Virtual Technology
Conference
Saturday, 05/05/18
@ 1 PM ET

Conference Description
& Registration Links go to

apcug2.org/category/virtual-tech-conference

Create A Smart Home
with Home Automation
&
Smart Voice Assistants

An introduction to fundamentals of creating your Smart Home.

Home Automation is finally ready for everyone

Voice Assistants can be fun and useful

Introduction

Home Control is finally ready – from simple to elaborate, from off the shelf to DIY

Controlling devices with a computer is obviously fascinating to gadget junkies. But it can provide useful benefits, as well.

Consumer home control products and technologies in the past have been extremely limited until the last ten or so years. The home control and automation field has exploded over the last five or so years with a wide assortment of products for most any application whether a hobbyist or a professional installation.

Costs have improved, thanks to the Internet, Cloud Services, innovation and competition.

Voice control adds Star Trek-like capabilities (almost).

Agenda / Main Topics

- The High-Tech Smart Home –Overview of Technologies & Concepts
  - Home Control & Automation
  - Home HVAC & Energy Management
  - Home Security & Surveillance
  - Home Entertainment

- Smart Voice Assistants that use Artificial Intelligence
  - Amazon Alexa, Google Home, Microsoft Cortana, Apple HomeKit, Samsung SmartThings

- Automation Communication Technologies
  - Serial, USB, X10, Z-Wave, Zigbee, Insteon, PowerLine, and other wired and wireless

- How To Get Started, Where To Buy

- Caveats

The High-Tech Smart Home

Let's discuss common Technologies & Concepts

Smart Home Control & Automation

- Has finally come of age for everyone: easy and affordable

- A.I. Smart Voice Assistants (we'll discuss deeper in later slides)

- Smart home control devices (to control appliances, lighting)
  – here are a few examples to start with:
    - TP-Link: Power sockets, light switches, cameras, more
    - Belkin WeMo: Power sockets, light switches, cameras, more
    - Philips Smart Hue Lighting: white, color, dimming, effects
    - Samsung SmartThings: a hub based system with many features
    - Apple HomeKit: for those with Apple products

Smart Home HVAC & Energy Management

- Smart Thermostats, SoCal Edison Smart Meters, saving money on your HVAC and utility bills

Smart Home Surveillance and Home Security

- Systems (with and without monitoring services)
- IP Cams/ and NVRs
- CCTV Cams/Systems
- Video doorbells

Smart Home Lighting

- Smart Lighting Control Systems: Crestron, Lutron
- Smart LED Lighting: Philips Hue, Lifx, Akea

Smart Home Entertainment

- Smart Televisions
- Smart Home Theater Systems
- Smart Gaming Controllers

Smart Home Cloud

- Access your home network and devices remotely

Controlling Your Smart Home Devices

A.I. Smart Voice Assistants

- Amazon Alexa and Echo
- Google Assistant and Home
- Microsoft Cortana and Invoke
- Apple Siri and HomeKit
- Samsung Bixby and SmartThings
- Facebook M virtual assistant
- We're going to see Microsoft, Google, Amazon, Apple, and Samsung do battle in this space over the next few years. Competition spurs technology and feature improvement, as well as keeping costs under control
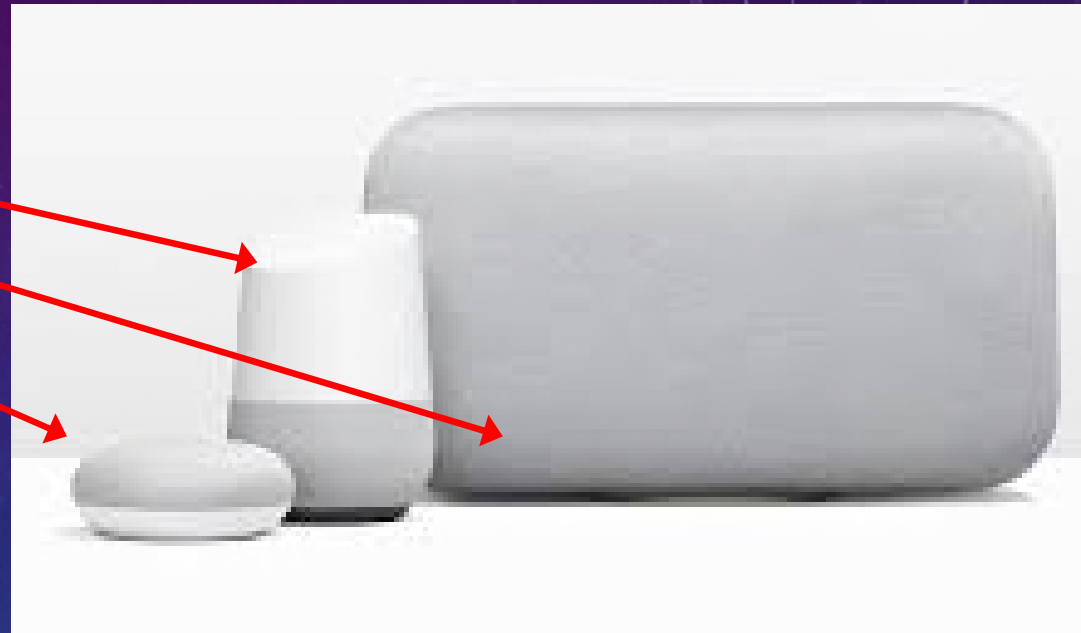
Amazon Alexa & Echo Devices

