84229 NHTSA 00-7013-14

CENTER FOR AUTO SAFETY
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202-328-7700 ◆ www.autosafety.org

June 14, 2000

ORIGINAL

Docket Section
National Highway Traffic Safety Administration (NHTSA)
400 Seventh Street, SW
Washington, DC 20590

Re: NHTSA 00-7013 -- Advanced Air Bag Final Rule, 65 Fed. Reg. 30680 (May 12, 2000)

To the Docket:

Attached is a copy of a presentation given by NEC on occupant sensing technology for advanced airbag systems. NEC's use of electric fields as a means to determine occupant positioning represents an option available to manufacturers seeking to install safer and more effective frontal airbag systems in their vehicles. A similar system (geared to assist side airbags) is already installed in Honda-manufactured automobiles. As described in the presentation, these devices, as currently used, help detect situations in which the side airbags should and should not deploy -- e.g. out-of-position children -- and can be applied to both frontal airbags and other side airbag designs (i.e. tubes and curtains).

Sincerely,

Michael Kido
Staff Attorney

Attachment(s): 1 (NEC Presentation of June 14, 2000)

Occupant Sensing Technology

Presented by:

Phil Rittmueller
NEC Technologies, Inc.

June 14, 2000
Dirksen Senate Office Building
Washington D.C.

SeatSentry

occupant sensing system

2003:

35% of vehicles

install

Occupant Sensors

2005:

