Emotive Driver Advisory System (EDAS)

Oleg Gusikhin
Ford Research & Advanced Engineering
Dearborn, Michigan, USA

Research and
Advanced Engineering

Outline

- Introduction
- Background and Ford SYNC
- Emotive Driver Advisory System
  - Emotive Spoken Dialogue System
  - Avatar as an Advanced Automotive HMI
  - Cloud-based Infotainment
- Marketing & Business Impact

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Ford Motor Company

- Global automotive industry leader based in Dearborn, MI.
- Manufactures and distributes automobiles in 200 markets across six continents.

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Ford Brands 2010

Ford Technology

Ford SYNC

MyFord Touch

Ford Research & Advanced Engineering

Manufacturing, Vehicles Design & Safety Research Lab

- Information Services & Connectivity

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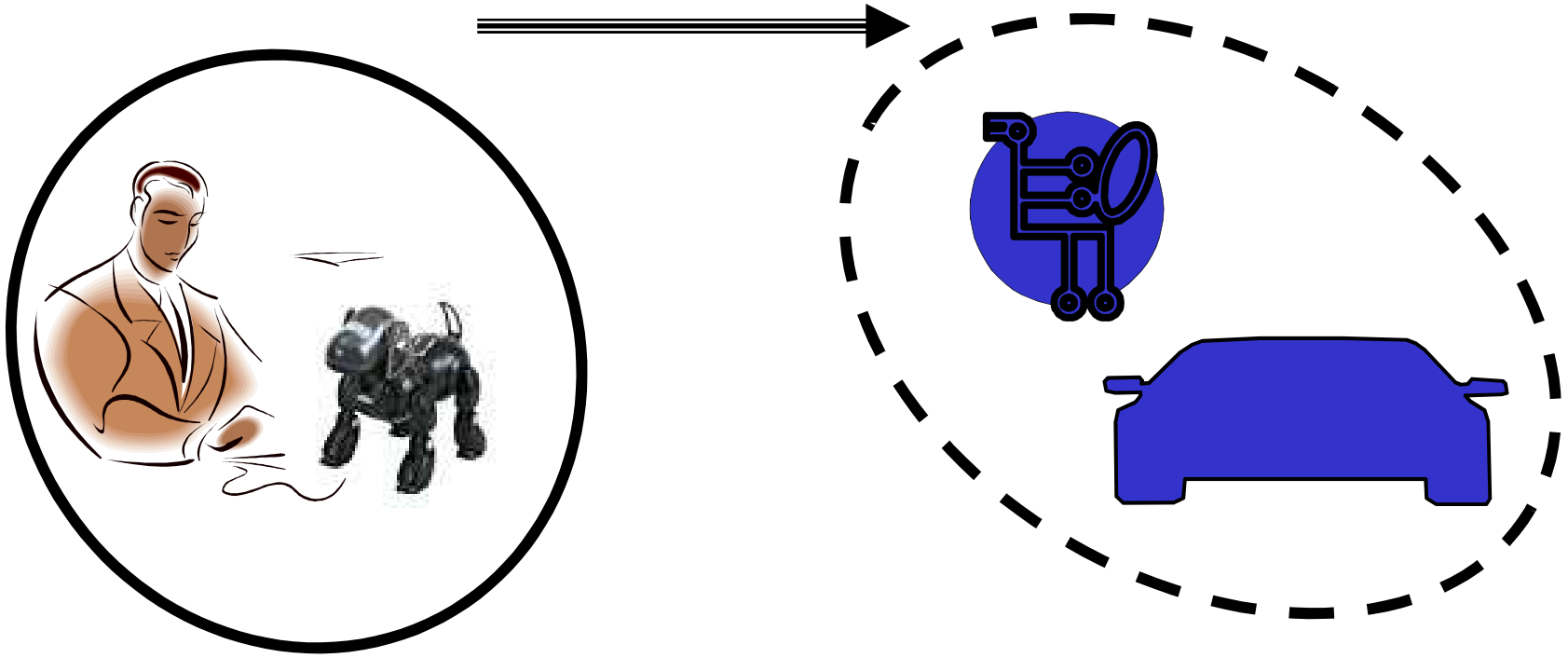
The Challenge

Aibo

Emotive Driver Advisory System (EDAS)



Emotions in Engineering

- Affective (Kansei) Engineering
  - a method for translating feelings and impressions into product parameters

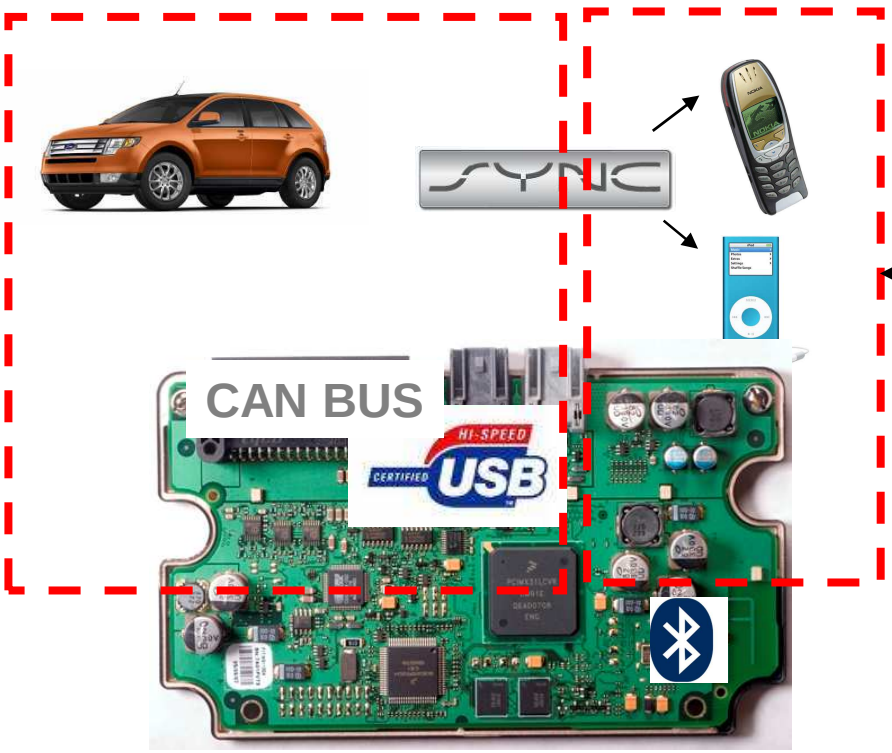
- Affective Computing
  - design of systems and devices that can recognize and/or simulate human emotions

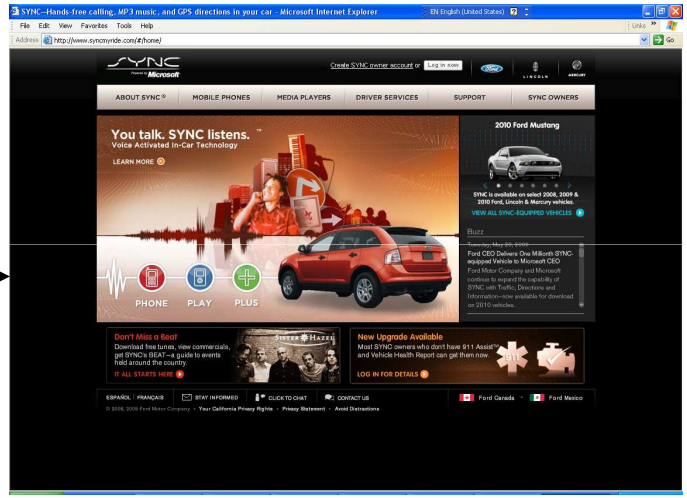
Emotive Driver Advisory System

- **Natural Interface**
- **Personalization**
- **Customization**
- **Context-Awareness**
- **Adaptable Interaction and Intelligence**
- **Seamless Integration of Vehicle Infotainment and Cloud-based Services**

