Monarch Center for Autism
A Division of Bellefaire JCB

edWeb.net

Current & Emerging Technology for Individuals with Autism: Building Communication & Education Skills

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Introduction

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Current Technology

tism

Early AAC

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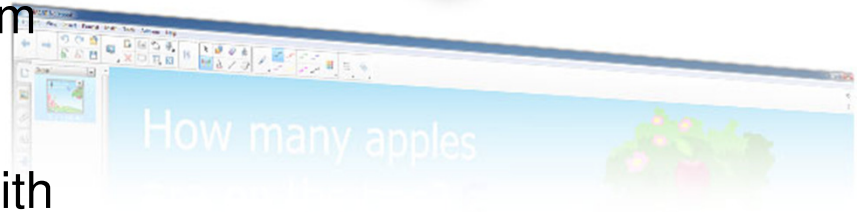
SMARTBoards

- Smartboards are a great way to engage a group.
- At Monarch Center we use 25+ SmartBoards.
- Staff build lessons on the SmartBoard Notebook software or VizZle and share them with each other.
- These lessons are customized to the IEP goals and objectives they are working on with the students.
- Smart Light Raise
- Ability to project up to a 100” display .
- Differentiates between touch and pen use.
- Has built in speakers and microphone.
- 2 to 4 touch points depending on the model.
- No actual board to damage.
- Access to Smart’s over 60,000 learning resources



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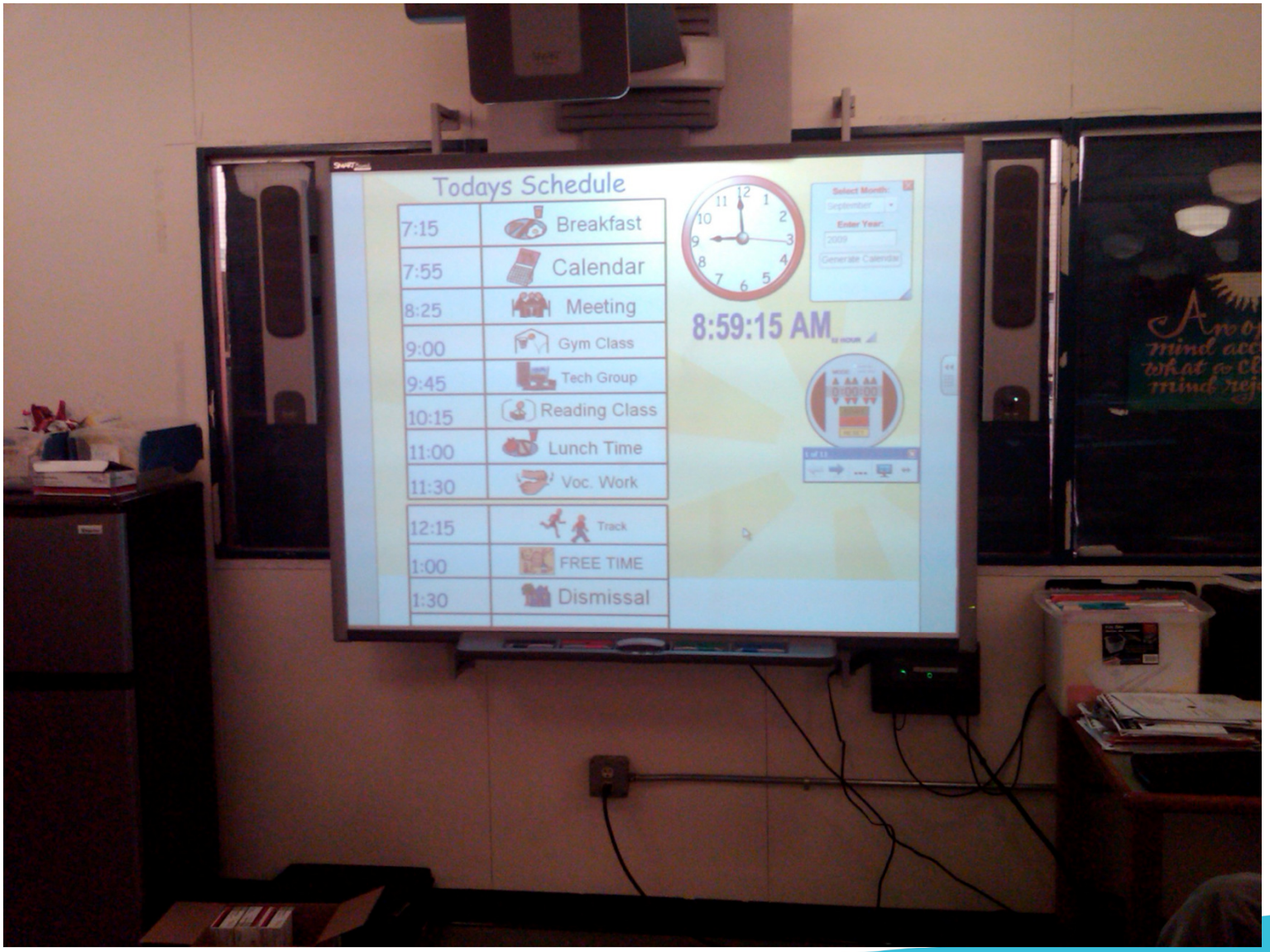
Daily Schedule – on Smart board



