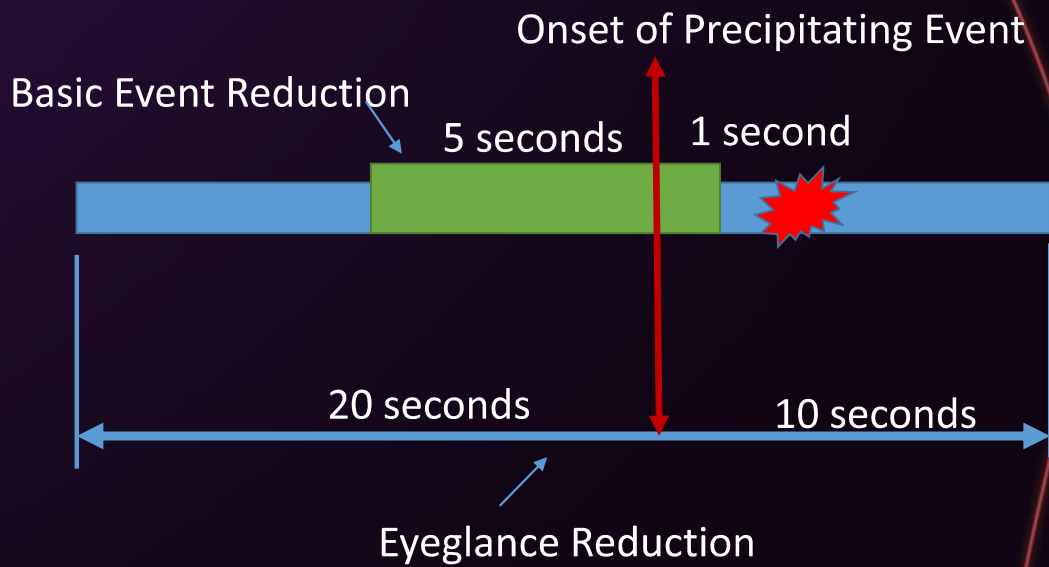
Approach

- 1) Identify crashes & near-crashes that include secondary task engagement as a *potential contributing factor*
- 2) For each event, select ~4 baseline events at random from SHRP2 baseline pool
- 3) Expand duration & type of existing reductions for C/NC & Baseline events
 - Plus high-level full-trip reductions

