Agenda

• User interfaces - Challenges
• EB’s Complete UI Package
• The In-Car User Platform (ICUP)
  EB GUIDE Tool
• Augmented Reality Creator
• Summary
Gradual Evolution

Purely mechanical, rudimentary

Infotainment

First phones
© Geoffrey C. Fors 2005; 
http://www.wb6nvh.com/MTSfiles/Carphone3.htm

Partially automated, touchscreens
Increasing Complexity of User Interfaces

- Autonomous driving
- Connected cars
- Multiple technologies, disparate systems
- Product development cycles
- Usability and personalization
- OEM brand image
Smart User Interfaces for Connected Cars

Demand for New Technologies

Extendable | Hybrid | Adaptive | Personalized | Smart

Digital cluster instrument + navigation + speech
Augmented reality + predictive navigation

3D cluster instrument + system alerts
Multiple displays + infotainment
Our Solution: The Complete Package

PLATFORM
Reference UI & apps | Navigation | Self-learning HMI | Smart Voice Assistant

TOOLS
EB GUIDE Studio | EB GUIDE Speech Extension

FRAMEWORKS
EB GUIDE GTF | EB GUIDE STF | AR Creator
In-Car User Platform (ICUP)

• Base platform for in-car infotainment and information displays
• Customizable
• Shorter implementation cycles
In-Car User Platform Architecture

HMI layer
Application layer
Service layer
Libraries & framework (e.g. GTF)
RTOS (e.g. Integrity, QNX)

HMI layer
Application layer
Service layer
Libraries & framework (e.g. GTF)
OS (Android)

Hypervisor or multiple SoCs
Detailed Architecture for One Partition

- **HMI layer**
  - Navigation
  - Media
  - Phone
  - Tuner
  - ...
  - XYZ

- **App layer**
  - Navigation
  - Media
  - Phone
  - Tuner
  - ...
  - XYZ

- **Service layer**
  - Destination Entry
  - POI
  - Traffic
  - MP3
  - Connectivity
  - ...
  - ABC
  - Map
  - Route Calculator
  - Guidance
  - Spotify
  - TTS
  - ...
  - XYZ

- **FWK & libraries**
  - Service Broker
  - Service Discovery
  - IPC
  - OSAL
  - Persistency
  - Device abstraction

- **Others**
  - OpenGL ES
  - Web kit
  - GTF
  - STF
  - Display mgmt.
  - Notification mgmt.
  - Layout mgmt.
Reference User Interfaces

- Holistic HMI
- Supports multiple displays and modalities
- Seamless content synchronization between displays
- Customization
Multimodal Tool

Graphic user interfaces
2D | 3D | Composition | Interaction | Animation

Voice user interfaces
Natural Language Understanding (NLU) | Connected Speech Recognition | Hybrid Speech
• Multimodal HMI (haptic, touch, speech, gesture) development
• Complex user interfaces
• One tool for cross-team collaboration
• WYSIWYG
• 3D graphics, animations, effects
• Platform agnostic
Multiple Display Support

- Across multiple displays
  - Model user interfaces
  - Synchronize content

- Single toolchain (EB GUIDE 6)
- Single and distributed multi System on Chip (SoC) solutions

- Modeling of modality, resolution, and aspect ratio changes
Today – One GTF instance/process monolithic HMI using a single model
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Next step – Multiple GTF instances/process non-monolithic HMI using multiple models
Goal – Multiple GTF instances/process non-monolithic HMI using multiple models

Smart User Interfaces for Connected Cars

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EB GUIDE 6 Speech Extension

- Single toolchain approach
- Intuitive system responses and interactive dialogues
- Test directly on the tool

- Cloud-based
- Customizable
- Platform agnostic
Smart Voice Assistant

The personal assistant in the car – the new travel companion | Driver and passenger centric | Navigation | Alerts and updates
Self-Learning HMI

- Automatically executes non-driving related tasks:
  - Usage-sensitive HMI
  - User-sensitive HMI
  - Context-sensitive HMI
- Minimizes user distraction
- Increases user trust in vehicle
Predictive Navigation

• Self-learning navigation – frequently used routes and destinations

• Real-time guidance and enhanced vehicle control

• Multiple driver profiles, map data providers, data encryption
Augmented Reality Creator

- Cruise control
- Manual takeover
- Route guidance
- Lane guidance

Manual driving in 3 seconds
Augmented Reality Creator Architecture

- **Sensors**
  - Camera
  - Radar
  - Gyro
  - Odometer
  - Accelerometer
  - GPS

- **Data Fusion**
  - Lane Fusion
  - Object Fusion
  - HD Positioning

- **Prediction**

- **EB GUIDE GTF**
  - EB GUIDE Studio
    - Lane departure view
    - ACC view
    - Navigation view
    - 3D Rendering

- **Head Up Display**

- **Guidance Information**

- **Electronic Horizon (ADASIS, PSD ...)**
Summary

From human machine interfaces to human machine relationships

User experience
• Deliver personalized user experiences with multimodal HMI
• Offer holistic HMI experience and OEM branding

Intelligent UI
• Learn about user in context
• Adapt to user preferences
• Offer user context-specific information

Safety and trust
• Minimize user distraction
• Increase user trust in vehicle
• Provide the required functional safety levels
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