Autonomous Detection of Distracted Driving by Cell Phones

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"Anatomy of a Distracted Driving Crash"

Texting increases crash risk by 23 times (www.distraction.gov)

Images Courtesy of VIA

- 2008 - Metropolitan Transit bus driver rear-ended crash.
- The driver was convicted of reckless driving.

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The Evolving Landscape

Professor John W. Senders
Attentional Demand of Automotive Driving"

Automobile Navigation System Lock-out

High-profile loss of life

25 Killed
September 12, 2008

2 Killed
July 7, 2010

1960s — 2000s — 2009 — 2010

"Distracted driving is a deadly epidemic…

Ray LaHood, US Transportation Secretary, First National Distracted Driving Summit.

"Some kind of technology [to detect]…cell phone use"

Senator Jay Rockefeller, Chair Senate Committee on Commerce, Science, and Transportation.

"Federal Leadership on Reducing Text Messaging While Driving"

Executive Order 13513 of October 6, 2009. Federal Register.

Challenges

Driver Distraction: A Review of the Current State-of-Knowledge
DOT, NHTSA report HS 810704, April, 2008

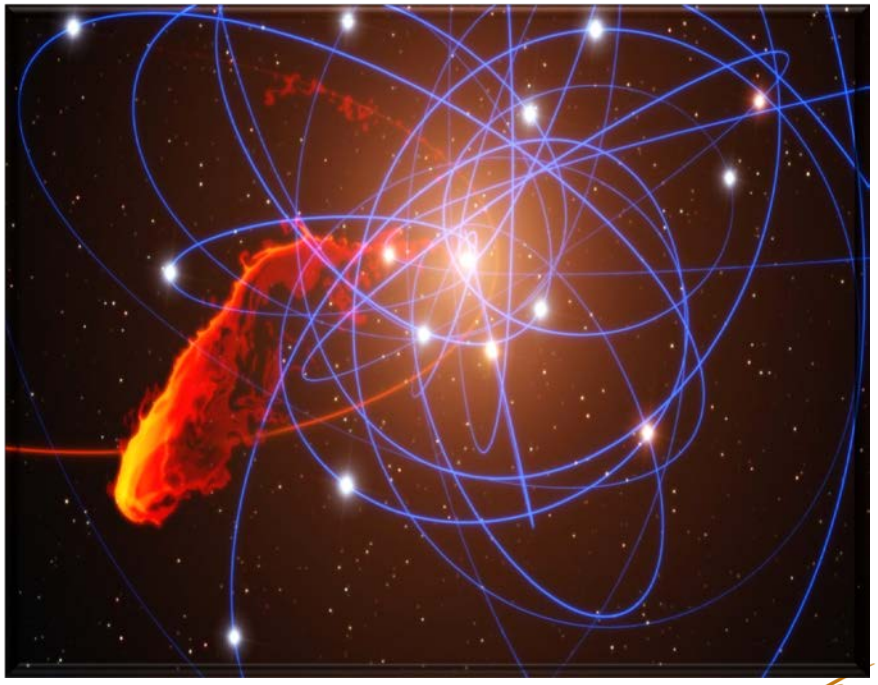
- **The problem will worsen with the increasing use of mobile devices.**
- **Detecting and measuring driver distraction is a major challenge.**
  - Can't be categorized as "yes" or "no"
  - Can't be quantified (i.e. like blood alcohol level).
  - Conventional impairment studies utilize:
    - Observation of drivers, Crash-based studies, Driving performance
- **Onboard technologies for detecting and measuring driver impairment are notoriously difficult.**
  - Eye-glance, lateral vehicle control, longitudinal vehicle control, and object-event-detection.
- **Common countermeasures are not anticipated to be adequate.**
  "Standard behavioral countermeasures, including laws, enforcement, and sanctions, are considered unlikely to be effective…"

When faced with a challenging problem…
....try changing your perspective

Distracted Drivers
&
Cell Phones

Stars & Black Holes ??

The Diner at the Center of the Galaxy
December 30th 2011, NASA.gov



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Conceptual Animation

Click the link under Video(s) on the web page for a qualitative animation of measured dynamics

Normal Texting

Texting + Driving

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Opportunities

- Autonomous - vehicle independent.
- Would not impact a passenger's phone use.
- No additional phone hardware required.
- Language and "text message" independent.
- No need to send data to second party.
- Applicable for alternative device inputs – swype/speech.
- Mitigation actions can be scaled/tailored.
- Useful in detecting other forms of impairment - alcohol, drugs, fatigue, change in medical condition, etc.
- Useful with other "devices" (e.g. machinery).

Examples of Scenarios for Voluntary Use

- Parents paying for their kid's phone service.
- Organizations desiring to enforce phone use policy and mitigate their liability.
- Individuals incentivized by insurance credits.
- Court-required use for "convicted at risk" texters.
- Individuals desiring help to "break the habit".

Looking To the Future

"Behavioral-based"
"Pay per use"
Insurance Premiums

Mobile Service Providers Offer GPS-based App

Very Smart Phones
That help us safely navigate busy lives

2009 2009 2010 2011 ?????

National Organization Youth Traffic Safety

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A Final Thought

If we could detect a drunk driver and, with the flick of a switch, make them sober surely we would…… Likewise, if we can effectively and inexpensively detect a driver distracted by a cell phone and, with the flick of a switch, alert them to their distraction ……..will we ?

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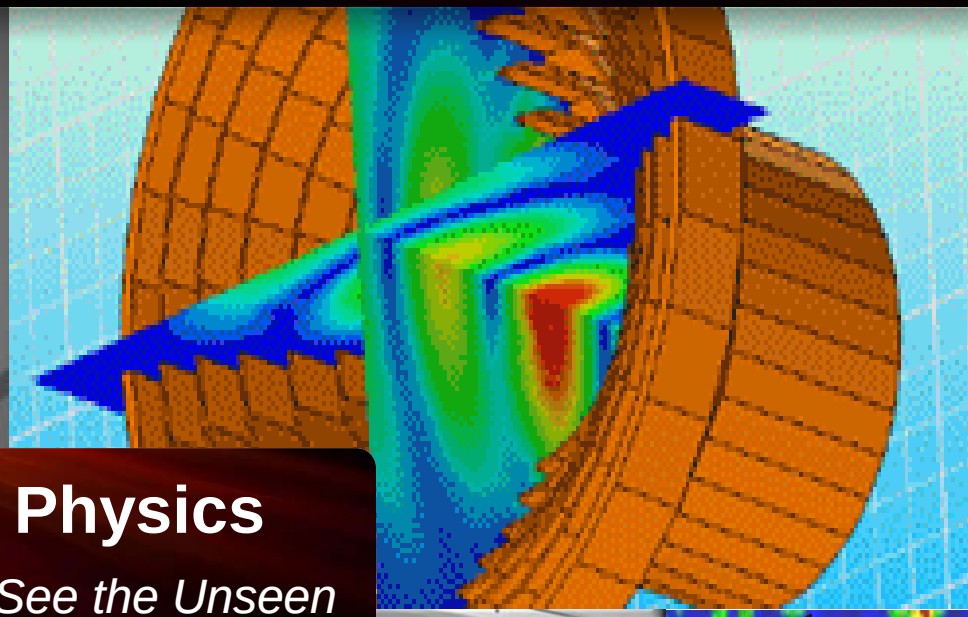
Electromagnetics

Multi-Physics Simulation



Applied Physics

Capabilities to See the Unseen

Acoustics and Ultrasonics

Optics and Spectroscopy

Detecting Distracted Driving by Cell Phones

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