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Mini Projector

- At Monarch Center we have begun to test a Mini Projector aka. Pico Projector
- These are usually used in the business field for the traveling salesman.
- Need: Some students require a 1 on 1 interaction in a separate environment other than the group.
- With an iPad connected to a Mini Projector a staff member can set up a classroom activity almost anywhere.
- We are currently trialing the AAXA P2JR
- Works with both Android and iPad devices.
- Also accepts HDMI and component connections.
- Can play back video and images from an SD card as well. This can also eliminate the need to bring another device with you.
- 120 minute battery life.

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Apple iPad

- At Monarch Center we use primarily iPads.
- The iPads are assigned to Teams and individuals such as SLPs and behaviorists.
- We use a mix of iPad 1's, 2's, 4's, Air's, and Minis
- iPads have been a great boon to our schools educational resources as it allows us to be more mobile with our teaching.
- They serve as a wide variety of uses such as educational apps for the student's, reinforcers, visuals such as schedules and token boards, data collection, photography and video capturing, and much more.

Android

- Android is an operating system developed by Google.
- Android is free for companies and developers to use on their devices.
- There is not one Android / “Droid” tablet or phone.
- They come in many form factors (screen size ranging from 7”-11”).
- Nexus tablets are made by google directly.
- Android tablets range in price between $199 - $899

Android AAC

- Amazon's Fire tablet is an android device.
- Android has a large Market place of Apps through the Google Play store.
- Unfortunately none of the big name in AAC apps such as Touch Chat or Proloquo2Go are available for Android devices.
- Dynavox T10 is an android based tablet with their Tobii software loaded on to it.

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Windows Surface

- Made by Microsoft.
- Currently 3 models Surface Book, Surface Pro 4, & 3.
- Currently comes in a single form factor with a 10.8”-13.5” inch screen.
- Although pictured and advertised with one the keyboard and stand do not come with the tablet .
- Has traditional USB ports to connect with traditional devices like hard drives and thumb drives.

Priced $499-$1499

Wearables

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Pebble Watch

- Wearable technology is an emerging tech within the last few years.
- It really came to public notice when the Pebble – a smart watch created a KickStarter campaign with the initial goal of $100k they end up raising $10.2 Million in a 1 month span.
- Receives your text messages and emails. Vibrates on notification.
- Prompt a student without drawing attention to the behaviors.

Apple Watch

- The watch has the ability to connect with your iPhone and share data from apps.
- Using features such as Tap or Messages you could prompt a student in a more socially appropriate way.
- There is the potential for multiple prompt types physical (through vibration), visual (through images or messages), verbal /audio (from built in speakers)
- The Apple Watch has built in sensors to monitor things such as heart rate. These sensors could allow for additional data to be tracked on a Student with ASD.
- They could also be beneficial in helping an individual know when they are upset.

Scene Cues & Wearable Technology

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Principal Investigator : Amanda O'Brien, MS

Primary Aim

To determine the effect of "Just-In-Time" (JIT) visual supports delivered through wearable technology (e.g., the Apple Watch) on language and behavior of individuals with Autism Spectrum Disorder (ASD)

Scene Cues & Wearable Technology

Secondary Aims

1. Assess *operational competencies*

- **Perception of images on screen**
- **Tolerance for wearing**
- **Raise arm to view**
- **Tap screen view dynamic cue**

2. To explore *multimodality* of JIT delivery and comprehension.

- **Visual only (e.g., static scene cue, dynamic scene cue).**
- **Auditory cue presented with dynamic scene cues.**
- **Attention to, and comprehension of, haptic prompts.**

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Scene Cues & Wearable Technology

Delivery of Scene Cues

Perceptual

- Ipad & Other Tablets √
- iPhone & Other Mobiles Devices √
- Apple Watch LIKELY

Operational

- Haptic ?
- Tolerance wearing ?
- Review image ?

