Homeland Security Opportunities and Threats

Connected and Self-Driving Vehicles -- A National Perspective Panel

Homeland Security
Science and Technology

Dr. Mitchell Erickson

Science and Technology Directorate

Hor
Sec

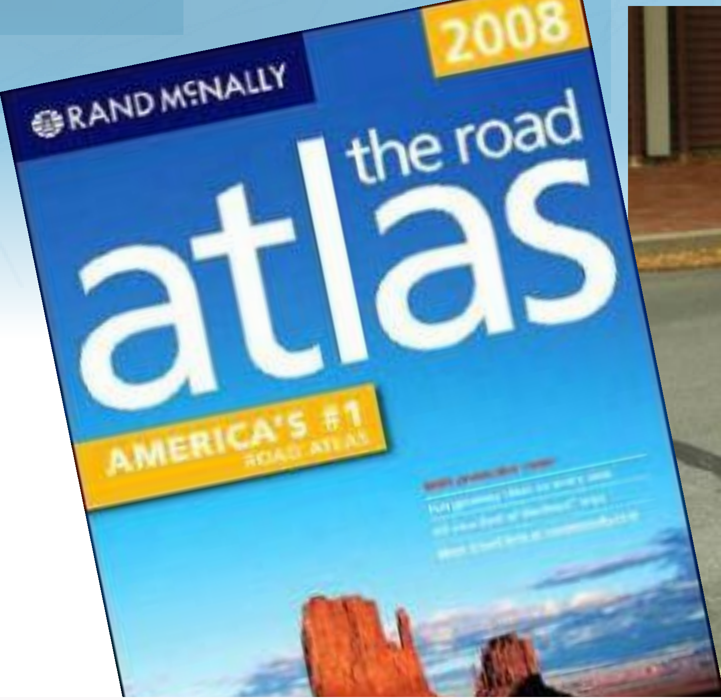
Science

Homeland Security

Science and Technology

Homeland Security

Science and Technology




La Gazzetta dello Sport

Tutto il rosa della vita

GAUDÌ

La Juve soffia sulla bufera anti-arbitri
«Conte e Pirlo hanno proprio ragione»

INTER
Brividi Ranieri
Con il Bologna
esame verità

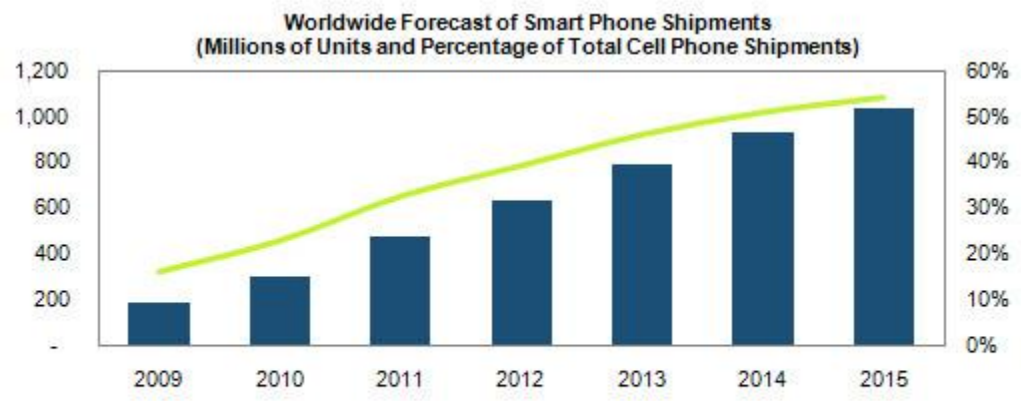
INCHIESTA GAZZETTA
DOVE PUÒ ARRIVARE?
MILAN
NO
LIMITS

