A survey of context-aware applications and systems in use today

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Overview

• Apple Siri Case Study
  – Features
  – Development History

• Current Context-Aware Applications
  – Google Now, Sherpa, Grokr

• Context-Aware Analysis
  – Context Used
  – Context Not Used Yet

• Future Development
  – Gimbal SDK
  – Anticipatory Computing Engine

• Comparison to Weiser's vision
Apple Siri Case Study
Apple Siri

• Voice-Activated Personal Assistant
• Allows a user to manage phone resources
  – Communication
    • Voice and Text
  – Navigation
  – Planning
    • Calendar
    • Meeting Setup
  – Search
    • Sports Scores
    • Restaurant Reviews
Apple Siri

- Uses context to respond to requests with better results
- Context reduces search space
  - Geographic area for navigation and finding attractions is confined
  - Activity history is used to reduce information search space
- Overall, enables easy interaction with phone services
History of Siri

• Military User Scenario
  – Commander receives a warning about an event
  – All resources available to respond to that event are presented

• Personal Assistant that Learns (PAL) project started at SRI International with support from DARPA around 2001

• Data gathering and data analysis system

• DARPA requested an office assistant because of developer familiarity with problem
“If you told PAL what information you needed, and it observed what you did with that information, it would figure out a more efficient path to acquiring and sorting relevant information the next time around.”

Figure courtesy of: https://pal.sri.com/Plone/framework/framework/architecture

Quote from: http://www.wired.com/dangerroom/2011/10/siri-darpa-iphone/
Siri Commercialization

- After DARPA project, SRI looked to commercialize the product
- Identified as a way to improve mobile data usage
  - Act as an interface for a user to make use of the data-intensive services of the emerging mobile devices
- Several points contributed to success
  - Improved capabilities of mobile devices
    - Processing Power
    - GPS and Wi-Fi for location
    - 3G network speeds
  - Improvements in natural-language processing
- In 2010, Apple purchased Siri
Current Context-Aware Applications
Google Now

• Voice-Activated interface to services
  – Google Voice Search
    • General search
    • Navigation
  – Request and manage phone services manually
    • Voice, text, and email

• Automated Activity Management
  – Receive weather at home and work location in morning
  – Get traffic for way to work with alternate route recommendations
  – Pre-fetch airline boarding pass
  – Get activity summary for given time period
Google Now

- Automatically maintained connection to other services
  - Zillow: automatic query for property listing based on location
  - Fandango: Reminder to leave for theater given that user purchased a ticket
- Display relevant news articles
- Receive public alerts
Sherpa

• Android App

• Attempts to predict what information a user will need next

• Anticipates important events based on context
  – Location
  – Communication history
  – Calendar

• Cool Feature
  – When close to a favorite coffee shop, will ask if you want the regular and place the order
Grokr

• iPhone App

• Predictive Search
  - As opposed to interface for services, query services in advance on users behalf
  - Software agent

• Suggests routes to work based on traffic conditions

• Shows sports scores

• Notifies about upcoming events
Context-Aware Analysis
Context Utilized

- **Location**
  - GPS, Wi-Fi location, and Cell-tower proximity

- **User Activity and Movement**
  - Commercial Transactions
  - Transportation style

- **Meeting and schedule information**
  - Calendar
  - Ties to location and activity history

- **User Communication History**
  - Call and Text log
  - Email
Context Not Utilized Yet

- Exact location within buildings
  - Likely due to mapping constraints
- User physical gestures and non-verbal cues
  - More than half of all communication is non-verbal
  - User emotional reaction would be key to user preferences
- Conversation context
Future Development
Gimbal SDK

- Context-Aware SDK developed by Qualcomm
- Provides context-aware development framework for mobile platform
  - Measurement of user activity and application usage
  - Location and movement tracking
  - Push notification to specific users
  - Privacy framework
Anticipatory Computing Engine

- Determine context of a user's conversation
- Display information relevant to the conversation
- Next step is making decisions based on conversational context
- Potential downsides are privacy concerns and technology that is intrusive
Comparison to Weiser's Vision
Comparison

- Connection to other devices
  - Wireless connection to printers and other computer peripherals
- Deep connection to external services
  - Restaurant ordering, flight reminders, movies purchases, etc.
- Not as much control over physical environment as envisioned
  - Environmental control of lights and temperature
References

- http://www.google.com/landing/now/