vehicle owners

DEMAND

NEC's

SeatSentry™

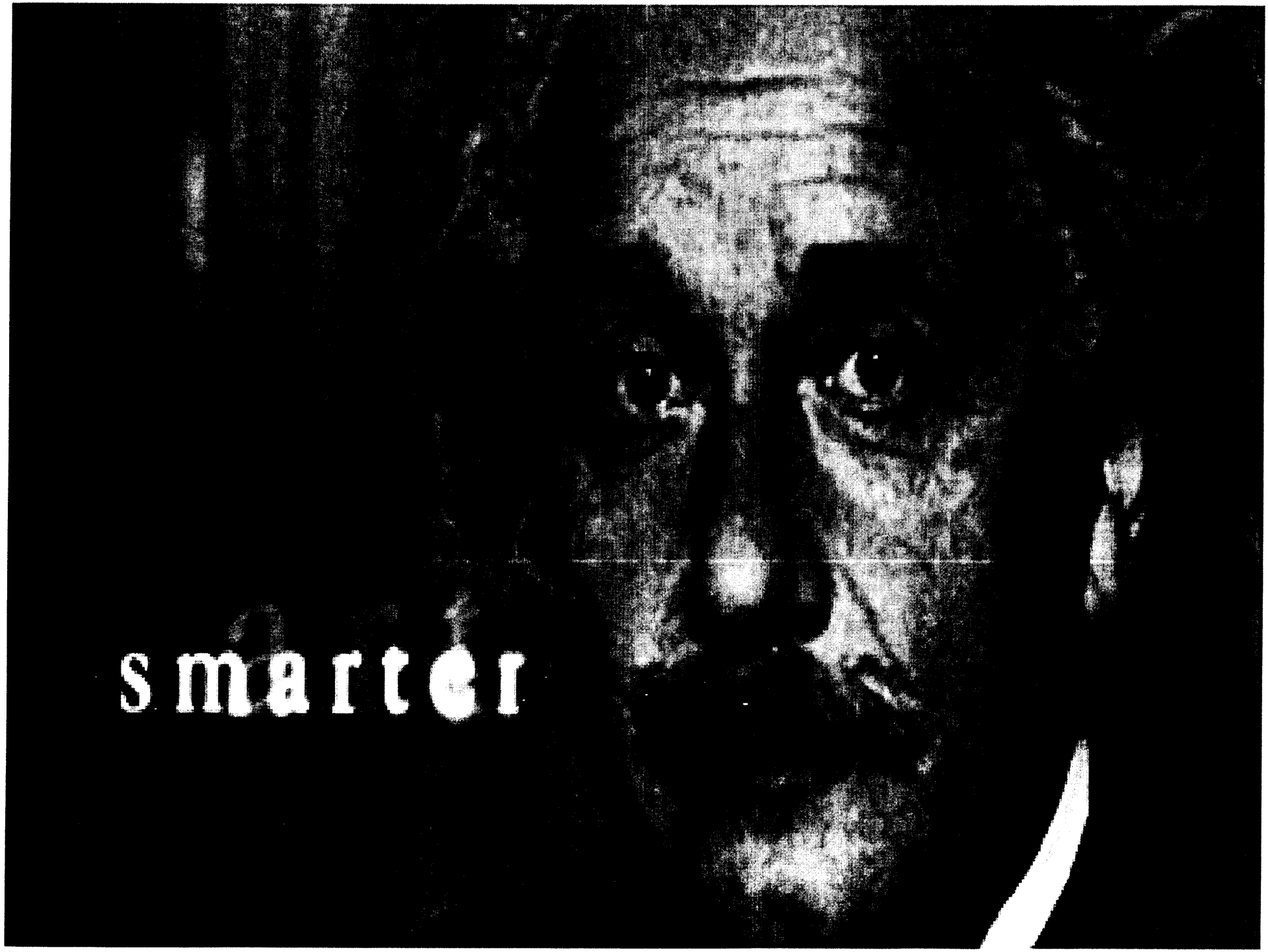
Purpose and Schedule

- Present SeatSentry™ Occupant Sensing System
- Actions resulting from the Transportation Equity Act for the 21st Century (TEA21)
- Future ideas for automotive safety
- Presentation and Q&A in this room
- Demonstration in vehicle

SeatSentry™

occupant sensing system

smarter tougher safer


smarter

M.I.T. Medialab

MAKING

THINGS

SMART

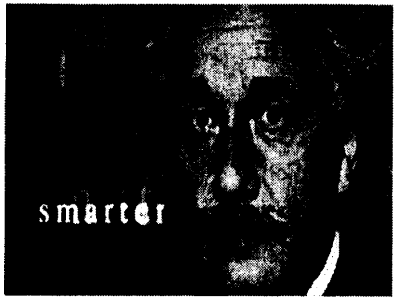
WITH EMBEDDED, NON-INTRUSIVE COMPUTING.

Side Bar

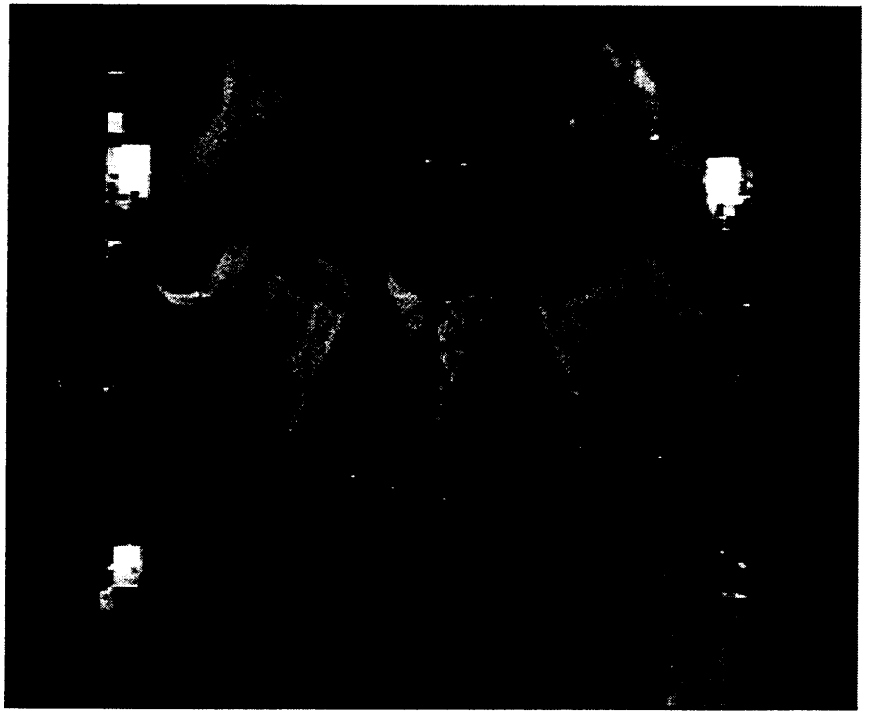
- The starting point of this development was research into Yo Yo Ma playing the cello

- Directed research for example: automotive safety done byNHTSA or Intelligent Transportation Systems (ITS) R&D is not always what produces the results. It can come from other areas.