NAPOLI
Jovetic
e Cavani
che sfida
a Firenze

SACCHI: BRAVO ALLEGRI

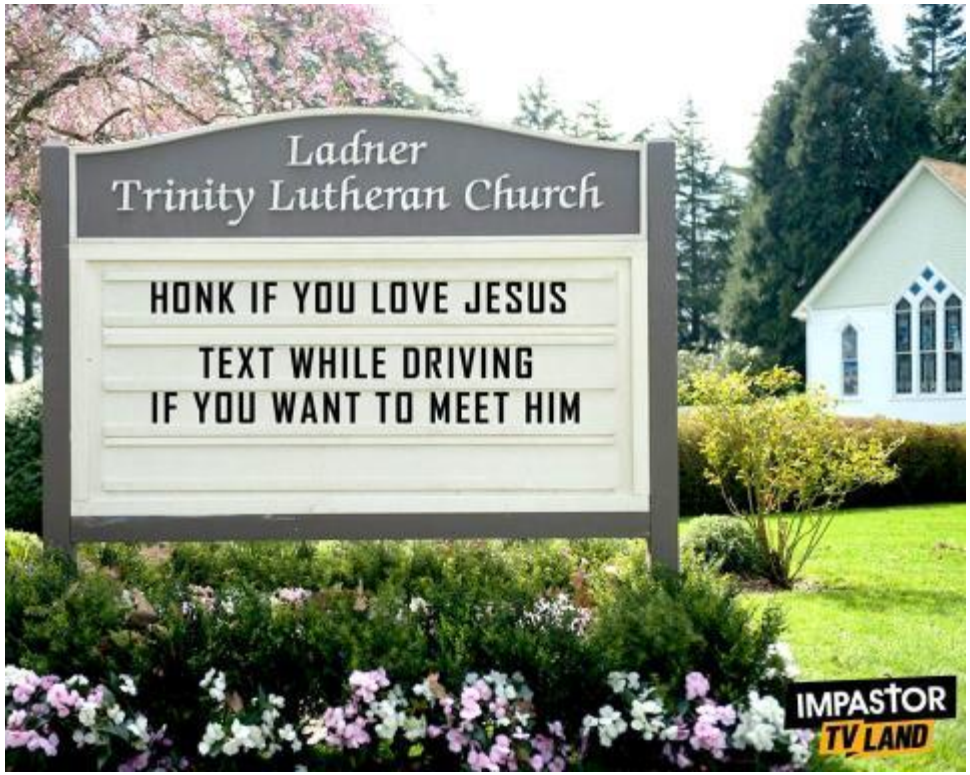
Homeland Security

Science and Technology



al Cellphone Shipments

Source: IHS iSuppli August 2011




“The future ain’t what it used to be.”
Yogi Berra, American philosopher,
baseball player, and team manager.
NEVADA
AU 010

European Truck Platooning Challenge

https://www.eutruckplatooning.com/default.aspx

Homeland Security
Science and Technology

European Truck Platooning Challenge

European Truck Platooning Challenge

TECHNOLOGY IS ROCKETING FORWARD !

Homeland Security
Science and Technology

SCIENCE, TOO:

Homeland Security
Science and Technology

https://www.youtube.com/watch?v=M1Q-EbX6dso

Homeland Security
Science and Technology

How do they do it?

- Each boid attends to a few near neighbors, ignoring the rest of the flock, and obeys three simple rules: .

http://www.americanscientist.org/libraries/documents/20101261348582 79-2011-01ComputingScience-Hayes.pdf

Homeland Security
Science and Technology

How do they do it?

- Each boid attends to a few near neighbors, ignoring the rest of the flock, and obeys three simple rules:
  - 1. ***Collision avoidance:*** Try not to run into neighboring boids.

http://www.americanscientist.org/libraries/documents/2010126134858279-2011-01ComputingScience-Hayes.pdf

Homeland Security
Science and Technology

How do they do it?

- Each boid attends to a few near neighbors, ignoring the rest of the flock, and obeys three simple rules:
  - 1. ***Collision avoidance:*** Try not to run into neighboring boids.
  - 2. ***Velocity matching:*** Try to fly at the same speed and in the same direction as neighboring boids.

http://www.americanscientist.org/libraries/documents/2010126134858279-2011-01ComputingScience-Hayes.pdf

Homeland Security
Science and Technology

How do they do it?

- Each boid attends to a few near neighbors, ignoring the rest of the flock, and obeys three simple rules:
  - 1. ***Collision avoidance:*** Try not to run into neighboring boids.
  - 2. ***Velocity matching:*** Try to fly at the same speed and in the same direction as neighboring boids.
  - 3. ***Cohesion:*** Try to stay close to neighboring boids.

http://www.americanscientist.org/libraries/documents/201012613485827 9-2011-01ComputingScience-Hayes.pdf

Homeland Security
Science and Technology

How do they do it?

- Each boid attends to a few near neighbors, ignoring the rest of the flock, and obeys three simple rules:
  - 1. ***Collision avoidance:*** Try not to run into neighboring boids.
  - 2. ***Velocity matching:*** Try to fly at the same speed and in the same direction as neighboring boids.
  - 3. ***Cohesion:*** Try to stay close to neighboring boids.
- A bird interacts with a fixed number of nearest neighbors, regardless of their geometric distance. The number of birds comprising the neighborhood is probably six or seven.

http://www.americanscientist.org/libraries/documents/2010126134858279-2011-01ComputingScience-Hayes.pdf

Homeland Security
Science and Technology

How do they do it?