Speech Synthesis

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Evolution of the Synthesized Computer Voice

Robotic → Intelligible → Natural → Personalized

Speech Synthesis

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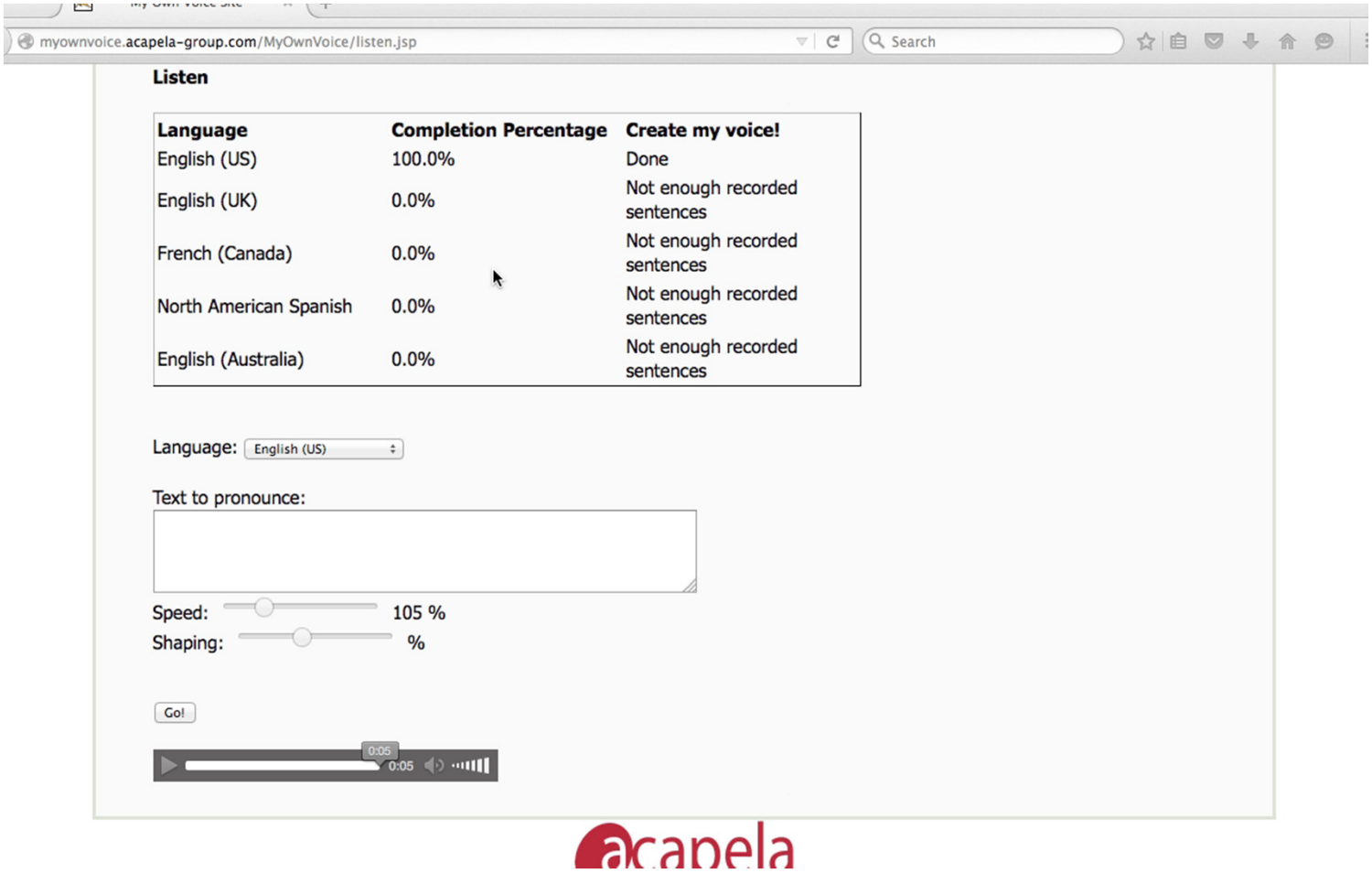

Video 1: Speech Synthesis

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Virtual Reality

- In the 1990's the Virtual reality craze was everywhere, from TV shows to video game systems.
- The technology never fully took off due to prohibiting costs & limitations of the technology.
- In the 1990's screen density of pixels was pretty low around 72-96 pixels per inch (ppi). With an iPhone 6 Plus it has a resolution at 401 ppi. This helps trick the mind into thinking the image is more real.
- In 2013 Sony produced a concept OLED screen that was **2098 PPI.**

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Oculus - Rift

- The technology has great potential though as it promises to immerse an individual in a world where a user could have full control of the environment.
- In 2014 Facebook paid $2 Billion for a company by the name of Oculus VR
- A developer version of the software has been available since 2012.
- Oculus created a Kickstarter 2012 in which they released a set number of test units.
- At their May 2015 Press event they announced a partnership with Microsoft and a consumer version of the product is expected to go on sale in Q1 2016.
- The Rift uses an OLED panel for each eye, each having a resolution of 1080x1200 and refresh rate of 90 Hz.