Ford SYNC

(CAN & USB) (Bluetooth) www.syncmyride.com





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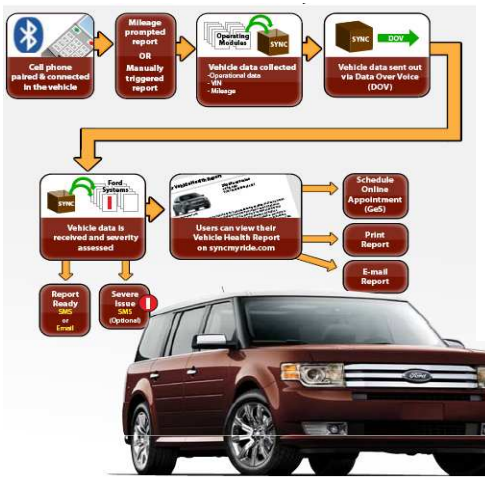
SYNC Services

- Standard Services
  - ✓ 911 Assist
  - ✓ Vehicle Health Report
- Subscription Services
  - ✓ Traffic
  - ✓ Directions
  - ✓ Business Search, News, Sports, Weather



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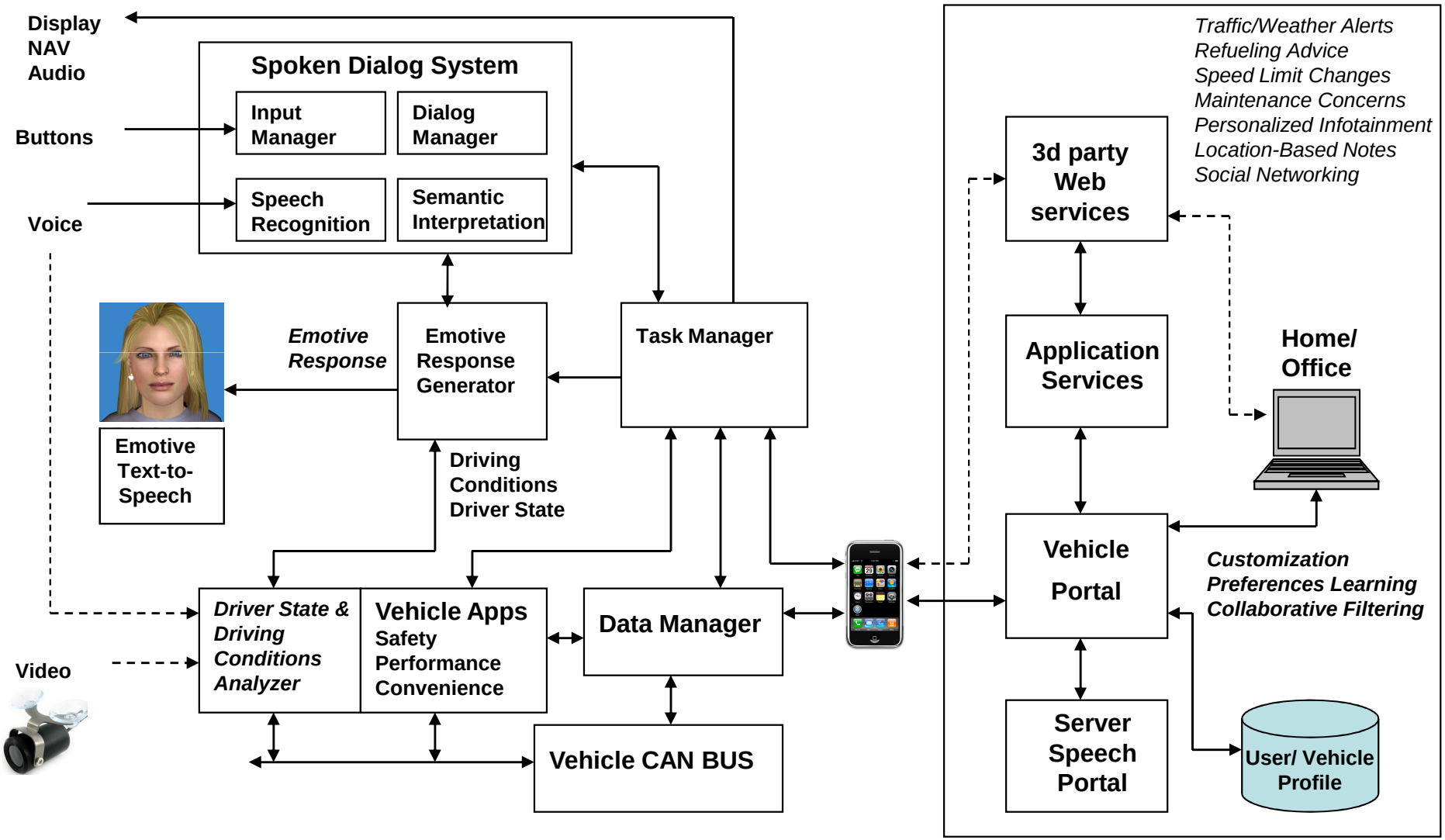
EDAS Overview



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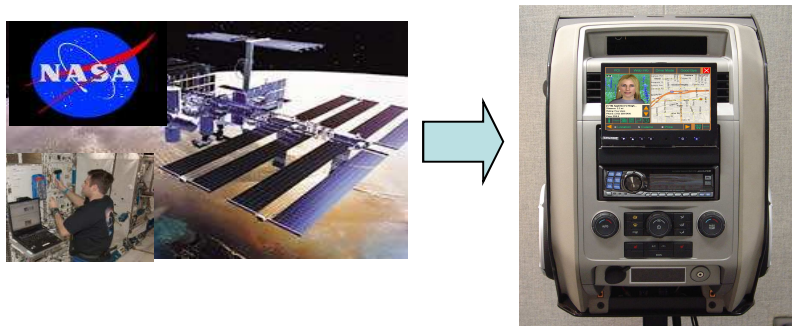
Spoken Dialogue System (SDS)

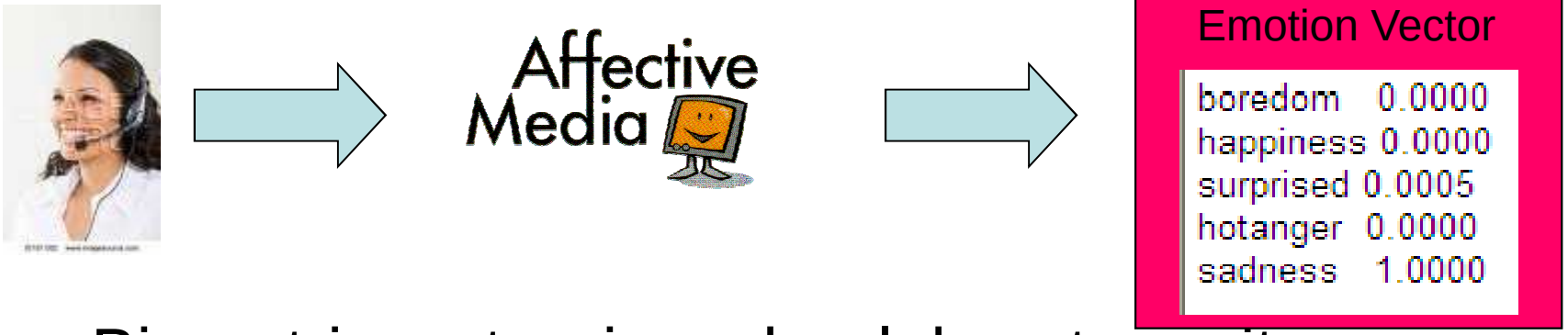
- Conversational
- Communication does not need to be hierarchical / menu driven
- Supports Open Mic / Push-to-Talk
- Multimodal (speech and/or button based interaction)
- Context aware & emotive dialogue



