

**Lifesavers Conference 2011**  
*What's New in Crash Avoidance and Other Vehicle Technologies*




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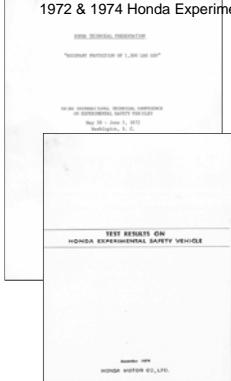


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**Is Anything New?**

1972 & 1974 Honda Experimental Safety Vehicles

*"With a prime emphasis placed on the preventative safety measures for accident avoidance, improve man and machine communication and provide sufficient information to the driver."*

**Features:**

- Centralized Warning for 21 systems
- Tire inflation pressure monitor
- Four-Wheel Controlled Anti-Skid Brakes
- Fail-Safe Tires for 200 km deflated running
- Pedestrian "soft bumper"
- Corrugated "Energy Absorption Unit" body

Source: Honda

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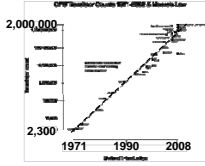
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Technological Corollaries to Vehicle Safety

- Moore's Law:  
"The number of transistors that can be placed inexpensively on an integrated circuit doubles approximately every two years"  
- Gordon E Moore, 1965



- Wirth's Law:  
"Software is getting slower faster than hardware is getting faster"  
- Niklaus Wirth, 1995
- Are there automotive equivalents? Are advances in vehicle safety offset by negative behavioral adaptations by drivers?

HONDA  
Source: Wikipedia.com

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What is Crash Avoidance Technology?

- According to a Haddon Matrix, **equipment** in the **pre-event** box would be crash avoidance technology

	Human	Vehicle/Equipment	Physical Environment	Social/Economic
Pre-Crash	Poor vision or reaction time, alcohol, speeding, risk taking	Failed brakes, missing lights, lack of warning systems	Narrow shoulders, ill-timed signals	Cultural norms permitting speeding, red light running, DUI
Crash	Failure to wear seat belt	Malfunctioning seat belts, poorly engineered air bags	Poorly designed guardrails	Lack of vehicle design regulation
Post-Crash	High susceptibility, alcohol	Poorly designed fuel tanks	Poor emergency communication systems	Lack of support for EMS and trauma systems

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What is Crash Avoidance Technology?

- Does this definition need to evolve to include non-conflict scenarios – recognizing avoidance that occurs prior to imminent conflict?

	Non-conflict Driving	Pre-Crash (crash imminent)	Crash Event	Post-Crash
Driver/Operator				
Vehicle/Features /Equipment				
Environment/ Roadway				
Social/ Economic				

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### Applying Research Results to the Problem

The 100-Car Naturalistic Driving Study Fact Sheet

The 100-Car Naturalistic Driving Study: A Descriptive Analysis of Light Vehicle-heavy Vehicle Interactions from the Light Vehicle Driver's Perspective

VehTech TRANSPORTATION INSTITUTE

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### Focus on the Right Technologies

- How to prioritize?
  - Start with the data
    - NASS and FARS can tell us how many people have died by vehicle type, occupant age, crash mode
    - To be effective, each crash avoidance technology has to be relevant to the crash problem
    - The right technology might be different by vehicle type or other parameters (example?)
  - What is acceptable to the market?
    - Automakers can't introduce features that are not:
      - Technically feasible
      - Reliable
      - Practical and convenient for use
      - Affordable
      - Understood by consumers
      - Accepted by consumers – a safety feature that a customer won't purchase does not benefit anyone
  - Consumer perceptions are a complex mix of value (price), values (safety), and a sense of security

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### Focus on the Right Technologies

#### Example of Setting Crash Avoidance Priorities

2009: 33,808 U.S. Traffic Fatalities

39% of Fatalities in Passenger Cars

35% of all US crashes are frontal

Angled, head-on and rear-end fatal crashes = 33%

Acqua Collision Mitigation Braking System® (CMBS)

Source: NHTSA

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### Gauging Effectiveness

- There are many approaches to alerting the driver to an impending crash:



Source: Honda

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### Gauging Effectiveness

- Are visual alerts beneficial?
- Are certain types of audible alerts more effective than others?
- Are tactile alerts beneficial?
- Is braking both alert and mitigation?



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### Balancing Crashworthiness & Crash Avoidance

- Today, Crashworthiness and Crash Avoidance are not balanced, they are essentially isolated
  - Certain exception for restraints, pretensioning seatbelts, positioning head restraints and pre-arming airbags for impending crashes
  - Future advances promise greater restraint optimization, tailoring vehicle response to suit specific crash conditions
- It's too early to talk about trading crashworthiness off for crash avoidance, but the future may hold potential as:
  - Crash avoidance system performance improves
  - Reliability improves
  - Confidence improves based on statistical measures

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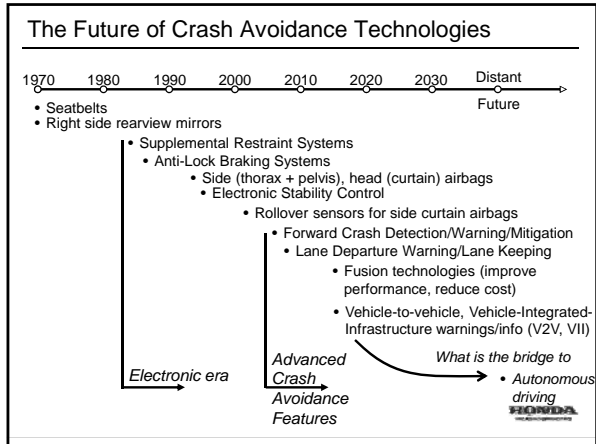
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