



Drivers' need for information and the problem of distraction

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Outline of the presentation

- Driver needs and “needs” for information
- The role and magnitude of distraction
- What happens in traffic within 5 seconds?
- How to minimize distraction?
 - Specific challenges for in-vehicle design
- Automation solves the problem – or does it?

Drivers' needs & "needs" for information



- Driving related information

- road/environment, other road users, road signs, traffic lights, travel times, incidents, road works, weather ...
- Information related to the vehicle...

- Non-driving related information

- In-vehicle infotainment, incl. social networking
- Discussions, ..., phone calls
- Distraction caused by external sources
- "Office-on-the-wheel"



What is distracting the driver?

- Sources of distraction
 - In-vehicle devices
 - Talking
 - Objects outside the car
 - Anything causing eyes-off or brains-off
- Magnitude of the problem
 - According to NHTSA distraction plays a role in 25% of the police reported accidents
 - According to SWOV 2 – 25%
 - Problem for other road users, too

Distracted Driver Dies After Posting On Facebook About The Song 'Happy,' Taking Selfies

The Huffington Post | by Ryan Grenoble

Posted: 04/28/2014 10:27 am EDT | Updated: 04/28/2014 10:59 am EDT



What is distraction?

According to Merriam Webster dictionary

- *something that makes it difficult to think or pay attention*
- *something that amuses or entertains you so that you do not think about problems, work, etc.*
- *a state in which you are very annoyed or upset*



Distracted driving

(<http://www.distraction.gov/content/get-the-facts/facts-and-statistics.html>)

- The number of people killed in distraction-affected crashes decreased slightly from 3,360 in 2011 to **3,328** in 2012. An estimated 421,000 people were injured in motor vehicle crashes involving a distracted driver, this was a nine percent increase from the estimated 387,000 people injured in 2011.
- 10% of all drivers under the age of 20 involved in **fatal crashes** were reported as distracted at the time of the crash. This age group has the largest proportion of drivers who were distracted.
- Drivers in their 20s make up **27 percent** of the distracted drivers in fatal crashes. ([NHTSA](#))
- Engaging in visual-manual subtasks (such as reaching for a phone, dialing and texting) associated with the use of hand-held phones and other portable devices increased the **risk of getting into a crash by three times**. ([VTTI](#))
- **Five seconds is the average time your eyes are off the road while texting**. When traveling at 55mph, that's enough time to cover the length of a football field blindfolded. ([2009, VTTI](#))

What about 5 seconds on the highway?

- Car 50 km/h 69 m
- A truck 80 km/h 111 m
- A car 120 km/h 167 m



How long would you dare to keep your eyes closed?

Design challenges for In-Vehicle use

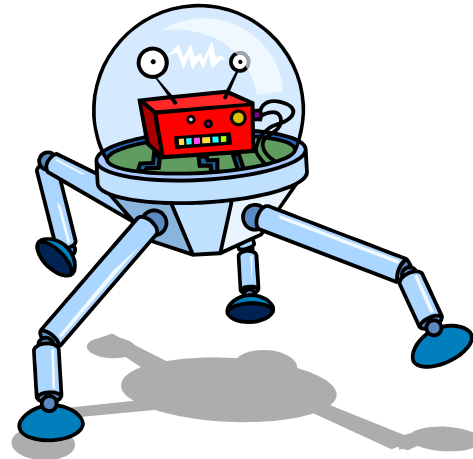
- Primary vs. secondary task
- Touch interactions in the moving car
- Variety of controls: (hard keys, soft keys, touch)
- Overloaded buttons -> deep menus
- Pictograms/symbols
- Voice UI's
- Restricting the functionalities, e.g. car mode
- Different users, different contexts



http://www.cars.justelite.net/wp-content/uploads/2007/10/38_marazm_65390.jpg

Automation helps?

- With automation you can take your eyes, hands, feet and brains off the driving task.
- Or can you?



Levels of automation (SAE)

1. Driver assistance, e.g. ACC, or Lane keeping assistance
2. Partial automation, e.g. ACC+Lane keeping, Traffic Jam Assist
3. Conditional automation, e.g. Traffic Jam Pilot, Automated parking
4. High automation, e.g Highway Driving pilot, driverless valet parking in garage
5. Full automation, e.g. automated taxi, car-sharing repositioning system

Driver's role in various level of automation

1. System supports only one "function", and driver needs to take care of other functions AND monitor the driving environment
2. Driver needs to monitor the driving environment
3. Driver can(?) or at least will multitask when driving, **but needs to be able to take the control when needed**
4. Driver may even sleep, the system alerts if driver is needed to get back on loop again
5. No driver needed



Human factors issues raising/raised

“Why is my car doing that?”

- levels between 1 and 4/5 (modern car versus where you are not driving at all)
- mental model: what the car can and will do in various situations?
 - How do the drivers understand the functionality and especially the limitations?

Today: “I’m in charge....”

Tomorrow: “why is my car doing this...?”

After tomorrow: “ let’s take a nap...”

Thank you!



http://www.autoinfozone.com/car_fun/car_fun_images/ATT000033.jpg



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