Staying Relevant to the Always-On Consumer
A look at Augmented Reality and Natural User Interfaces
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Consumers Today

Millennials dominate
Gen Z arrives

• Consumers are always online
• There is a “Smart” variation of almost every device today
• Centennials spend 74% of their time outside work and education in the digital world
Augmented Reality

Statue of Liberty
Height: 93m / 310 feet
Made in: France
Dedicated on: Oct 28, 1886

Brooklyn Bridge
Length: 1825m / 5989 feet
Opened on: May 24, 1883
Return of the QR Code

Hyperlinks from the Physical world

- Created in 1994, became popular with the adoption of smartphones
- Considered dead in 2013
- Today used by Facebook, Snapchat, We Chat, PayTM
- iOS camera now comes with a built-in QR Code reader
- Scanner apps are available for most phones
Redirect to your Website

QR Codes can be used on empty shelves to redirect customers to the website

- QR Code could be added to the price label
- Scanning the Code takes the user website’s product page
- Can also trigger a message to in-store staff to replenish stock

*SDKs: Scanner built into Android and iOS dev kits. ZXing for creating QR Codes.*
Challenges

QR Codes need to be applied physically

- Deployment of QR Codes is a physical activity
- Printed QR Codes have a cost impact for removal
- QR Codes in print ads or products can become broken links, or may become outdated
AR Applications

AR Apps are becoming common today

- Games like Ingress, Pokemon Go popularized the concept
- Snapchat filters allow modification of videos
- IKEA has an app to see how furniture looks in your room
- **SDKs:** PTC Vuforia, ARCore (Google), ARKit (Apple), Lens Studio (SnapChat), EasyAR
How to AR

1. **Evaluate Context**
   - Image Processing
   - Computer Vision
   - Identify Elements
   - Geolocation

2. **Fetch or Create Data**
   - Call backend
   - On-device processing

3. **Render**
   - Identify Output Positions
   - Define Output Graphics
AR Wearables

The real promise of AR is outside of smartphones

- Many brands are shipping Dev Kits for experimentation
- Already being evaluated by the military
- Possibilities for use in training and education
- AR overlays during surgeries
- Science Fiction imagines AR over broadcast
Challenges

• Quality and Color of the overlay has an impact on effectiveness
• Using AR apps in public places or on staircases could cause accidents
• Privacy concerns from AR apps capturing real world images
• Google Glass was banned in many establishments in the US
• Digital Fatigue can be harmful to human mental health
• Augmented Reality Spam may overwhelm the usefulness of the technology
Natural User Interfaces
The End Is Nigh

Some believe that Smartphones could be obsolete by 2025

- Gen Z feels that Smartphones are useful, but distracting
- Increased smartphone use is leading to mental health worries
- Natural User Interfaces are becoming better
Siri, Alexa, Google Assistant have made it common to talk to devices.

- Speech to Text Conversion today happens on the cloud.
- The text then needs to be parsed to understand intent.
- This then needs to be converted to a backend query.
- If the response is by voice, it needs to be formulated.
- Speech Synthesis then creates the audio response.
Simple Commands

Open Angry Birds

Find Party Dress

Set Alarm for 7:00am
Synonyms

I want to **Play** Angry Birds

I’m **looking** for a **Party Dress**

Wake me up at **7:00am**
Interpretation

I want to **Play** that Bird Game

I want to **wear** something **nice** to a **party** next **week**

Remind me about my **meeting with Sanjay** tomorrow
Conversation – Remember past questions

When was Abraham Lincoln born?

1809

When did he die?
Conversation – Ask for more input

I want to listen to that song from that new Amitabh Bachchan movie

*Do you mean Piku?*

No, the murder mystery
Challenges

Security/Privacy
- Anyone can hear you
- Insecure to say passwords aloud

Experience
- Need to account for synonyms
- Spoken language has different assumptions than Text-based UI
Tools

Speech recognition
- Google Cloud Speech-to-Text
- Microsoft Bing Speech API
- Watson Speech to Text

NLP
- Apache Open NLP
- Stanford’s Core NLP Suite
- Google Cloud Natural Language
- Amazon Lex

Text to Speech
- Mozilla Web Speech API
- Google Cloud Text-to-Speech
- FreeTTS
- MaryTTS
Gesture-based Interfaces

Interpret the user’s actions

- Natural gestures are more intuitive
  - *Twist* your wrist (show time)
  - *Look* at your phone (Face ID)
  - *Look* at the bottom of the screen (scroll downwards)

- **SDKs**: Android/iOS SDKs, Kinect SDK, OpenCV, SimpleCV, SciKit Image, TensorFlow
Challenges

Biometrics like data once in the public domain, cannot be erased

- Biometrics are much less secure than passwords
- Easy to accidentally trigger
- Power consumption is higher because of constant monitoring
- Privacy concerns
Thank You

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