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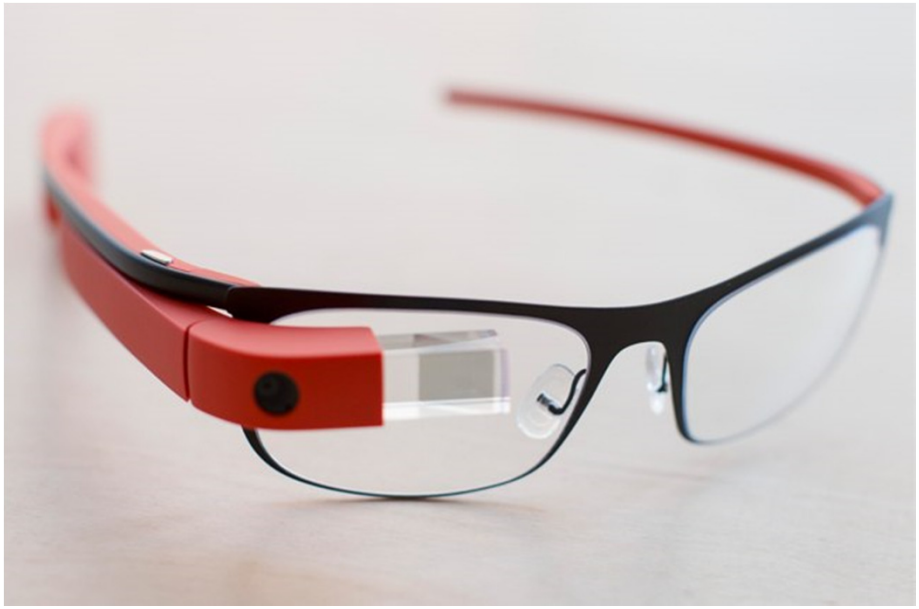
Project Glass / Google Glasses

- The project was to provide the user with a Heads Up Display (HUD) throughout their life. This gives the wearer more information about their surroundings but also to assist them in day to day activities.
- For example a user could bring up your Facebook profile just by looking at you.
- The future of Glass is currently on hold. Google seized sales of their generation 1 model.
- The device was expensive at $1500 and there was a social stigma against users, as it was unknown if they could be recording you.



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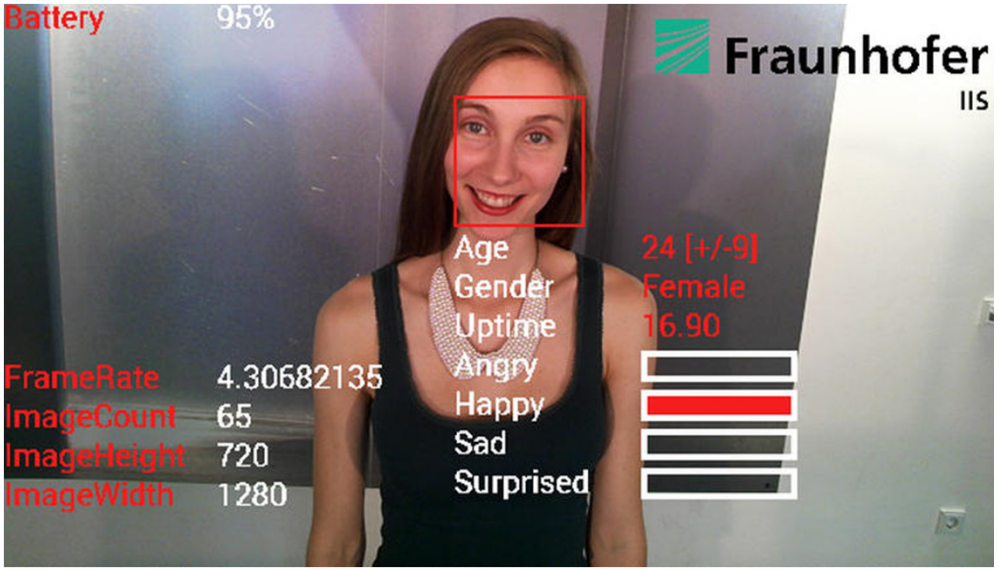
Detecting Emotions

- Project Glass and other HUD style technology also has the opportunity to assist those with ASD by letting them know emotions of people around them.
- The The Fraunhofer Institute for Integrated Circuits (Fraunhofer IIS) has been working on an image analysis system for many years. It allows them to detect age, gender and emotion.
- When a person is experiencing feelings they are often conveyed through facial expressions and body language.
- Using the built in camera and facial recognition the device can tell them the emotions the person is most likely feeling.



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Making Sense of Symbols

- Google glass and other HUDs have a great potential in providing more information about one's surroundings. Deciphering complex symbols like street signs.
- Or if the individual is illiterate it could even read signs for them.
- For the visually impaired it could also provide verbal notices to the individual about their surroundings.