C/ NC Event Data Reduction Process

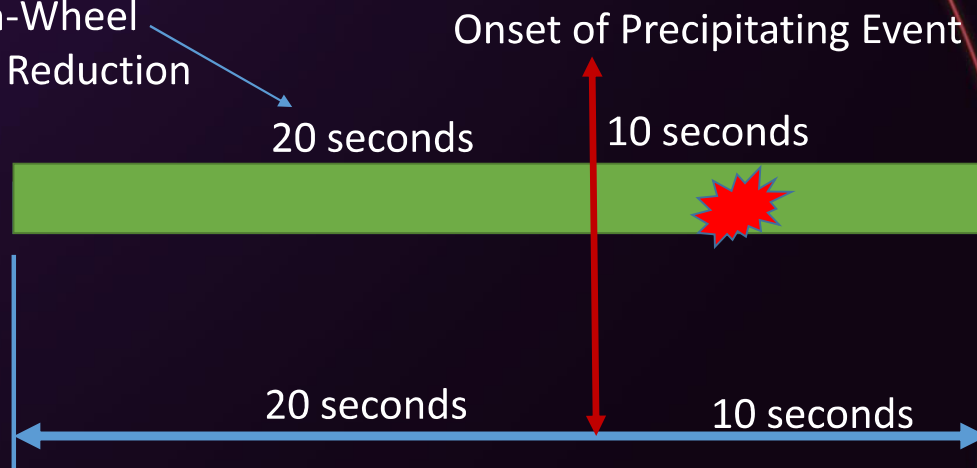


Current SHRP2 Event Reduction



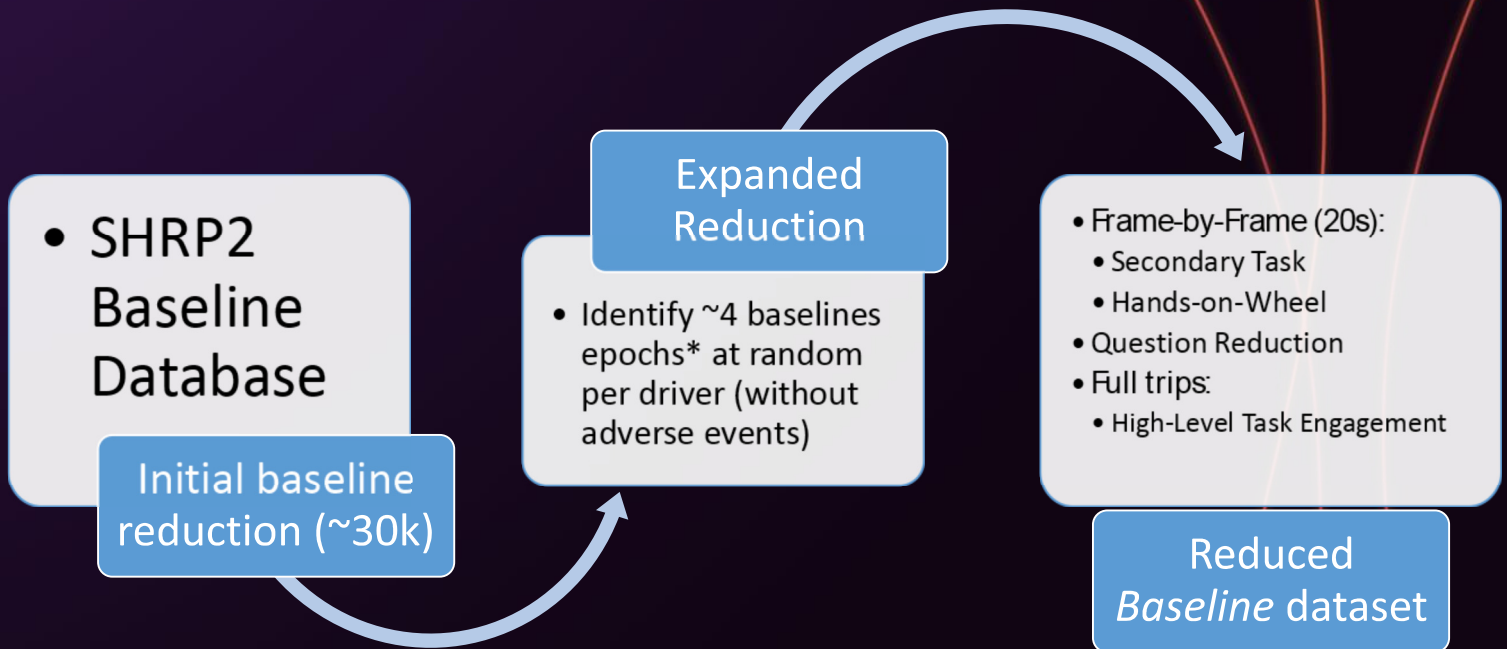
Expanded C/NC Event Reduction

- Secondary Task
- Hands-on-Wheel
- Question Reduction



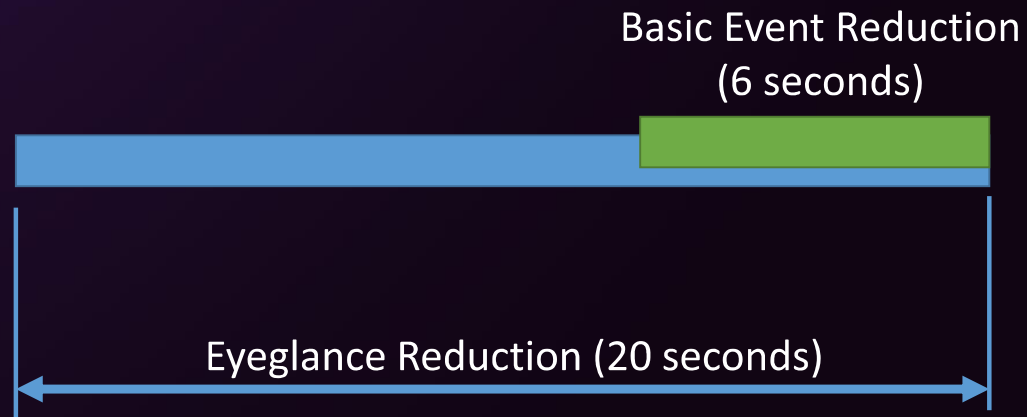
PLUS: Full-Trip High-Level Reduction

Baseline Epoch Data Reduction Process



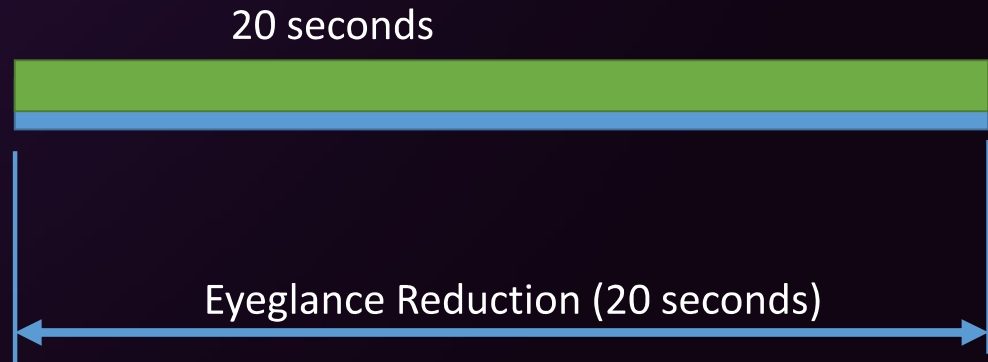
*Dependent on availability of SHRP2 reduced baselines

