

# Reducing distraction with integration and interaction design?

Understanding how different interaction modalities affect driving performance

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# Agenda

- Distraction
- Purpose
- Simulator Study
- Results
- Discussion & Conclusions

# Distraction

- Driver distractions occurs when the driver takes away attention from the primary task of driving due to distractions inside (moving objects in car, adjusting radio/CD, talking on the mobile phone) or outside (events, people, billboards) the vehicle (Stutts et al, 2005).



# Distraction

- “In terms of human cognition, distraction can be defined as misallocated attention” (Smiley, 2005)
- “Driving involves constant and complex coordination between your mind and body. Events or things that prevent you from operating your car safely are distractions” (DMV, Department of Motor Vehicles)

# Distraction & Inattention

- There are four types of distraction
  - Physical
  - Visual
  - Auditory
  - Cognitive
- Driver inattention is a broader term caused by
  - Fatigue
  - Driver related inattention (checking mirrors or blind spots)
  - Non-specific eye glances (not looking at anything in particular)(Neale et al, 2005)



## Distraction & Inattention

- There is evidence that looking away from the road for too long has a negative effect on driver performance, e.g. drivers being in crashes reported having eyes of the road for an average of 2 second. (Klauer et al, 2006).
- Another contributor of degraded driving performance is task completion time, where a linear decrease in driving performance is seen for each second that the driver spends on completing a task. (Gellatly & Kleiss, 2000)



# Purpose

- Reduce task completion time with interaction design and integration
- Focus was to see handling effects of driver performance while performing secondary tasks
- The designed integrated interface should have less negative effect on driver performance and improve task completion times

## Simulator study - Method

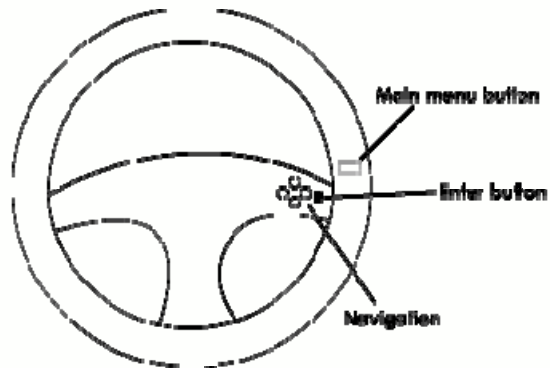
- The Participants consisted of 14 participants - 7 women and 7 men
- Participants were asked to drive three conditions (Nomadic device, Button and Touch Screen)



## Simulator study - Method

- They drove a test session for 10 minutes to get used to the simulator
- They drove an untrafficked country road scenario
- The participants were instructed around 5 min on how the interface worked with both button and touch screen conditions

# Simulator study - Method



## Simulator study - Method

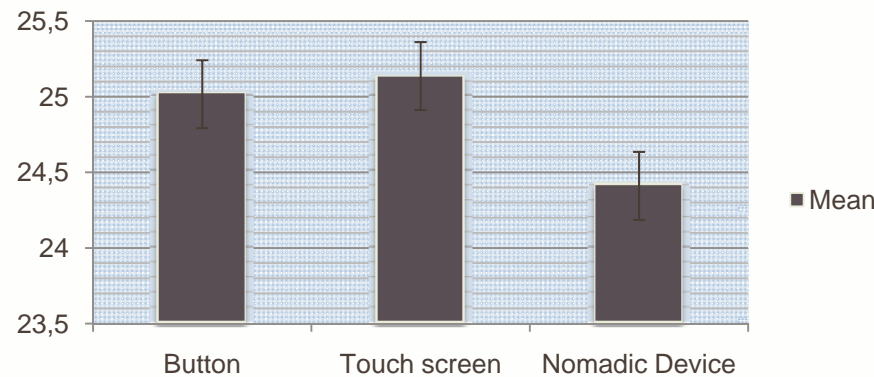
- Performing 7 different tasks
  - Call a person in the most recent used list
  - Look at the newest message
  - Reply that you are busy
  - Call a person from your phonebook
  - Answer incoming call
  - Find a specified song to play it
  - Change mode to play random song