Microsoft HoloLens

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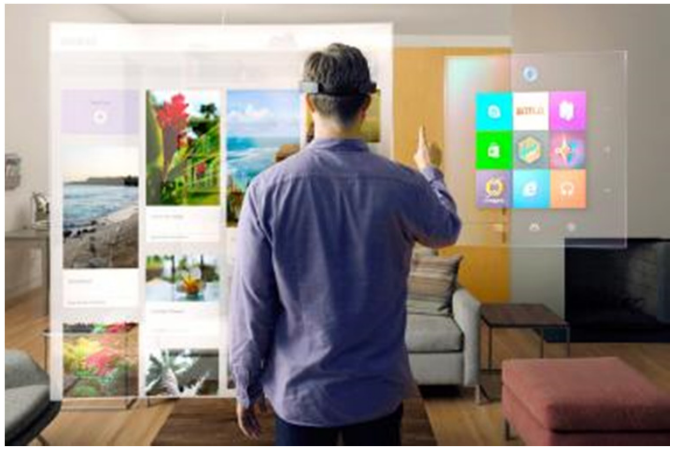
- HoloLens is a set of smart glasses, that allows the user to see “Holographic” interfaces in their surroundings. It is similar to Google Glass in that it Augments your reality.
- An example of this would be that you could walk up to your fridge, and see an interface projected onto the fridge that acts as an order form for an online grocery store.
- HoloLens was demoed at the Windows 10 announcement, and was said to be released in the lifespan of Windows 10.



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Artificial Intelligence

- True Artificial Intelligence thinks on its own – the current AI technologies on the market work by taking the input from the person, and converting it to text. Then they perform a keyword search.
- Example saying something like What is the weather tomorrow, triggers the system that you are asking a question by the presence of “What”
- Then follows by searching for Weather with a parameter of tomorrow.

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Siri – Google Now - Cortana

- Siri, Google Now, and Cortana are programmed to take your requests and perform an action.
- For an individual with Autism these are important learning tools as it teaches them how to phrase a request or question.
- Additionally they provide an assistive resource for an individual with ASD.
- Some services such as SIRI also have emergency services built into it which will call 911 for you in an emergency and provide all potential information for you to the operator. It pulls this information from your Location, Contact, and healthbook information.

Personal Assistants

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Personalize as therapy assistants?

Social Pragmatics:

To Siri, With Love

How One Boy With Autism Became B.F.F.'s With Apple's Siri

Siri: “It’s nice to be appreciated.”

Gus: “You are always asking if you can help me. Is there anything you want?”

LOUIE CHIN

Siri: “Thank you, but I have very few wants.”

Gus: “O.K.! Well, good night!”

Personal Assistants

"……they will also be able to carry on more complex conversations about a person's area of interest. "Your son will be able to proactively get information about whatever he's interested in without asking for it, because the assistant will anticipate what he likes," said William Mark, vice president for information and computing sciences at SRI."

Personal Assistants

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Personalize as therapy assistants?

Speech improvement

	Google Now	Siri	Cortana
"Where is the NASDAQ today?"	4.79 seconds	5.9 seconds	6.14 seconds
"What's the traffic like around Washington Avenue?"	5.97 seconds	8.82 seconds (launches Apple Maps)	6.05 seconds
"What's the weather like?"	4.26 seconds	4.33 seconds	4.22 seconds
"What's the population of Germany?"	4.82 seconds	4.51 seconds	5.86 seconds
"What's the time in London?"	4.63 seconds	4.1 seconds	6.29 seconds
Overall average	Averaging 4.894 seconds	Averaging 5.53 seconds	Averaging 5.712 seconds

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Amazon Echo

- Amazon is delving into the world of AI with their first stand-alone device the Amazon Echo.
- Amazon's voice is known as Alexa
- Amazon Echo is made to be placed around the house and it answers questions for you and acts as a personal assistant.
- Uses farfield technology so it can hear you when you are not close by.
- Amazon notes that since it uses it's cloud services for the AI functionality it would add more features as time goes on.

Personal Assistants

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Personalize as therapy assistants?

Information gathering / look-up

Temporal Functions (e.g., time, set alarms, etc)