Making Things Smart



MIT - from Spirit Chairs to Safety Seats



EF Sensing - "Making Ears Smart"

EF Sensing is among the best technologies to consider for occupant sensing because:

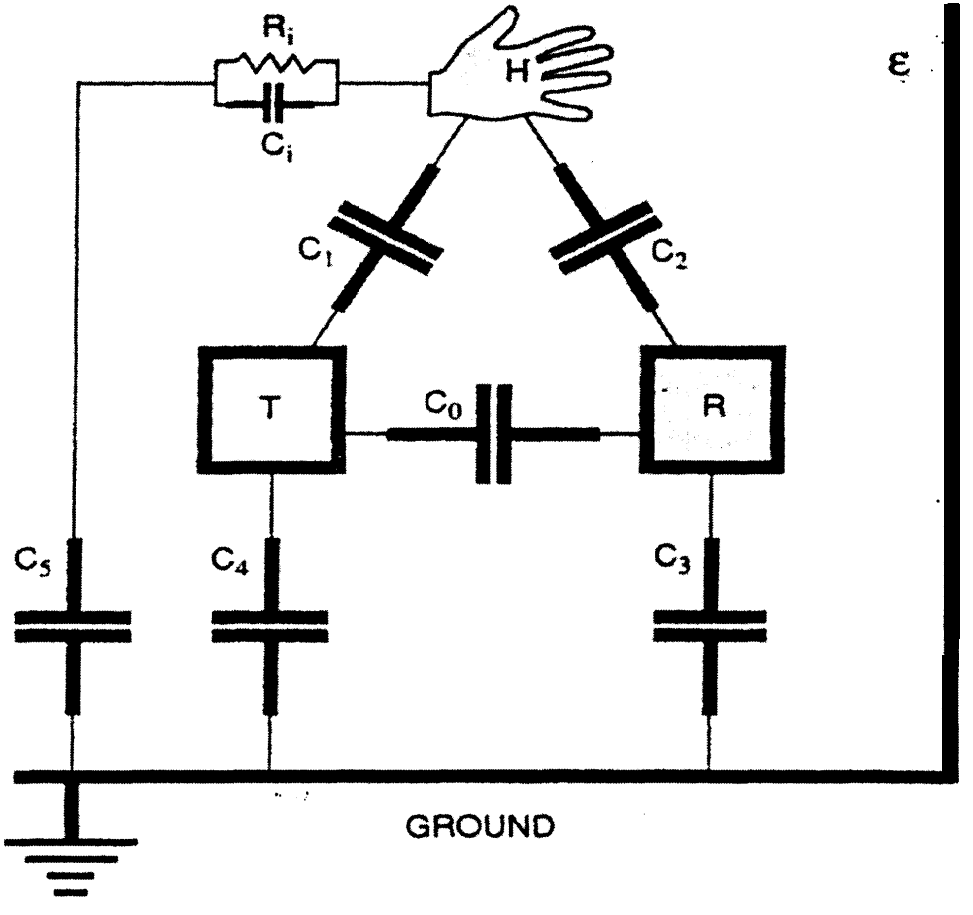
- EF is a "bulk" sensor
  - It can sense the relative mass of what we actually want to measure....the occupant
  - It can sense the relative location of the occupant within a defined space
  - It is not affected by surface conditions

- EF is active...meaning that it "looks" for an occupant electrically rather than depending on some other "mechanical interaction".

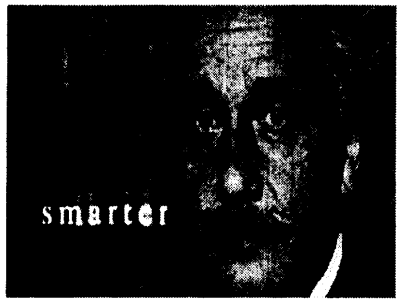
EF Sensing - “Making Cars Smart”

- EF is very fast.
- EF is simple and low cost.
- EF systems can be made very small, lightweight and low power.