## Simulator study - Method

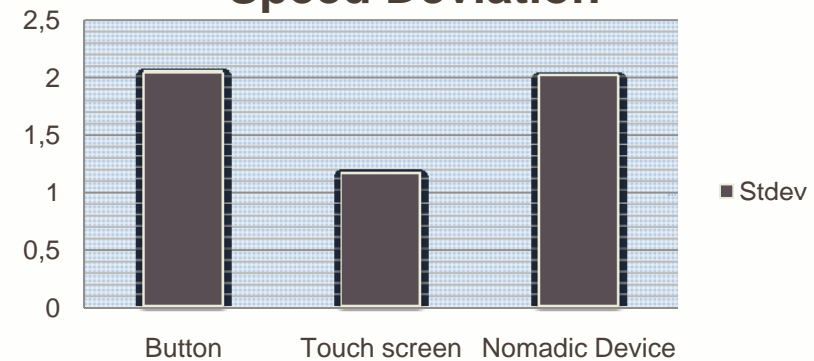
- Drivers' performance was measured in terms of:
  - task completion time
  - Speed mean, Speed deviation
  - lateral deviation, lateral position
  - subjective workload questionnaire (Modified DALI)

# Simulator study - Results

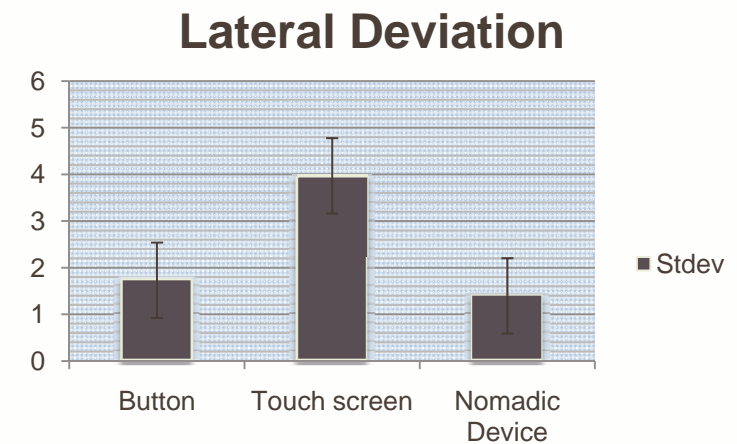
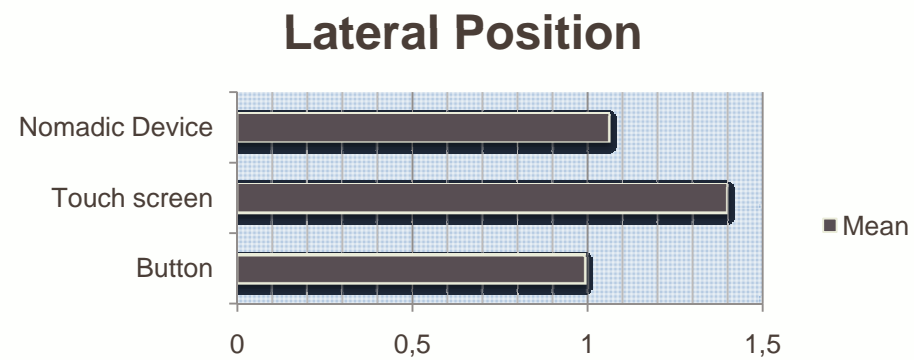
**Speed Mean**