https://www.youtube.com/v/aA4PGEWprLA

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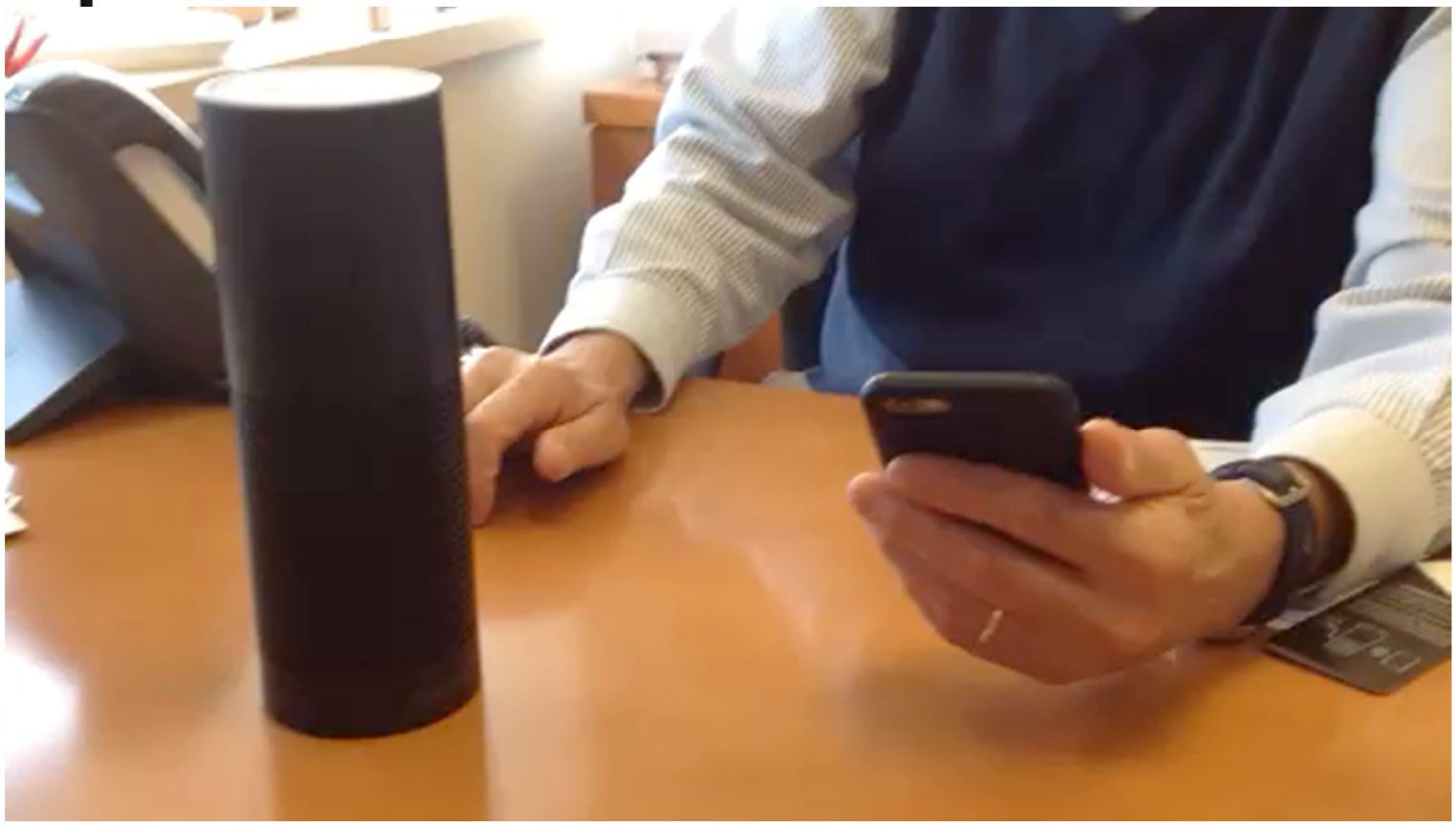
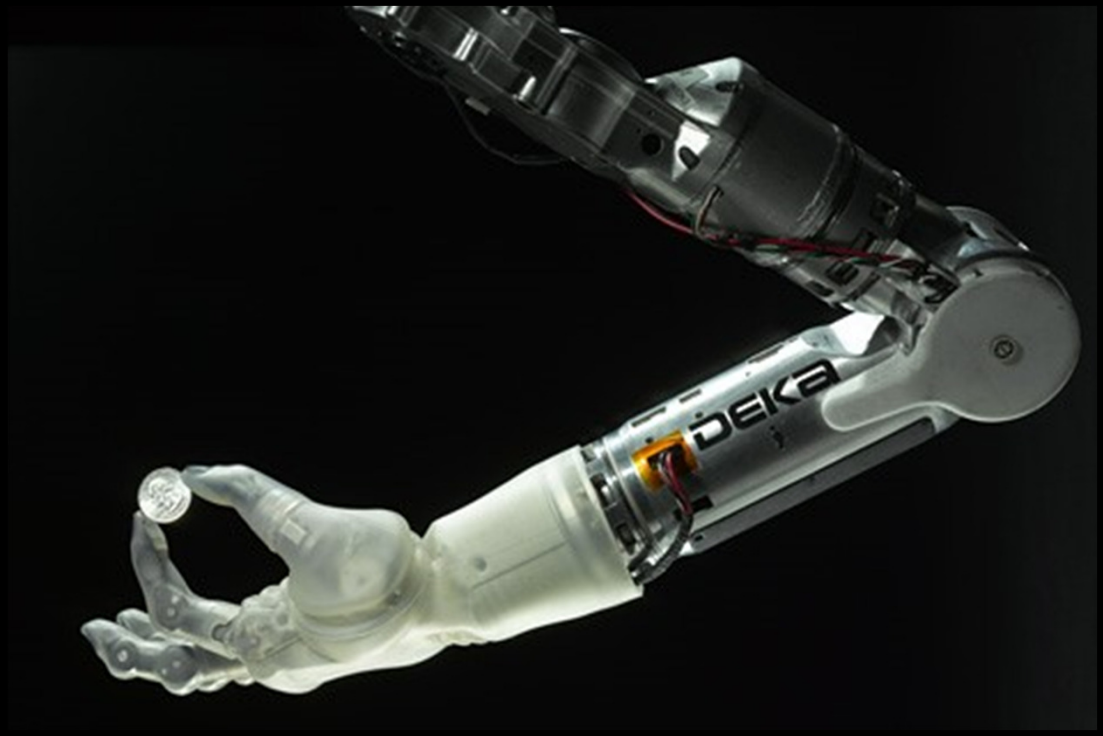