Electric Field Sensing
Lumped Circuit Model



EF Sensing



NEC has employed many variations of the basic technology developed by MIT.

- Single antenna
- Multiple antenna transmit and receive
- Multiple antenna loading only
- Studied many antenna configurations and locations

EF Sensing

- NEC has obtained a global license for this basic technology from MIT.
- We have added our own patents and application specifically related to occupant sensing.

SeatSentry™
occupant sensing system

smarter tougher safer

The first occupant sensor to detect an out of position child to be installed on vehicles available in the U.S.

SeatSentry™

Acura and Accord vehicles wlth side airbags carry the Side Air Bag sensor.

Air Bag mounted in seat

SeatSentry™

Detects a **child** whose head is too close to the airbag…"sleeping position"…then suppresses the airbag,

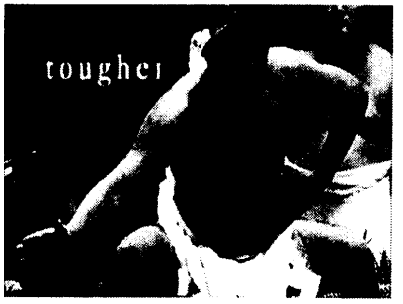
Air Bag mounted in seat

SeatSentry™ Side Suppression

- Introduced in 1999
- Meets NHTSA's "strong suggestion" to automakers regarding side airbags.
- Applied in North America and Japan to Honda and Acura vehicles with side airbags.

