CSRC Overview

Approach
Focus Areas
Research Themes

Collaborative Safety Research Center
TOYOTA
Announced January 2011

- “Work with leading NA universities, hospitals, federal agencies ...”
- “...benefit the entire industry.”
- “… Initial funding: $50 million over 5 years
Three Pillars:

1. Collaborative Research
2. Accident Data Analysis
3. Outreach
Initial Research Focus Areas

- Active Safety
- Driver Distraction
- Vulnerable Populations
  - Children
  - Newly licensed teens
  - Seniors
  - Pedestrians
Vulnerable Population – Children

Traffic Fatalities Among Children Age 14 and Younger - US

Motor vehicle injuries are the leading cause of death for children ages 3 to 14 in the U.S.

NHTSA Traffic Safety Facts DOT HS 811 387
Vulnerable Population – Teen Drivers

- Motor vehicle crashes are leading cause of death for teen drivers age 16-19 in the U.S.
- Per mile driven, 16~19-year-old drivers are 4 times more likely to crash than older drivers
Vulnerable Population – Seniors

Increasing Percentage of 65+ Year-Olds

- Canada
- Japan
- US

Stat Canada, US Census Bureau, Toyota Data
Vulnerable Population – Seniors

Number of Drivers Involved in Fatal Accidents per 100,000 Miles – US

IIHS Traffic Fatality Facts 2007
Vulnerable Population – Pedestrians

Number of Pedestrian Fatalities – US (11-12% of total traffic fatalities)

In Japan in 2009, there were more fatal injuries to pedestrians than vehicle occupants.
Integrated Three Part Safety Approach

People

Vehicles

Traffic environment
### Integrated Safety Management Concept

<table>
<thead>
<tr>
<th>Parking</th>
<th>Active safety</th>
<th>Pre-crash</th>
<th>Passive safety</th>
<th>Emergency response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driving information &amp; support</td>
<td>Accident warning &amp; avoidance</td>
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<tr>
<td>Back Guide Monitor</td>
<td>Radar Cruise Control</td>
<td>Distance warning</td>
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<tr>
<td></td>
<td>Lane Keeping Assist</td>
<td>Lane Departure Warning</td>
<td>VDIM Brake Assist</td>
<td>Emergency response</td>
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<tr>
<td></td>
<td>Night View</td>
<td>VSC / ABS</td>
<td>Frontal Pre-collision System with Pedestrian Detection</td>
<td>GOA</td>
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<td>VSC / ABS</td>
<td>Rear-end Pre-collision System</td>
<td>Seatbelts, airbags</td>
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<td>Vehicle-Infrastructure Cooperative System</td>
<td>Pedestrian Injury-Reducing Body</td>
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<td>HELPNET</td>
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- **GOA**: GOA Pedestrian Injury-Reducing Body
- **RESPONSE**: HELPNET
- **Passive safety**: Seatbelts, airbags
- **Emergency response**: Pedestrian Injury-Reducing Body
- **Crash**: Crash
CSRC Portfolio Model – Modified Haddon

Driving information & support

Accident warning & avoidance

Damage mitigation

Passenger protection

Rescue

Parking

Active safety

Pre-crash

Passive safety

Emergency response

Integrated Safety Management Concept

GOA

HELPNET

Parking

Active safety

Pre-crash

Passive safety

Emergency response

Vehicle-Infrastructure Cooperative System
### CSRC Portfolio Model – Modified Haddon

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**Vehicles**

**People**

**Traffic environment**

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# First Pillar – Collaborative Research

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Initial projects

- **Vehicles**
- **People**
- **Traffic environment**
Example Themes

- PCS Pedestrian Detection
  - Millimeter wave radar image

- THUMS Model Enhancement

- Teen Driver Electronic Coaching
  - Young Ribs, Old Ribs
  - Images from NHTSA

- Injury Biomechanics of Seniors

- Example Themes
  - Education, beliefs
  - Proactive/Passive
  - Active Safety
  - Pre-Crash Safety
  - Passenger Protection
  - Emergency Response