Video 2 – Synthetic speech recognition

Robotics



Robototics - NAO

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- Recent studies using robots to assist in the educating of individuals with Autism has shown positive results.
- Children with ASD have been found to respond better to robots due to the predictability and simplicity of the machines.

- NAO is a robot created by Aldebaran that has been designed to interact with children with ASD.
- NAO has many sensors to detect such things as when someone is touching it, and even when someone is looking at it.
- The robot can autonomously move on its own, and even dance.

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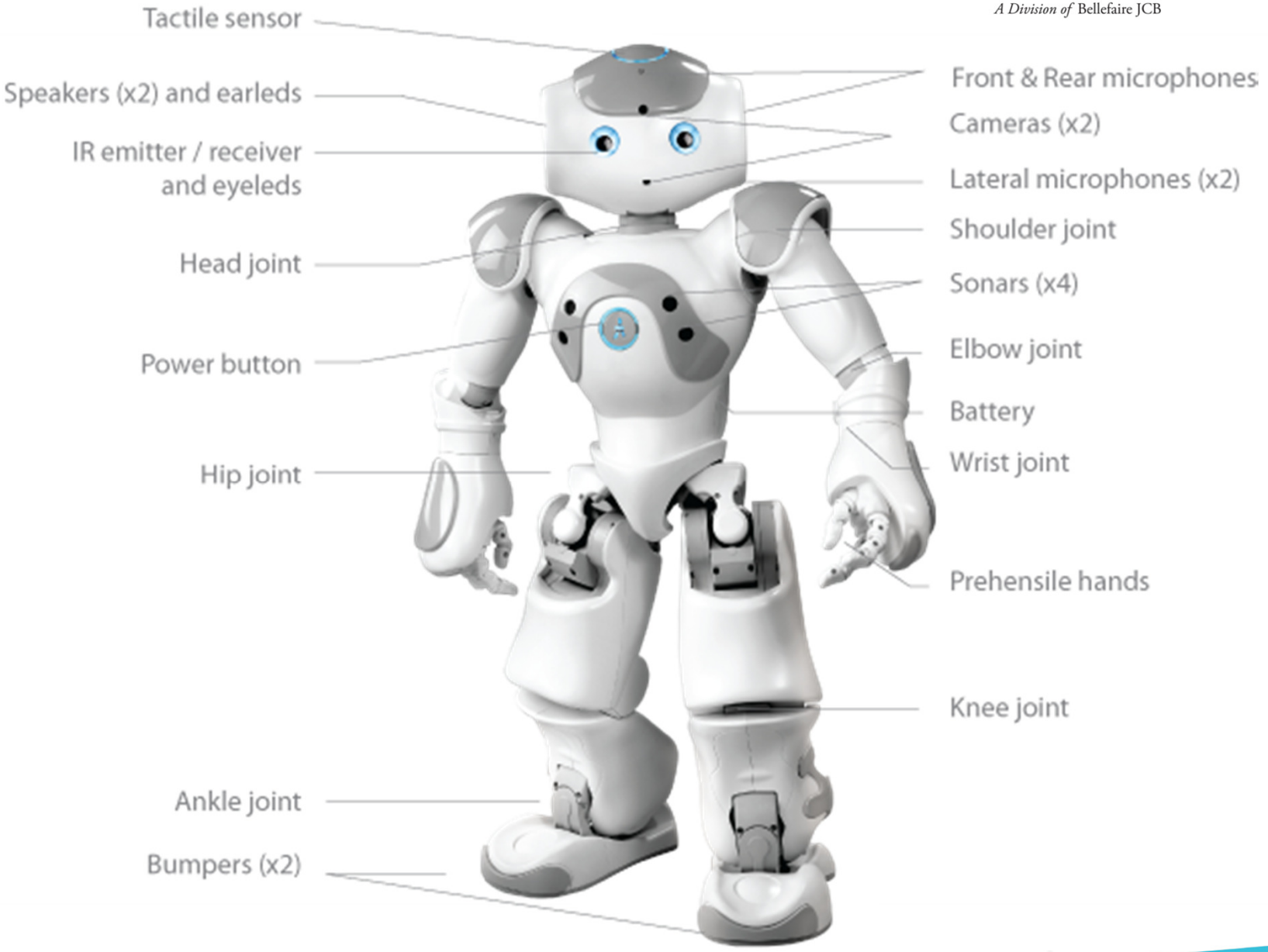