Emotion Recognition of Driver

Ways to detect emotions:

- Facial expressions: captured by camera
- Voice: input through microphone



- Biometrics: steering wheel, heart monitor
- Vehicle operating pattern: aggressiveness, workload

Emotive Conversational Dialog

Key Word Dialogue Interface

keyword

Speech Recognition: converts recognized key word to text

keyword

Dialogue Manager

Output Manager

Conversational Dialogue Interface

Natural phrase

Speech Recognition: acoustic + language models

words

Input manager: Semantic interpretation

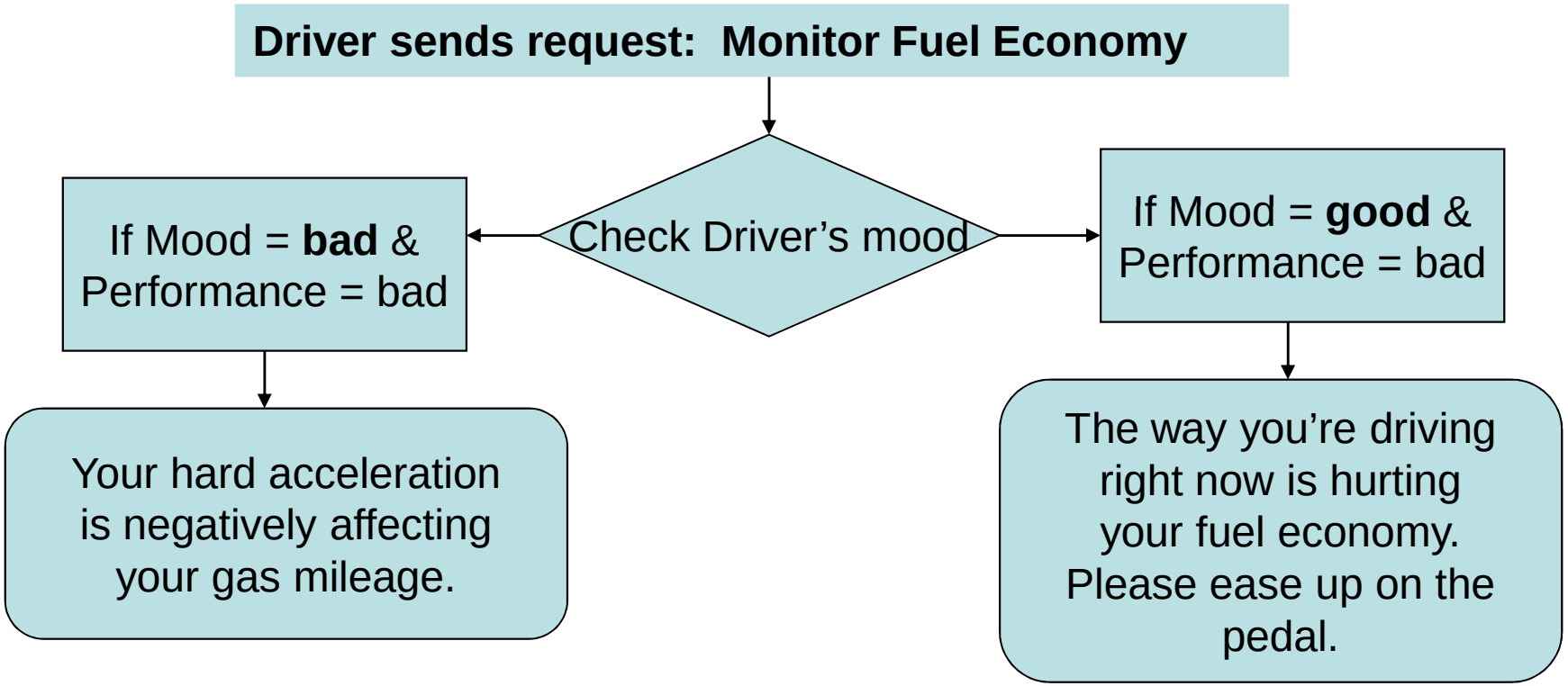
emotions