- Each boid attends to a few near neighbors, ignoring the rest of the flock, and obeys three simple rules:
  - 1. ***Collision avoidance:*** Try not to run into neighboring boids.
  - 2. ***Velocity matching:*** Try to fly at the same speed and in the same direction as neighboring boids.
  - 3. ***Cohesion:*** Try to stay close to neighboring boids.
- A bird interacts with a fixed number of nearest neighbors, regardless of their geometric distance. The number of birds comprising the neighborhood is probably six or seven.

http://www.americanscientist.org/libraries/documents/2010126134858279-2011-01ComputingScience-Hayes.pdf

Homeland Security
Science and Technology

https://www.youtube.com/watch?v=M1Q-EbX6dso

Homeland Security
Science and Technology

IMPLICATIONS FOR HOMELAND SECURITY?

Homeland Security
Science and Technology

AVs Homeland Security Implications

- **First Responders**

Homeland Security
Science and Technology

AVs Homeland Security Implications

- **First Responders**
- The reduction in traffic accidents and the resulting death toll will reshape first responders.

Homeland Security
Science and Technology

AVs Homeland Security Implications

- **First Responders**
- The reduction in traffic accidents and the resulting death toll will reshape first responders.
- Law Enforcement will have less concern over traffic law enforcement

Homeland Security
Science and Technology

AVs Homeland Security Implications

- **First Responders**
- The reduction in traffic accidents and the resulting death toll will reshape first responders.
- Law Enforcement will have less concern over traffic law enforcement
- Fire Fighters' apparatus can be designed to get into more hazardous zones than now possible without risking human life.

Homeland Security
Science and Technology

AVs Homeland Security Implications

- **First Responders**
- The reduction in traffic accidents and the resulting death toll will reshape first responders.
- Law Enforcement will have less concern over traffic law enforcement
- Fire Fighters' apparatus can be designed to get into more hazardous zones than now possible without risking human life.
- Safer ambulances.

Homeland Security
Science and Technology

AVs Homeland Security Implications

- **First Responders**
- The reduction in traffic accidents and the resulting death toll will reshape first responders.
- Law Enforcement will have less concern over traffic law enforcement
- Fire Fighters' apparatus can be designed to get into more hazardous zones than now possible without risking human life.
- Safer ambulances.
- Faster/safer response because V2V moves traffic out of the way.

Homeland Security
Science and Technology

AVs Homeland Security Implications

- **Disaster Response**
- Rescue, surveillance, damage assessment, and delivery of supplies and equipment.

Homeland Security
Science and Technology

AVs Homeland Security Implications

- **Disaster Response**
- Rescue, surveillance, damage assessment, and delivery of supplies and equipment.
- Utility repair vehicles traveling long distances to provide mutual aid will not be subject to the limits of driver duty-time or fatigue.
-

Homeland Security
Science and Technology

AVs Homeland Security Implications

- **Disaster Response**
- Rescue, surveillance, damage assessment, and delivery of supplies and equipment.
- Utility repair vehicles traveling long distances to provide mutual aid will not be subject to the limits of driver duty-time or fatigue.
- Vehicles can refuel autonomously while the crew is eating or resting.

Homeland Security
Science and Technology

AVs Homeland Security Implications

- **Counter Terrorism**
- VBIEDs without the suicide driver

Homeland Security
Science and Technology

AVs Homeland Security Implications

- **Counter Terrorism**
- VBIEDs without the suicide driver
- A new Explosive Ordnance Disposal tool?

Homeland Security
Science and Technology

AVs Homeland Security Implications

- **Critical Infrastructure**
- Reduced congestion => less need for expansion

Homeland Security
Science and Technology

AVs Homeland Security Implications

- **Critical Infrastructure**
- Reduced congestion => less need for expansion
- New road/track configurations?

Homeland Security
Science and Technology

AVs Homeland Security Implications

- **Critical Infrastructure**
- Reduced congestion => less need for expansion
- New road/RxR track configurations?

Homeland Security
Science and Technology

AVs Homeland Security Implications

- **Critical Infrastructure**
- Reduced congestion => less need for expansion
- New road/track configurations?
- Geofencing=> No need for barricades/cones
- V2V, V2I, V2X required for navigation => monitoring infrastructure health => maintenance prioritization

Homeland Security
Science and Technology

AVs Homeland Security Implications

- **Critical Infrastructure**
- Reduced congestion => less need for expansion
- New road/track configurations?
- Geofencing=> No need for barricades/cones
- V2V, V2I, V2X required for navigation => monitoring infrastructure health => maintenance prioritization
- Remote parking

Homeland Security
Science and Technology

AVs Homeland Security Implications

- **Critical Infrastructure**
- Reduced congestion => less need for expansion
- New road/track configurations?
- Geofencing=> No need for barricades/cones
- V2V, V2I, V2X required for navigation => monitoring infrastructure health => maintenance prioritization
- Remote parking
- No parking!

Homeland Security
Science and Technology


© www.AerialPhotosofNJ.com


MALL OF AMERICA

Homeland Security

Science and Technology

Dr. Mitchell Erickson
Mitchell.erickson@hq.dhs.gov

Homeland Security

Science and Technology