tougher

SeatSentry™

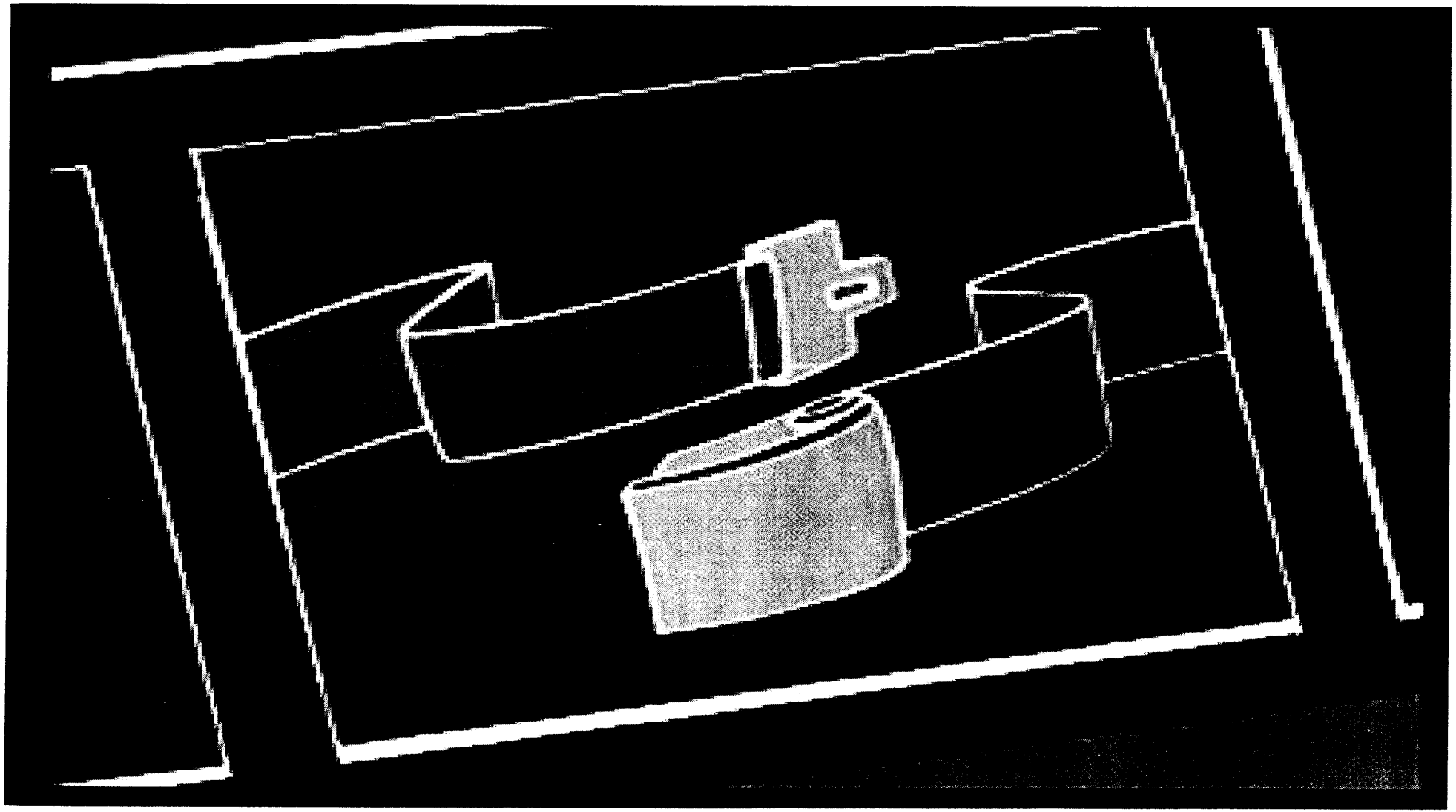


Performance not affected by many common environmental items:

Light	Reflectivity
Temperature	Dust
Noise	Air Conditioning

Biggest challenge: Meet automotive environmental requirements -30°C to 85 °C

SeatSentry™



Tough Antenna

Puncture it. Jump on it. Spill on it.

SeatSentry™ antenna materials individually meet automotive environmental and life requirements.

Withstands punctures and longitudinal cuts - with continued full performance.

Electronic Control Unit as a Part

Item	Specification	Remark
Input Voltage	+12 V DC	Typical
Power Consumed	Less than 6.0 watts	
Frequency of EF	125 kHz	
Amplitude	3 Vp-p	without Load
Wave Form	Sine wave	
Definition time	Approx. 120 msec	
Field Strength	Max. 25.6 V/m	Reference Value
ECU Size	138L x 67D x 37H (mm)	without mounting stay
Weight of ECU	241 grams	

SeatSentry™ Front Suppression

- As of May 5th, NHTSA issued the long awaited final regulation for advanced airbags.
- This same SeatSentry™ technology is designed for suppression.

NHTSA Advanced Airbag Regulations

- SeatSentry™ system utilizing EF Technology has been developed for installation in the seat cushion.
- This system will meet all of the requirements lor static suppression of the newly issued regulation.
- Will meet most all of the additional "real world" requirements.