Dialogue Manager

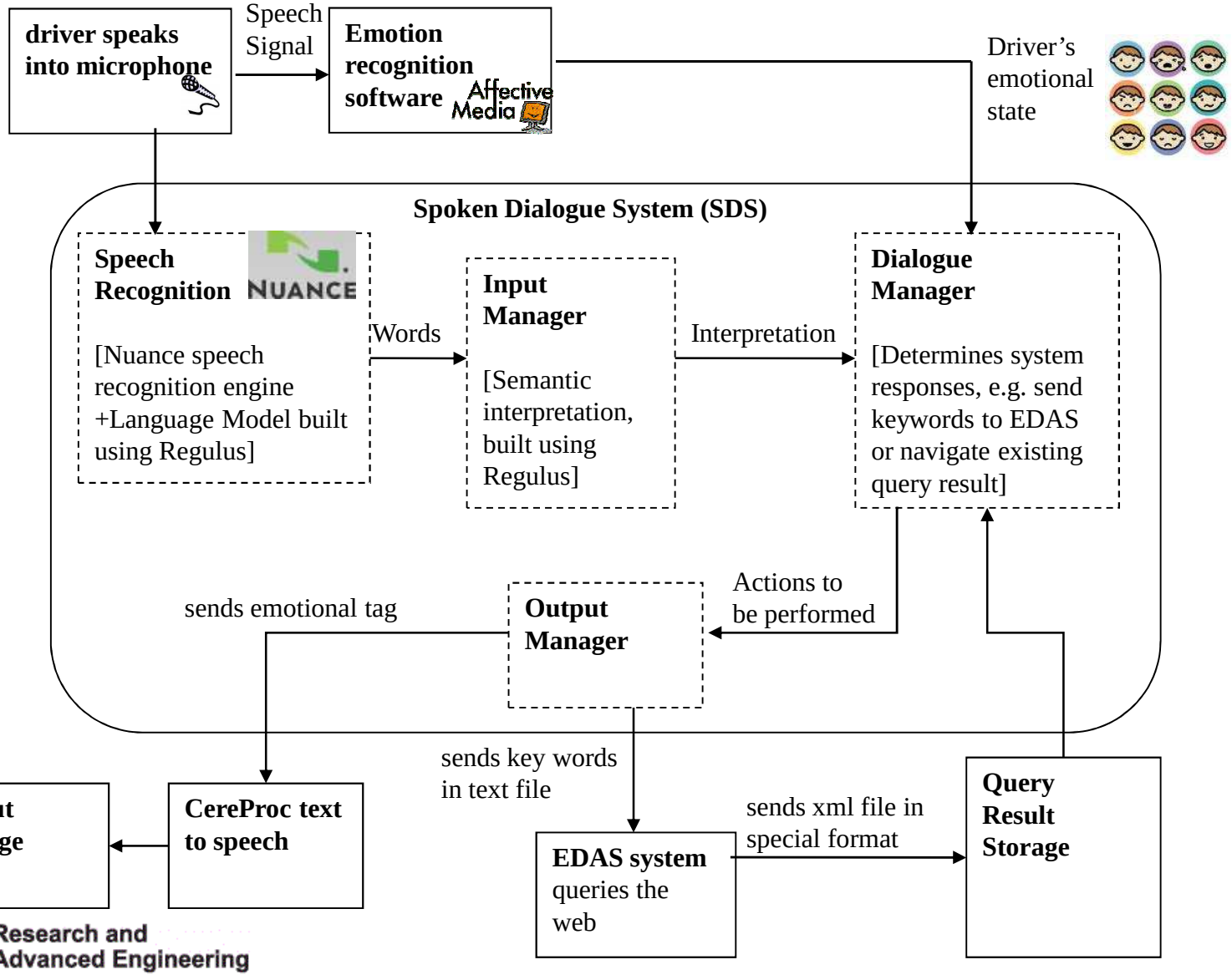
Output Manager

Emotion-based dialogue strategy

Using Driver's Emotions to Modify Responses



Dialogue Interface Architecture



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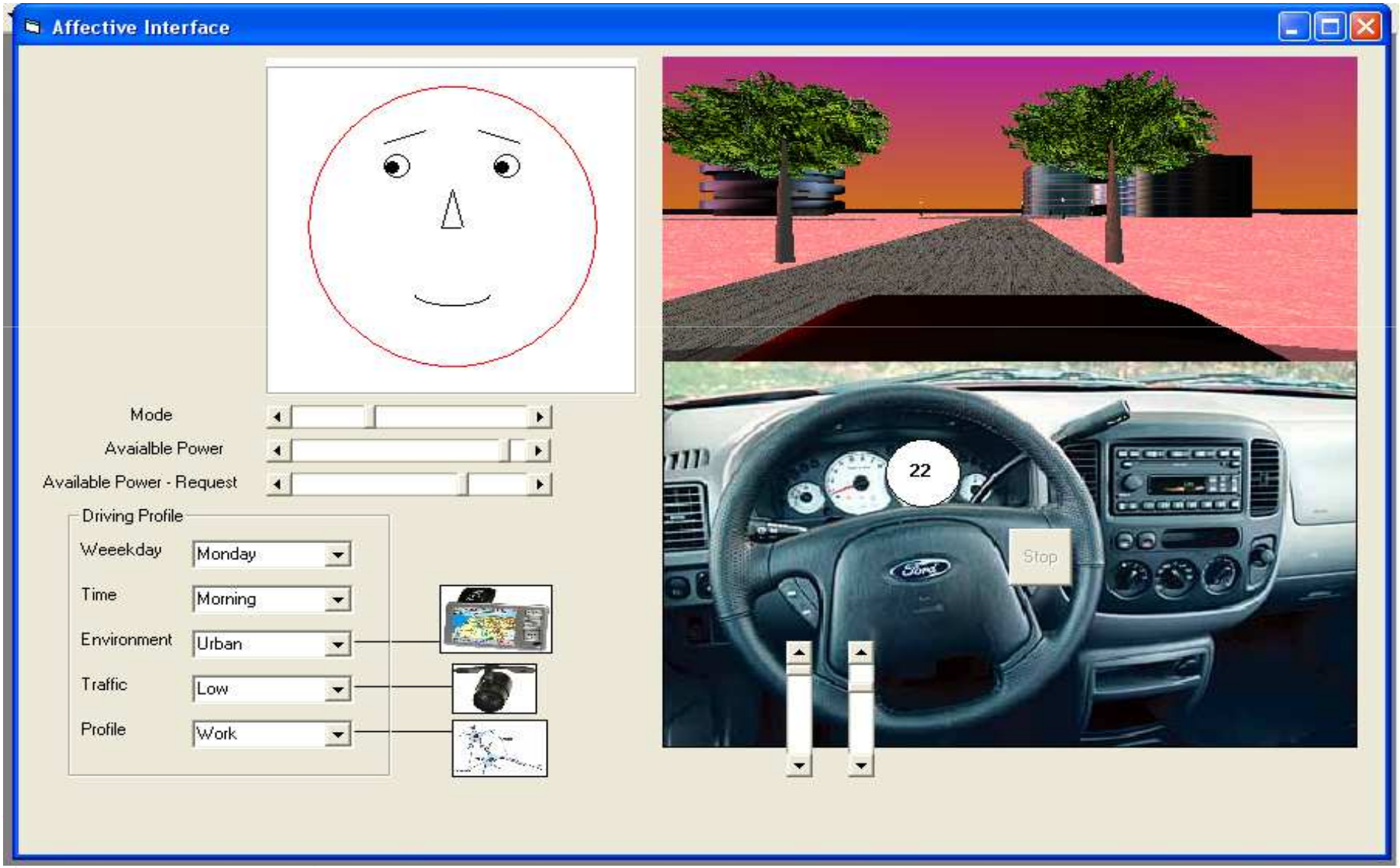
Motivation for Avatar

- Universal Multivariate Gage (Chernoff Face)
- Reference Point of Vehicle Intelligence
- Agent of Customization
- Emotive Supplement to Text-to-Speech
- More natural interface

EDAS Prototype 2005



Avatars

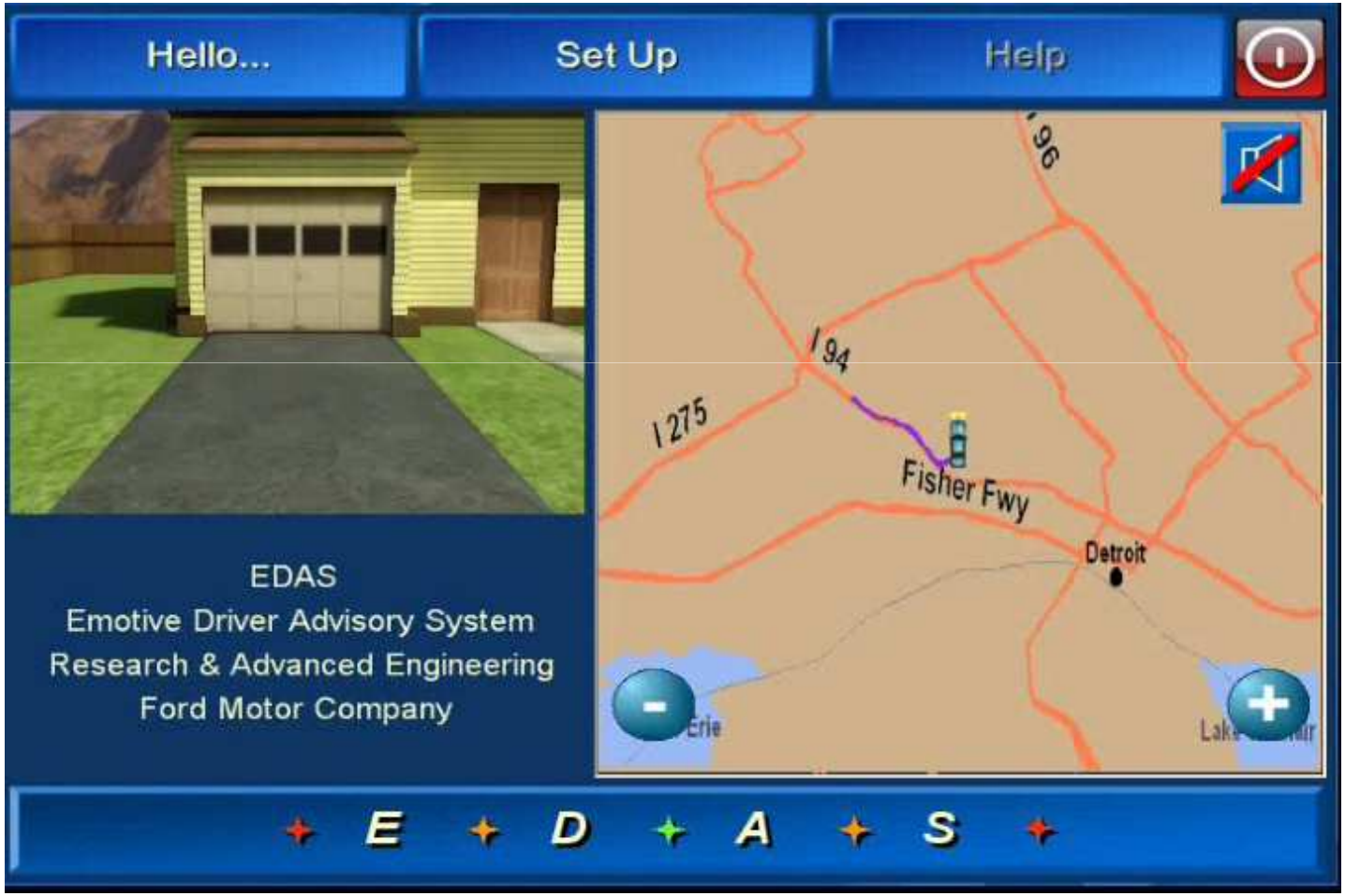
Customizable Avatars, Voices, Names, & Background Scene