Current SHRP2 Baseline Reduction



Expanded C/NC Baseline Reduction

- Secondary Task
- Hands-on-Wheel
- Question Reduction



PLUS: Full-Trip High-Level Reduction

Reduction Example

Secondary Task

The screenshot displays the Hawkeye software interface. On the left, there is a 'Variables' list with categories like 'File_Writer', 'HEL_CAN', 'IMU', 'Mask', 'Power_Supervisor', 'Road_Scout', 'SMS', 'Snapshot_Control', 'Snapshots', 'SQL_Data_Stream_Socket1', 'Storage_Board', 'Study_Info', 'Timing_Test', 'Trigger_Control', 'Usage_and_Tracking', 'User_Interface_Socket1', 'VehicleCAN_1', 'VehicleCAN_2', 'VehicleNetworkBox', and 'VehicleNetworkBoxCAN'. Below this is the 'Variable Properties' section for a video variable.

In the center, there are four video feeds: 'Video: Face', 'Video: Hands', 'Video: Front', and 'Hands on Wheel'. The 'Hands on Wheel' window shows a graph for 'Time: 775366.7034' with a blue bar indicating 'No Hands On' from approximately 774,000 to 776,000. Below the graph are buttons for '0: No Hands On', '1: One Hand On, One Off', and '2: Both Hands On', along with 'A: At Least One Hand ON, Other Unknown' and 'L: At Least One Hand OFF, Other Unknown'.

On the right, the 'External Variables' window shows a graph for 'Time: 775366.7034' with a blue bar indicating 'Writing, Reading' from approximately 774,000 to 776,000. Below the graph are buttons for 'G: Manipulating Object', 'H: Holding Object', 'B: Locking: External', 'N: Locking: Internal', 'A: Dancing', 'S: Reading', 'D: Writing', 'Q: Personal Hygiene', 'M: Eating/Drinking', '1: Other', 'F: Cognitive Other', 'P: Talk to Passenger', 'O: Talk to Self', '2: Not in Transit', 'L: Talking: Hands-Free', 'K: Talking: Handheld', 'Z: Manipulating Hands Free', 'X: Steering Wheel Buttons', 'C: Center Stack Controls', 'J: Reaching: Not Installed', and 'V: Adjusting Other Device'.

Hands-on-Wheel

Secondary Task Reduction (Frame-by-Frame)

- Manipulating Object
- Holding Object
- Talking: Handheld
- Talking: Hands-Free
- Reading
- Writing
- Reaching For Non-OEM object
- Dancing
- Steering Wheel Buttons
- Center Stack Controls
- Adjusting Other Devices
- Looking: Internal
- Looking: External
- More...

Question Reduction

(Situation/Environmental Info; 1-3x per)

- Worst Weather
- Traffic Density
- # Travel Lanes
- Locality
- Lighting
- Road Grade
- Road Alignment
- Road Surface Condition
- Intersections
- Traffic Control
- Driver Control Behavior
- Secondary Task
- Impairment
- Number Passengers
- Seat Belt Use
- Final Narrative

Trip-Length, High-Level Reduction

Simple

- Talking/Singing
- Dancing
- Holding Object
- Talk Hands-free
- Quick Adjust of Controls
- Steering Wheel Buttons
- Reach/Search Object

Moderate

- Eating/Drinking
- Look External
- Look Internal
- Long Adjustments
- 2 Simple Tasks
- Talk Handheld

Complex

- Reading
- Writing
- Manipulating Object
- 2+ Moderate
- 3+ Simple

Project Scope

- 1) Goal is ~1,000 reduced events in final dataset
 - a) ~200 C/NC events; ~40 each:
 - Level 1 (Most Severe)
 - Level 2 (Police-Reportable)
 - Level 3 (Minor Crash)
 - Level 4 (Tire Strike)
 - Level 5 (Near-Crash)
 - b) ~800 Baselines
- 2) Projected end date is December 2014
- 3) In future, provide reduced datasets back to SHRP2 community

(Brief) Questions?



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