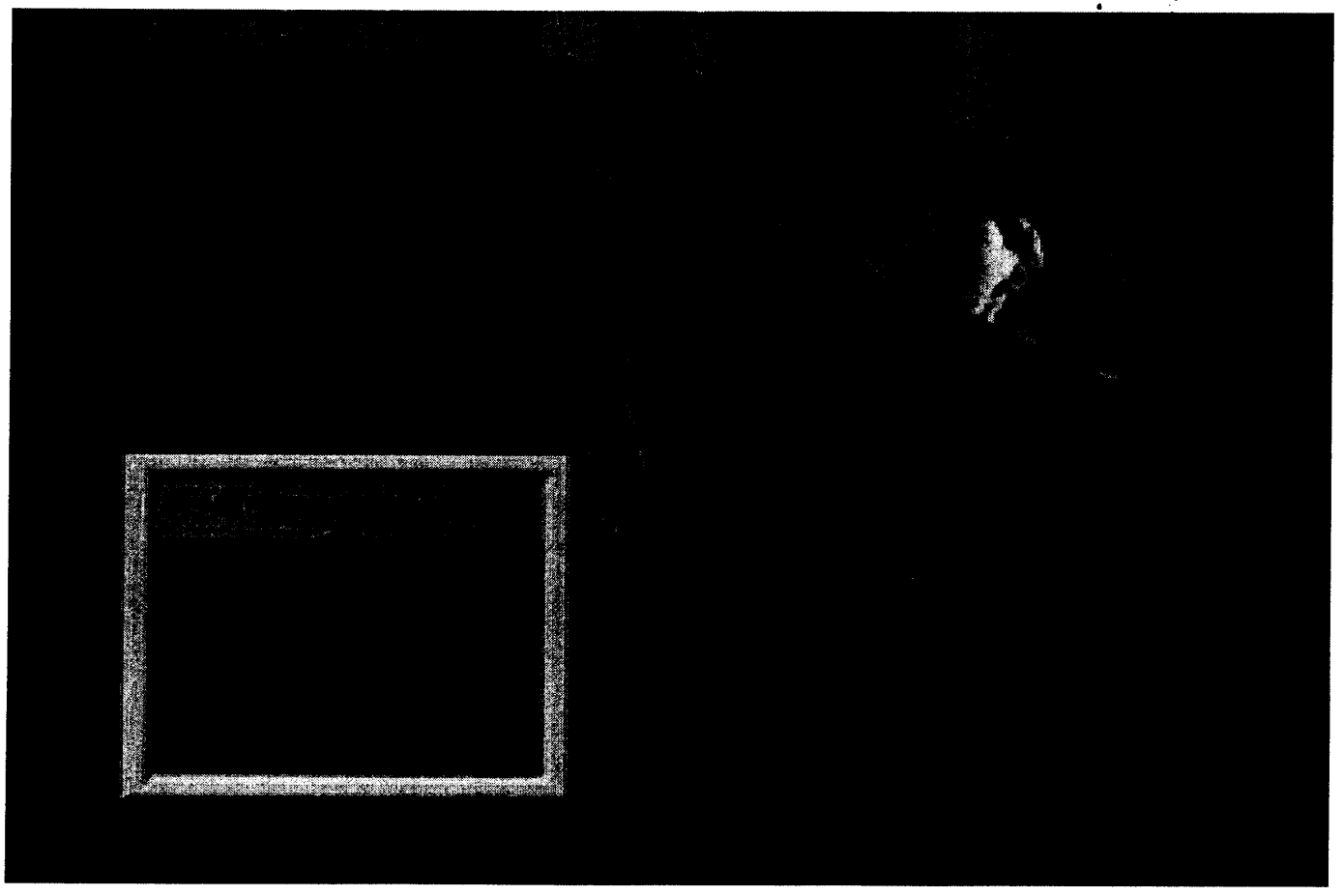
NHTSA Advanced Airbag Regulations

Dummy Dimensions

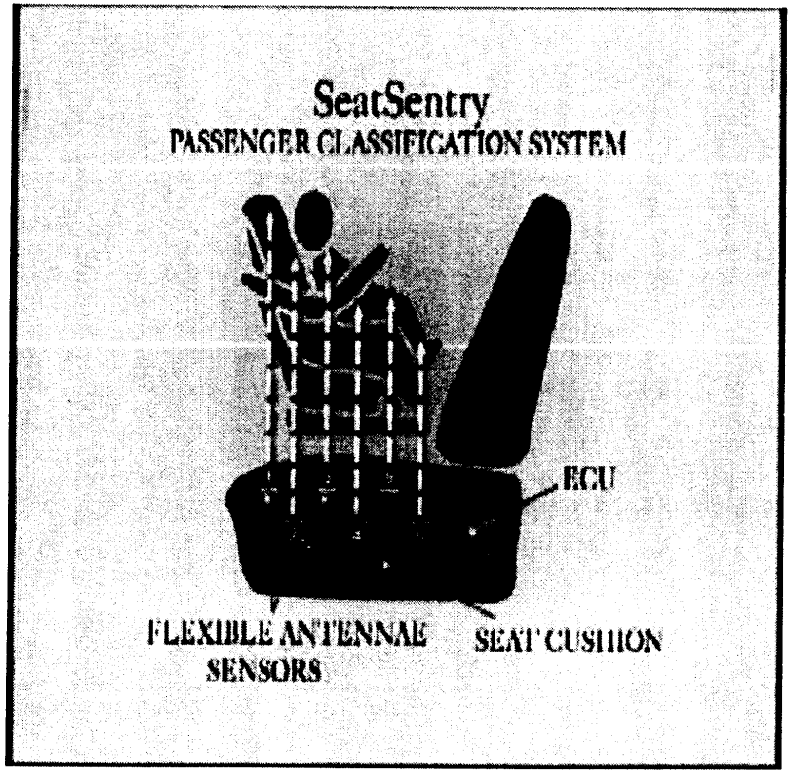
	Height	Weight
50th Percentile Male Hybrid III	5 feet 8 inches	171 pounds
5th Percentile Female Hybrid III	4 feet 11 inches	108 pounds
6 Year Old Hybrid III	3 feet 11 inches	52 pounds
3 Year Old Hybrid III	3 feet 1 inches	34 pounds
1 Year Old CRABI (Child Restraint Air Bag Interaction)	2 feet 5 inches	22 pounds