Ford Research and Advanced Engineering

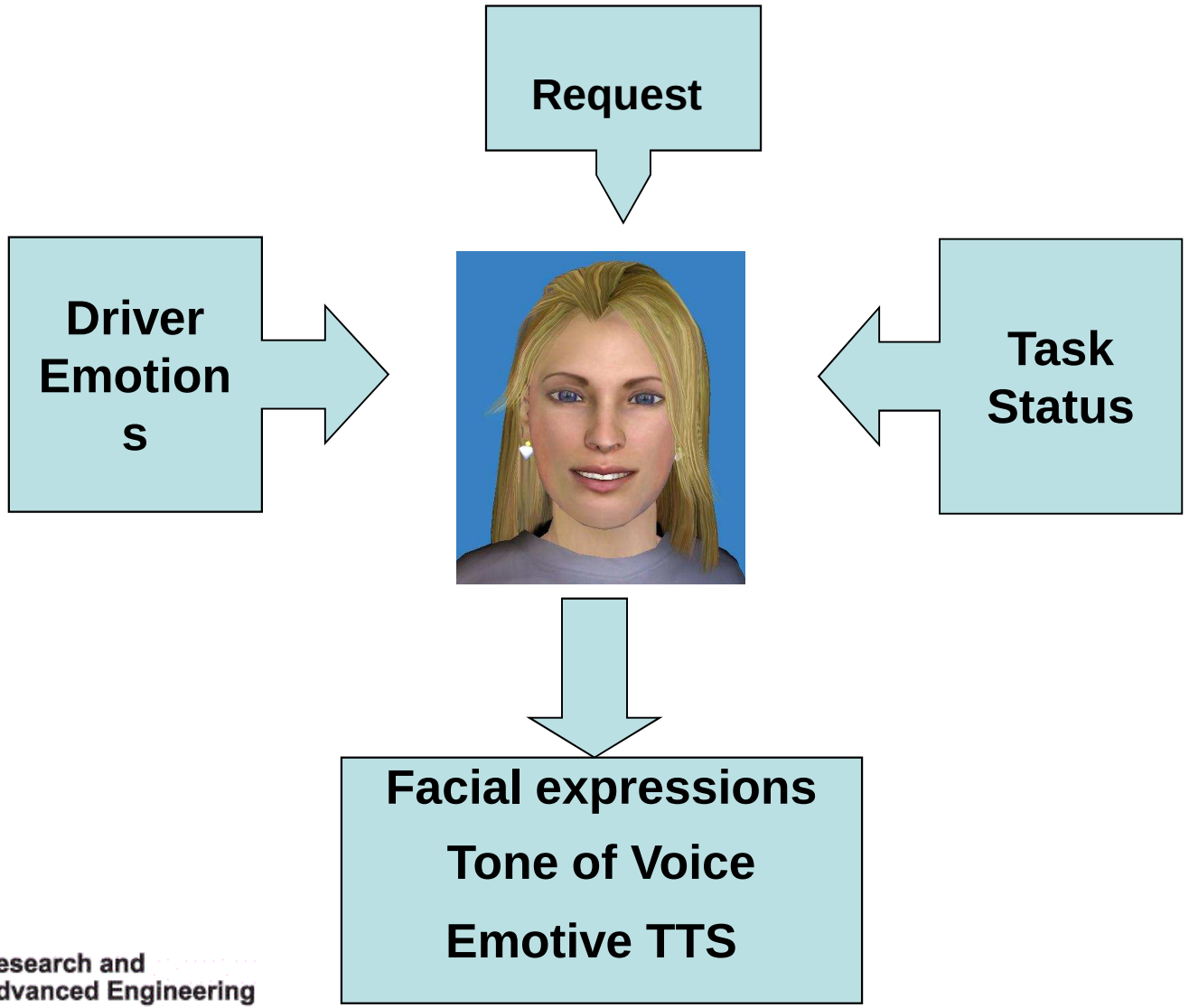
Jackie


Hello...
Set Up
Help
EDAS
Emotive Driver Advisory System
Research & Advanced Engineering
Ford Motor Company
I 94
I 696
I 275
Fisher Fwy
Detroit
Erie
E D A S

Toby Shouting



Output Responses from Avatar



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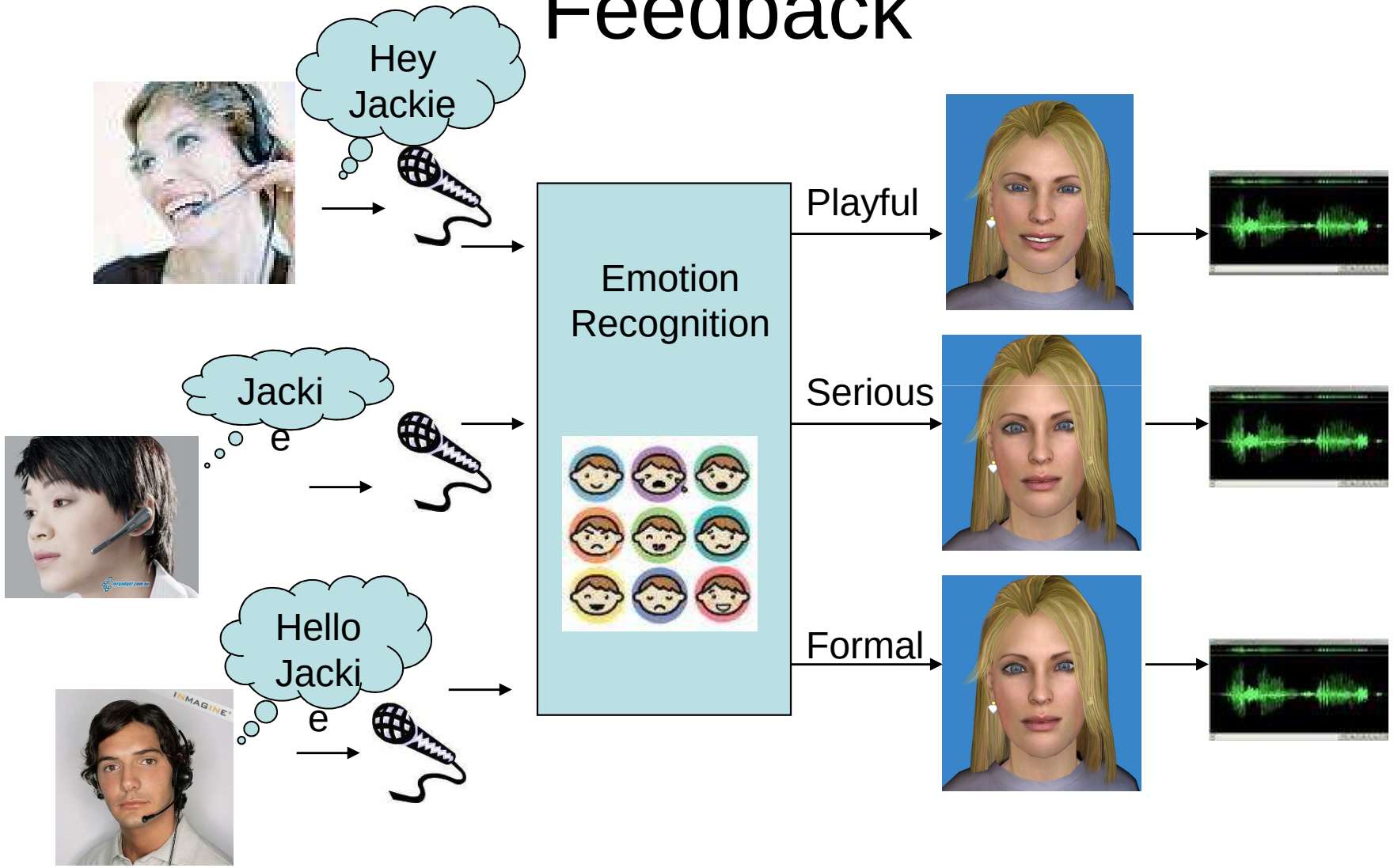
Emotion Recognition & Emotive Feedback