- Vehicles
- People
- Traffic environment

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### 13 Initial Research Themes

<table>
<thead>
<tr>
<th>Human Factors Projects</th>
<th>Wayne State Medical School</th>
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<tr>
<td>Driver Distraction: Cognitive Model and Validation</td>
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<td>Demands of Voice Based In-Vehicle Interfaces</td>
<td>MIT Age Lab</td>
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<td>Teen Driver Coaching</td>
<td>VTTI</td>
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<tr>
<td>Senior Driver Support – Brain Training</td>
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| Active Safety Projects                                     |
|------------------------------------------------------------|-----------------------------|
| PCS Performance Evaluation                                 | UMTRI                        |
| Pedestrian PCS Scenarios and Naturalistic Data Collection  | TASI                         |
| Lane Departure Warning Benefit Estimation                  | VT                          |
| Crash Data Archive                                         | WATS                        |

| Injury Biomechanics / Human Body Modeling Projects         |
|------------------------------------------------------------|-----------------------------|
| Finite Element Model – Child and Senior Female             | Wayne State                 |
| THUMS Simulation of Real World Crashes                     | Wake Forest                 |
| Senior Driver Seating Position                             | UMTRI                        |

| Post Crash Projects                                       |
|------------------------------------------------------------|-----------------------------|
| Child Injury Database                                       | Children’s Hospital of Philadelphia |
| Advanced Automatic Crash Notification                      | Wake Forest                 |
Second Pillar – Accident Data Analysis

Crash investigation and analysis

Development / Evaluation

Simulations
# Second Pillar – Accident Data Analysis

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- **Vehicles**
- **People**
- **Traffic environment**

## New data sources
- Naturalistic Driving

## Existing data
- NHTSA - FARS, CIREN, etc.

**Crash**

### Naturalistic Driving

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**TOYOTA SAFETY TECHNOLOGY SEMINAR**

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PRIUS PLUG IN HYBRID VEHICLE DEMONSTRATION PROGRAM

In late 2009, Toyota began delivery of 560 Prius Plug-in hybrid vehicles, equipped with lithium-ion batteries. To participate in a global demonstration program, more than 100 vehicles are being shared with program partners in the U.S. to demonstrate plug-in hybrid technology, educate and inform the public, evaluate performance, and better understand the technology's benefits to future customers.

On the consumer side, the program allows Toyota to gather in-use driving feedback and understand customer expectations for plug-in technology. On the technical side, the program aims to combine, in a wide variety of real world conditions, two technologies: the advanced, next-generation lithium-ion battery technology, while spanning the development of public-access charging station infrastructure.

View Prius Plug In Hybrid Vehicle Specifications

Latest News

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2011 Sustainable Mobility Summit: 3rd Annual Sustainable Mobility General... [Read More]

Risk Hydrogen Conference and Expo: The National Hydrogen Association (NHIA) Highlights... [Read More]

Driving Simulator: Traditional auto safety research and development... [Read More]

About ESQ

Toyota Motor Sales, USA, Inc. provides global sales, marketing, and quality communications support to Toyota's automotive operations as a primary source of information, coordination, services and support for the Toyota Motor Sales, USAy safety and quality activities and initiatives.

About Toyota

Toyota Motor Sales, USA, Inc. established operations in the United States in 1957 and currently employs 38.6,000 people. Today, there are more than 2,000 Toyota, Lexus, and Scion dealerships across the U.S. selling approximately 3.95 million vehicles in 2011.

Glossary

Toyota is committed to creating a safer and better world understanding of the research, development, and production of future vehicles. Join us for more information, services, safety, and support.

About ESG

Toyota Motor Sales, USA, Inc. currently employs 38.6,000 people. Today, there are more than 2,000 Toyota, Lexus, and Scion dealerships across the U.S. selling approximately 3.95 million vehicles in 2011.

Popular Topics

Advanced Technologies Vehicles

Active Safety

Safety Seminar
Outreach – Actively Share