NHTSA Advanced Airbag Regulations

Chaos in the car needs to be detected



SeatSentry™ for Front Suppression

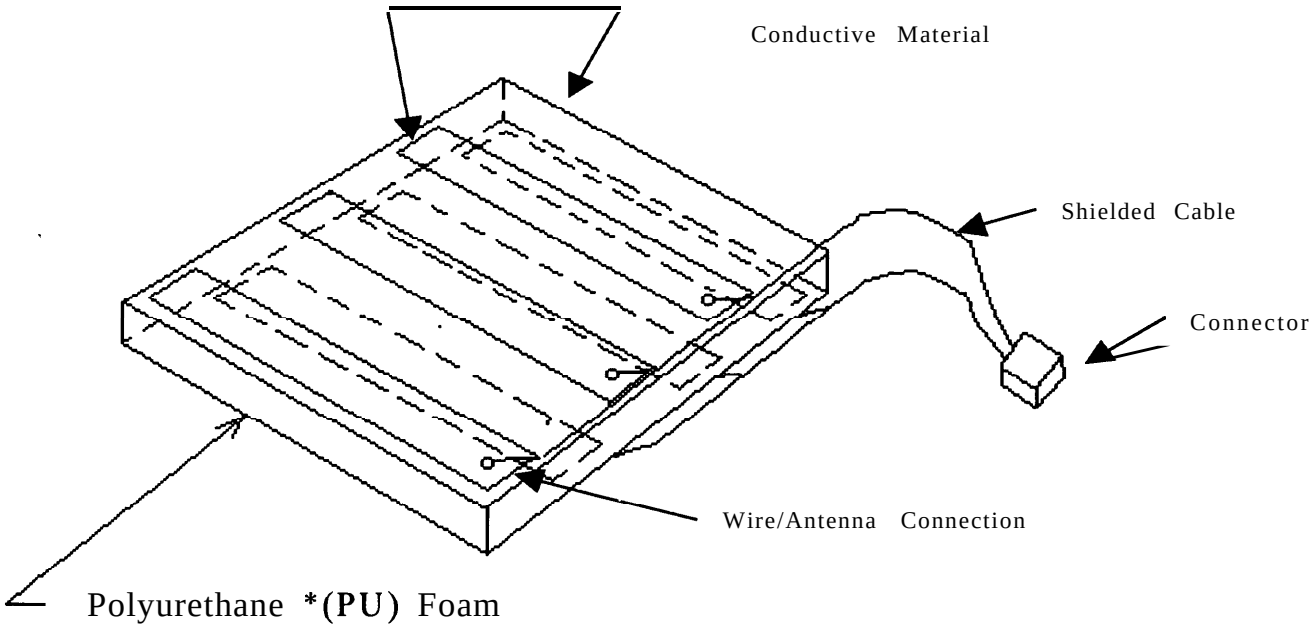


Suppresses the passenger side airbag for:

- Empty seat
- Baby in any rear facing infant seat or infant bed
- 3 and 6 year old children in any:
  - childseat
  - booster
  - normally seated position
  - out of position

Sensor Assembly For Front Suppression

Basic Construction of Antenna System



Can be:
Separate assembly
Foamed into seat cushion