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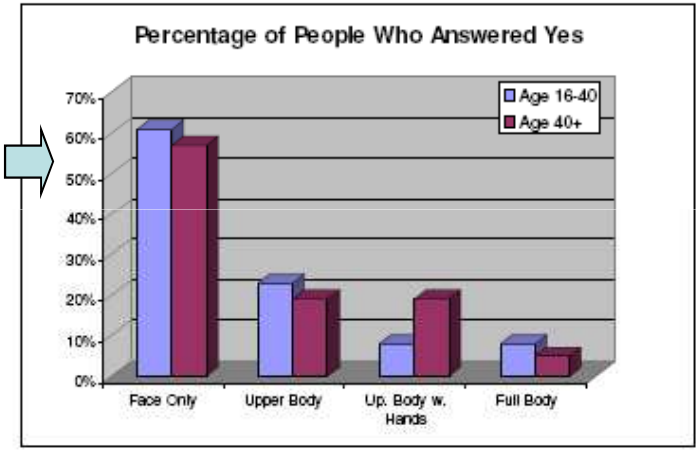
Example clinic results

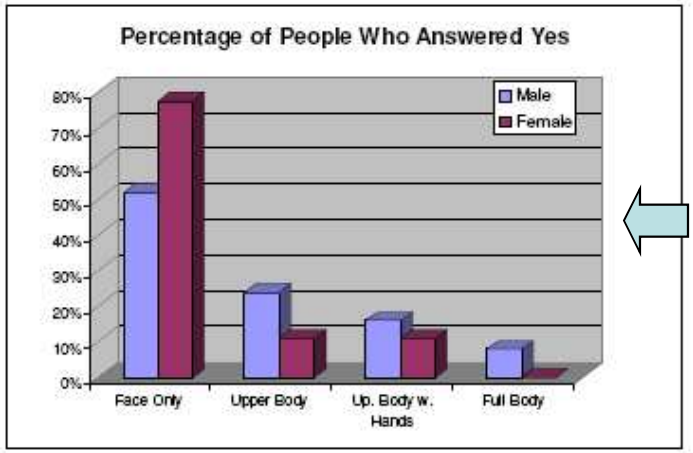
Question 1: If the avatar is human, what is the minimum you like it to appear?

Answers Sorted By:

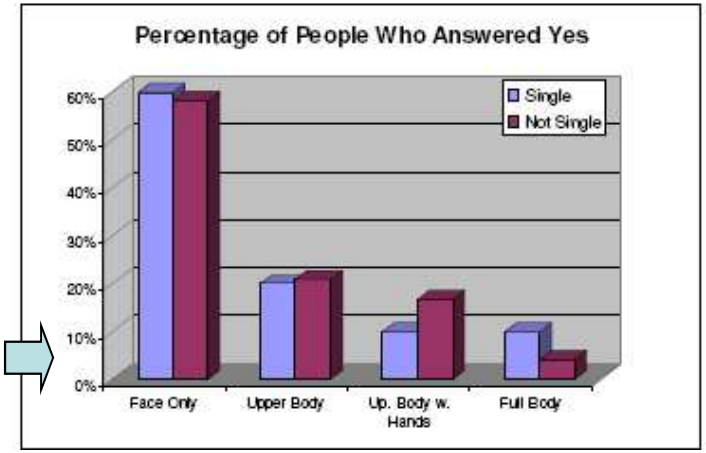
•Age Group



•Gender



•Single or Not



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Benefits of Integration of Vehicle Infotainment and Cloud-based Services

- Enable on-demand, personalized infotainment services
- Access to real-time information
- Enable continuum of personalized information and entertainment services between on-vehicle and off-vehicle activities
- Utilize power of social network collaborative filtering in recommendation services
- Outsource Computing Power to Remote Server
- Simplify maintenance and upgrade of infotainment applications

Examples of EDAS Services

- POIs
- News
- Music
- Refueling advice

POIs & News

- POIs
  - Facilitates Social Network Collaborative Filtering – based Recommendations
  - Allow consolidation of relevant information scattered throughout the internet for enhanced decision analysis and support
- News
  - Personalized Interactive News Radio
  - Support Continuum of Personalized Information Services between in-vehicle and off-vehicle environment

POI & NEWS Services DEMO

Personalized Music Radio

Existing In-Vehicle Music Services

Private Collection

Broadcast

Personalized Music Radio

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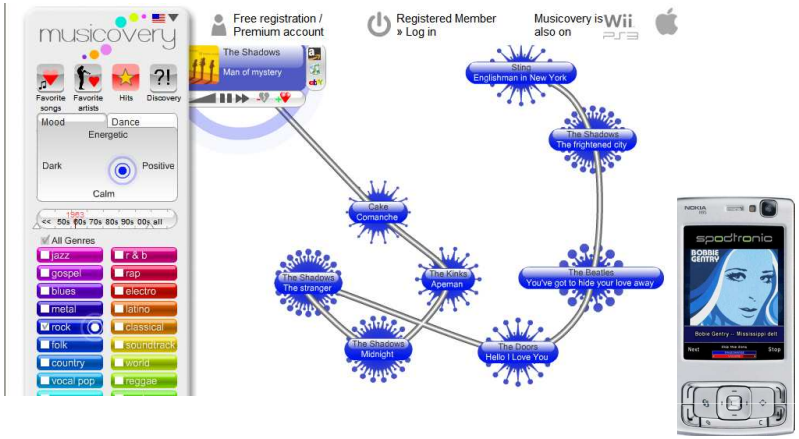
Internet Personalized Music Services



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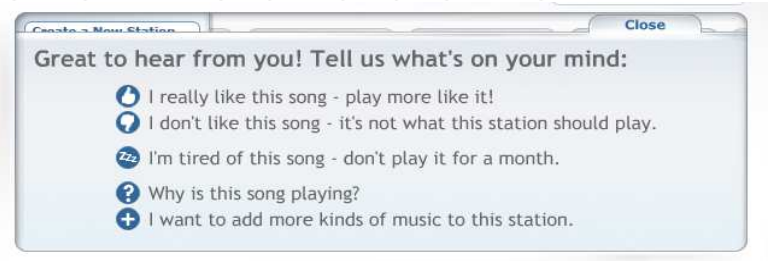
Pandora Music Radio