https://www.youtube.com/v/lm3vE7YFsGM

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KASPAR

- Kaspar was created at the University of Hertfordshire in Great Britain.
- He was created in 2005
- Is face is created to purposefully not have a lot of detail to minimize distraction.
- There are currently only 3 KASPARs in the world, but the university of Herfordshire is looking to develop approximately 30 more to test in other countries.

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Visual Syntax Instruction

Visual Syntax Instruction

Rule based order / organization of words in a spoken sentence

Symbol Syntax refers to construction of a sentences using the elements of language in a visual form

Visual Syntax Instruction

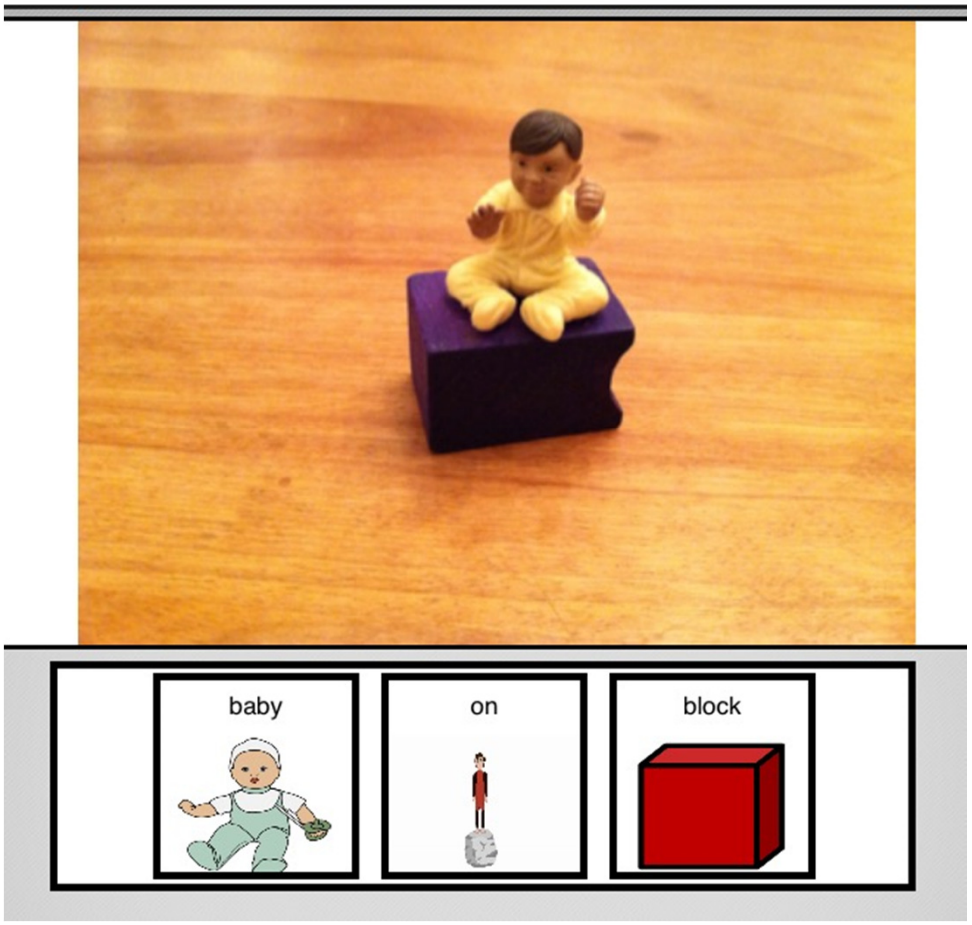
1. **For persons with moderate to severe autism the use of generative language, where symbols are combined to form novel sentences, is rare**

2. I + "desired item" is a scripted sentence and not novel, generative language

Visual Syntax Instruction

*"The reproduction of memorized multiword units would seem to be devoid of the creative and generative linguistic processes typically associated with the spontaneous production of multiword utterances." (*p. 303) Prizant (1983)

Visual Syntax Instruction – Mixed Display



Visual Syntax Instruction – Mixed Display

Video 3: Mixed Display

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https://www.youtube.com/v/D6gTHPoO9VI

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Services

- Preschool & Day School
- Transitional Education Program
- Boarding Academy
- Adult Autism Program & Residence
- Extended School Year
- Summer Social Language Program
- Family Training, Support & Social Activities
- On-Site Consultation & Therapy
- Online Resource Center

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