Personlized Youtube Recommendation
Cross-Cultural Adaptive Driver Navigation Systems

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Motivation

~ Driver navigation systems are very complex systems, they have up to 1000 functions.

~ Inescapable factor: Driving a car is often a matter of life or death.
Driver Navigation Systems

- Positioning module and route planning module
- User guidance and map presentation
- Integration into UI achieved via generic I/O channels (keys, microphone..) and indirect interaction.

Information presented should be suitable for the driver's situation and workload.
Adaptive Driver Navigation Systems

Adaptation: what has to be adapted? (Points of Interest (POI)).

Adaptation information: The number of POI can be adapted according to different cultural preferences of the users.

Adaptation process:

1. Recording and analyzing
2. Inference mechanisms (implement the adaptation performance)
3. Evaluation mechanisms

Adaptation objective: Avoid cognitive overload and low usability.
Adaptive Driver Navigation Systems

Three ways to optimize HMI (Human Machine Interaction)

- Manual Adaptation
- Automatic Adaptivity
- Semi-adaptivity

The knowledge found out about the user must be kept consistent and adequate.

Driver behaviors

- Speed
- Experience
- Gender
Cross-Cultural Adaptive Driver Navigation Systems

~ Culture definition

Behavior and values of a group of people in different contexts. (Nation, Region, Team)

~ The Goal of cross-cultural adaptive system

Make a situation-referential adaptation based on user's cultural background.

~ Driver navigation system depending on driver's cultural background can greatly reduce their mental load.
Cross-Cultural Adaptive Driver Navigation Systems

Cross-cultural adaptivity does not mean personalization but internationalization and localization at a national-cultural level.

User-individual adaptation need a corresponding person-tied identification.

Cross-cultural adaptive HMI applies an identification of the user’s culture.
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Behaviors according to culture can be abstract as

- Information speed (distribution speed and frequency of information)

- Information density (number and distance of information)

- Information order (appearing sequence and arrangement of information)
Drive Navigation System Example
Cross-Cultural Adaptive Driver Navigation Systems

Cultural adaptive interface design

Presentation (e.g. colors, time and date format, icons, font size)
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~ language (e.g. font, writing direction, naming)

<table>
<thead>
<tr>
<th>German</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hallo</td>
<td>Hello</td>
</tr>
<tr>
<td>Gute Nacht</td>
<td>Goodnight</td>
</tr>
<tr>
<td>Entschuldigung</td>
<td>Sorry</td>
</tr>
<tr>
<td>Gut</td>
<td>Good</td>
</tr>
<tr>
<td>Schlecht</td>
<td>Bad</td>
</tr>
<tr>
<td>Ja</td>
<td>Yes</td>
</tr>
<tr>
<td>Danke</td>
<td>Thank You</td>
</tr>
<tr>
<td>Willkommen</td>
<td>Welcome</td>
</tr>
</tbody>
</table>
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~Dialog design (e.g. menu structure and complexity, dialog form, layout, widget positions)

Menu and content dynamic
3 columns, all dynamic
Menu fixed, content & header dynamic
Menu fixed, Content dynamic
4 columns, all dynamic
Menu floating
3 columns fixed centered
dynamic with header and footer

Improvements by Idean. Touch elements provide much more usable flow, i.e. "two tabs in one", better visualisation (and cooler logo), much better logic, more relevant information architecture among other improvements.
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Interaction design (e.g. navigation concept, system structure, interaction path, interaction speed)
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~ Three steps to culturally adaptive

1. Cultural preferences – investigate what must be adapted.
2. Personalization – system modified according to cultural needs of user.
3. Adaptability – detect user preference in different driving situation to adapt the HMI.

~ Broadening Universal Access

Integration three steps adapt to the special needs of many users.
Important Use Cases

destination input (with or without using an input method editor, number and kind of items in list boxes, widget positions etc.)

map displaying (number of points of interest, number of information chunks, etc.)

voice guidance (voice guidance instructions, timing of voice guidance instructions, creation of voice guidance instructions, etc.)

dynamic presentation of information (navigation, cruise or vigilance mode)

other use cases like adaptive speech dialogs, adaptive interaction paths and etc.
Advantage

- Adapting scroll speed of list boxes
- Show the right information
- Anticipative driving
- Changing of light automatically
- Using intelligent automatic gearing
- Choosing routes according to driver's preference
- Compute destination time and optimize computation of routes
- Automatic showing of lanes
- Adaptive memory management
Problems

~ System need much more data to do inference.

~ Knowledge gathered about the user can be Misleading or simply false

~ Legal restrictions also have to be taken into account
It is necessary that the system already has corresponding user-knowledge before the user’s first contact with the system occurs.

Designing an appropriate system can avoid the problems rising due to adaptivity.
Design Principles

~ Adaptation must be comprehensible

~ Frequency of the adaptation should be as low as possible.

~ Haptically usable interaction elements can be attended by verbal output

~ Interruption and resumption of dialogs and interactions has to be possible
Conclusion and Future Research

Cross-culture adaptive driver navigation system adapt to user's special needs based on their own culture background.

Cross-culture adaptation driver navigation system can greatly prevent mental distress and increase expected conformity while can not avoid general problems of adaptive system.

Further research should show how cross-culture adaptation driver navigation system looks like and what is its real benefit.
Reference


~ Towards cultural adaptability to broaden universal access in future interfaces of driver information systems. Rüdiger Heimgärtner, Lutz-Wolfgang Tiede, Jürgen Leimbach, Steffen Zehner, Nhu Nguyen-Thien, Helmut Windl.
Thanks for your attention

Any Questions?