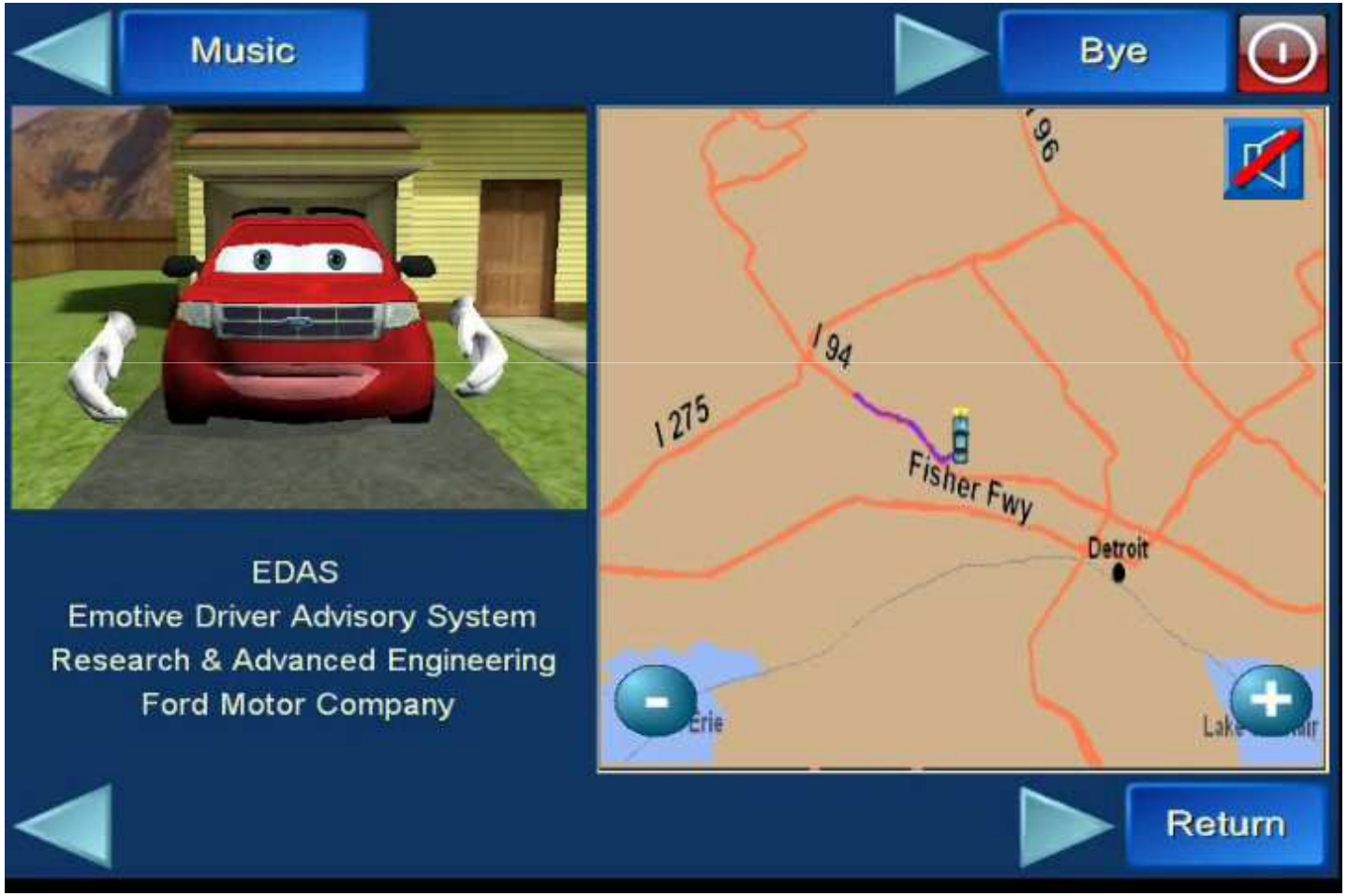
- Creates custom stations based on artists or individual songs

- Learns preferences by analyzing the musical qualities of songs listener like and dislike



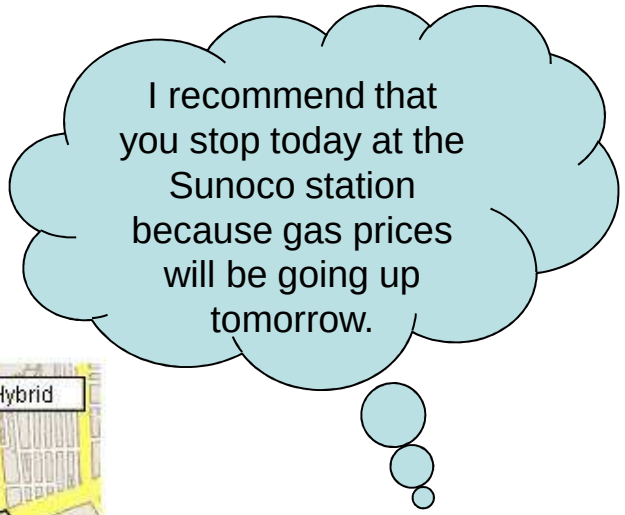
- Plays Music that matches personal preferences using AI and song genome database for song selection