**Speed Deviation**

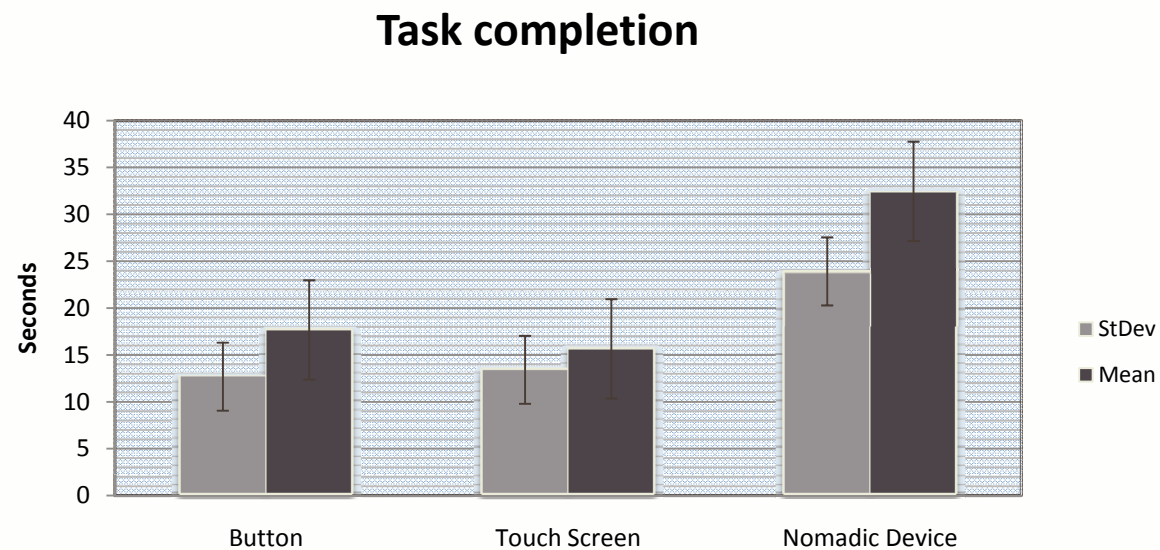


# Simulator study - Results

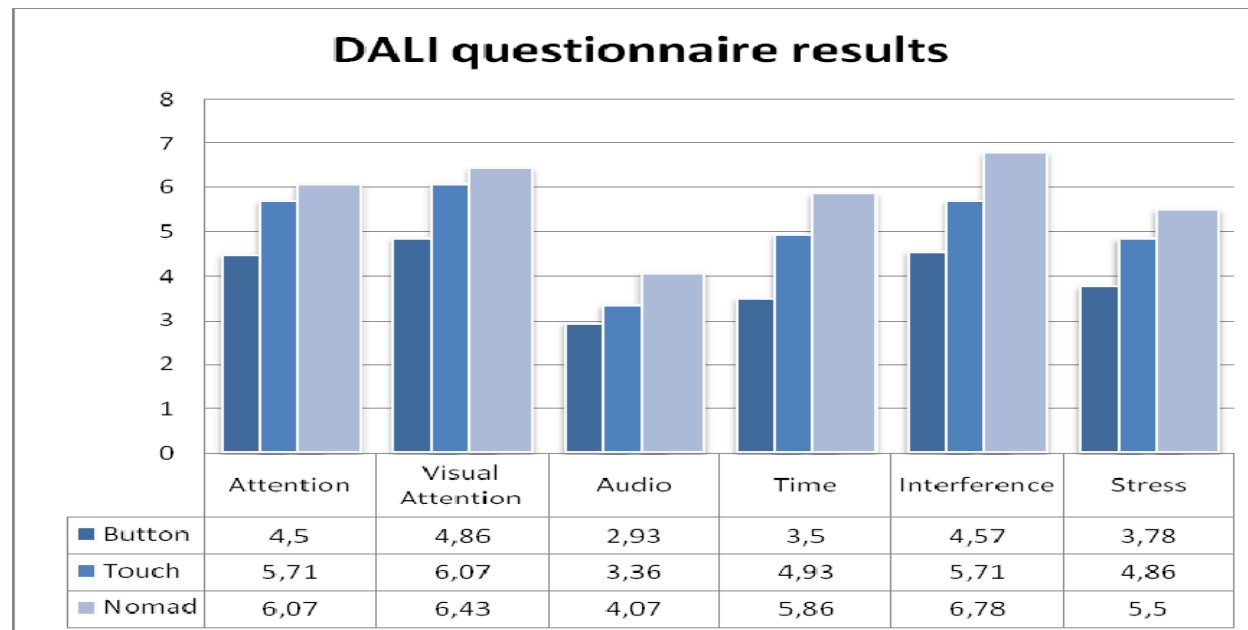




# Simulator study - Results



# Simulator study - Results



## Conlusions

- The integrated interface, with both modalities had improved task completion times.
- Subjective workload results showed that the button condition was the least demanding
- Nomadic device was the most demanding and took the longest to complete tasks

## Conlusions

- An integrated interface may have less negative effects on driver performance compared to hand-held nomadic devices while driving
- More research needed to see how interaction design methodology can improve driver performance

# Thank you!

# Questions?