EDAS Pandora Player

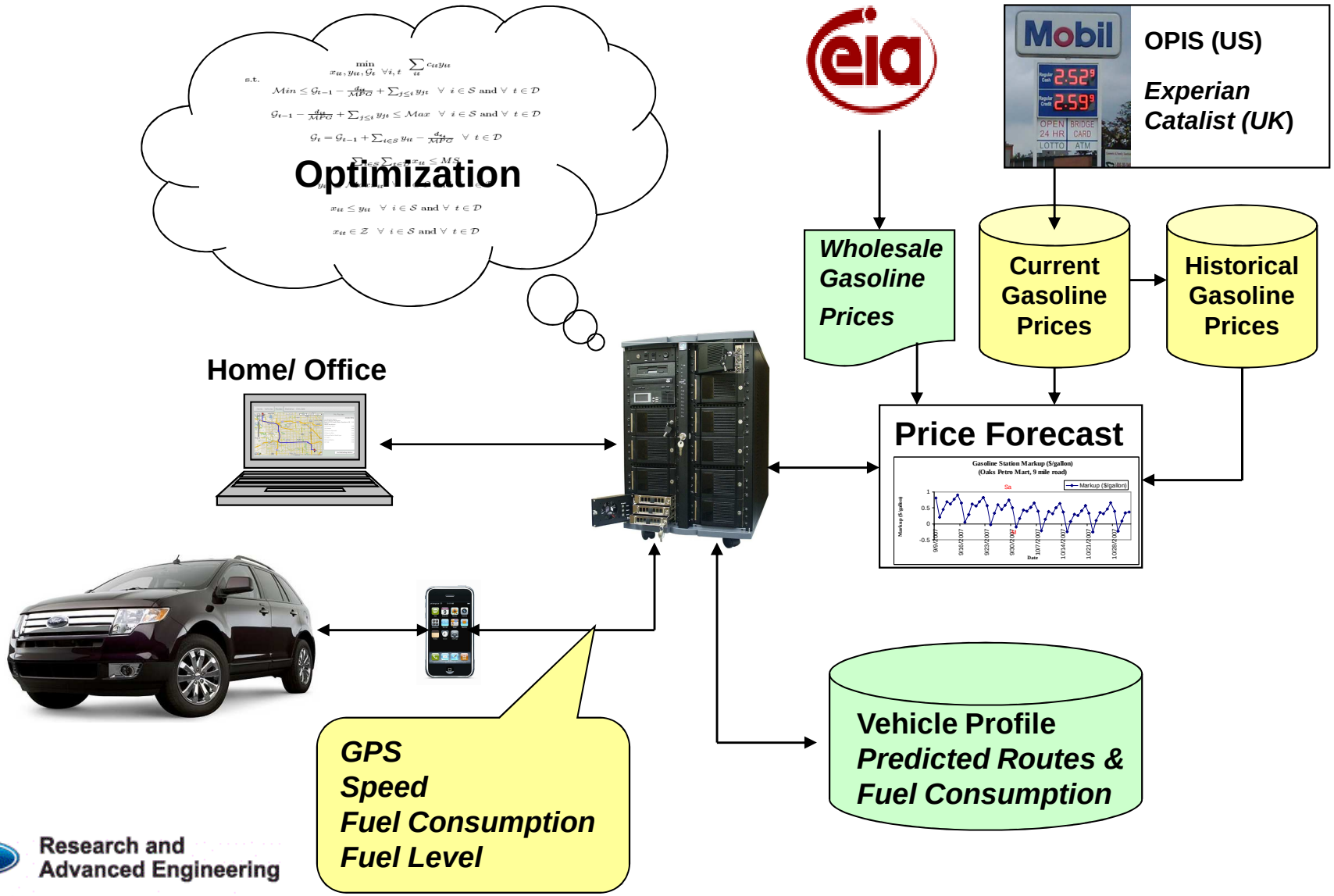


Intelligent Refueling Gauge

- Given a set of routes over a time period
  - When to buy gas
  - Where to buy gas
  - How much gas to buy



System Architecture



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EDAS at CES & NAIAS 2009

01:19 January 10th, 2009

CES: Ford turns hip with Eva

Posted by: Anupreeta Das

Post a comment

Tags: Mediafile, Autos, Big 3 auto, cars, CES, Ford, Microsoft, Sync

Ford CEO Alan Mulally unveiled new features of its voice-command activated in-car system Sync yesterday at the Consumer Electronics Show in Las Vegas, highlighting its connectivity with a driver's other devices, including cell phones and personal computers.

Mulally then showed off a futuristic dashboard featuring an electronic personal assistant, Eva (for Emotive Voice Activation). In a small video clip of how it could all work, the Eva avatar engaged the driver in conversation and performed tasks like scheduling appointments. It's the next generation of Ford's Human Machine Interface (HMI) strategy, Mulally said.

EDAS Media Coverage

US Patent Application No: 2009/0063,154
EMOTIVE TEXT-TO-SPEECH SYSTEM AND METHOD

Details

Back to Patents

EMOTIVE TEXT-TO-SPEECH SYSTEM AND METHOD

Inventors: **Gusikhin, Oleg Yurievitch**; **MacNeille, Perry Robinson**; **Klampfl, Erica** ; **Theisen, Kacie Alane**; **Filev, Dimitar Petrov**; **Chen, Yifan** ; **Tonshal, Basavaraj**
Assignee: Ford Global Technologies, LLC Abstract Text: Information about a device may be emotively conveyed to a user of the device. Input indicative of an operating state of the device may be received. The input may be transformed into data representing a simulated emotional state. Data representing an avatar that expresses the simulated emotional state may be generated and displayed. A query from the user regarding the simulated emotional state expressed by the avatar may be received. The query may be responded to.
Publication Date: Mar 5, 2009
Application Filed: Nov 5, 2008
International Classifications: G10L

Don't tell ME how to drive! - Next-gen Ford navigation system could have "emotions"

by **Dan Roth** (**RSS feed**) on Mar 10th 2009 at 3:58PM

SUNDAY, MARCH 8, 2009

Ford Patent App Hints Next Gen Navi Systems Won't Talk to You if You're Angry

On March 5, 2009 the PTO published a patent application assigned to Ford Global Technologies entitled "Emotive Text To Speech System and Method. The app can be viewed here.

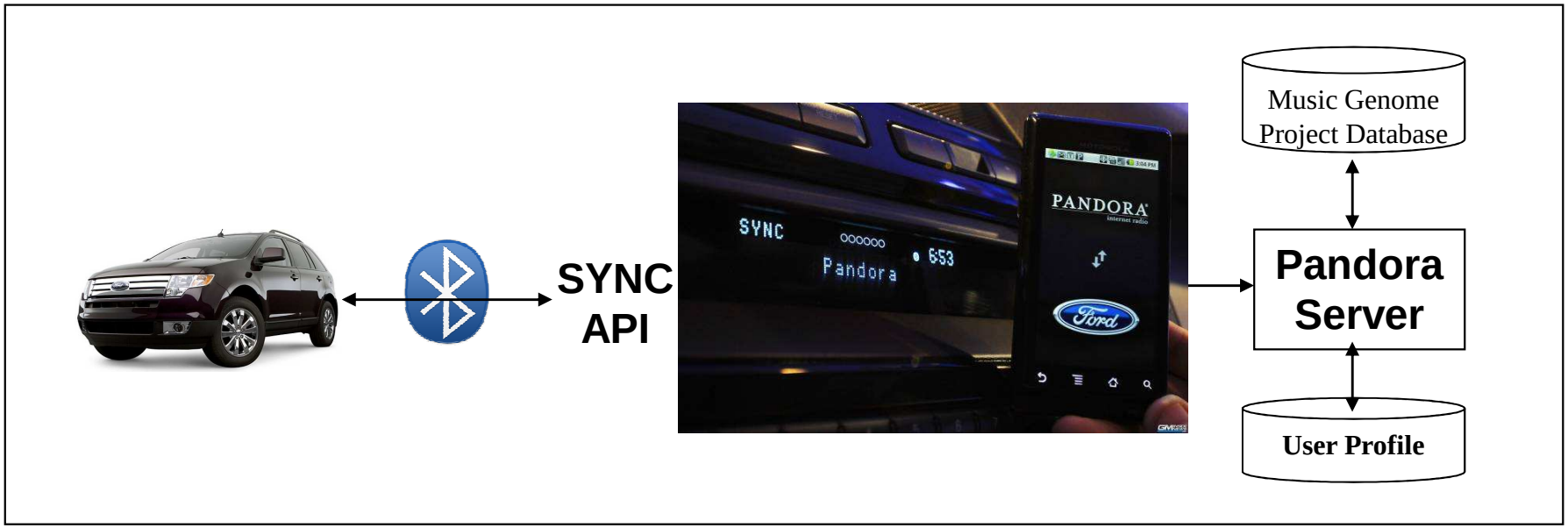
Nav. System Responds To Human Emotions

By Erwin Van Lun, March 21 2009 in Business news
Posted in Intelligence, Emotion, Comprehension, Appearance, Speech synthesis (TTS), Market, Patents

Nav.System that simulates emotion when reading out directions and detects the emotion of the driver

Ford has filed a patent called "Emotive Text-to-Speech System and Method" describing a system that can not only simulate emotion when reading out directions and describing traffic problems, but could also detect the emotion of the operator of the car and interact with them in ways designed to, oh, soothe a little road rage. The avatar is said to "appear to become frustrated" if the driver is a lead-foot, and may say "Your driving is hurting my fuel efficiency." Or, if a driver is going too fast, the dash-bound assistant could turn blue, ask what's wrong, and suggest a more direct route to their destination.

SYNC Pandora



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Acknowledgments

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P. MacNeille	Systems Analytics
J. Michelini	P/T Controls
K. Prakah-Asante	Active Safety
N. Rychtyckyj	IT
F. Syed	V&B Control
S. Szwabowski	P/T Controls
C. Teslak	P/T Controls
K. Theisen	Systems Analytics
B. Tonshal	Vehicle Design