- Echo 2nd Gen $100, Echo 1st Gen $80-110
- Echo Plus $150
- Echo Dot $50
- Echo Spot $130
- Echo Show $230
- Echo Look $200
- Amazon Tap $130
- Fire TV $40 starting
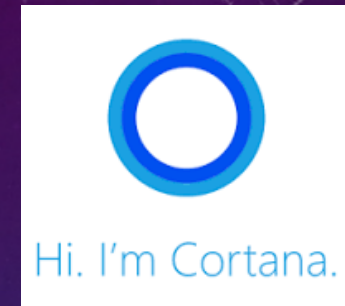- Fire Tablets $50 starting
- Ecobee 4, Sonos, Moto

Google Assistant & Home

- Google Home $130
- Google Home Max $400
- Google Home Mini $50

Microsoft Cortana and Invoke

- Cortana is an intelligent personal assistant created by Microsoft for Windows 10, Windows 10 Mobile, Windows Phone 8.1, Microsoft Band, Xbox One, iOS, Android, Windows Mixed Reality, and soon Amazon Alexa
- Cortana was demonstrated for the first time at the Microsoft BUILD Developer Conference in April 2–4, 2013 in San Francisco, development of Cortana started in 2009
- Harman Kardon Invoke is a voice-activated speaker featuring Cortana
- Searches will only be made with Microsoft Bing search engine and all links will open with Microsoft Edge, except when a screen reader such as Narrator is being used, where the links will open in Internet Explorer
- Cortana includes a music recognition service
- Cortana integrates with services such as Foursquare to provide restaurant and local attraction recommendations and LIFX to control smart light bulbs

Microsoft Cortana

- Cortana stores personal information such as interests, location data, reminders, and contacts in the "Notebook". It can draw upon and add to this data to learn a user's specific patterns and behaviors. Users can view and specify what information is collected to allow some control over privacy, said to be "a level of control that goes beyond comparable assistants". Users can delete information from the "Notebook".

- Starting in late 2016, Cortana integrated with Microsoft's Wunderlist service, allowing Cortana to add and act on reminders

- Cortana will get third-party skills capability, similar to that in Amazon Alexa

Apple Siri and HomeKit

- https://www.apple.com/shop/accessories/all-accessories/homekit
- https://www.apple.com/ios/home/
- https://www.imore.com/homekit
- https://www.cnet.com/news/apple-introduces-homekit-for-ios-8/

Samsung Bixby and SmartThings

- On March 20, 2017, Samsung announced the voice-powered digital assistant named "Bixby". Bixby was introduced alongside the Samsung Galaxy S8 and S8+ during the Samsung Galaxy Unpacked 2017 event.

- Bixby standard on Oreo phones like Galaxy S9, can also be sideloaded on older Galaxy devices running Android Nougat

- Bixby represents a major reboot for S Voice, Samsung's voice assistant app introduced in 2012 with the Galaxy S III

- Bixby comes with three parts, known as Bixby Voice, Bixby Vision and Bixby Home

Samsung Bixby and SmartThings

- Third parties will be allowed to develop applications for Bixby using the Samsung Developer Kit
- Family Hub 2.0 refrigerators

Remote Controls – Devices

- Universal Remotes
- Logitech Harmony
- Sensors
- RFID Tags
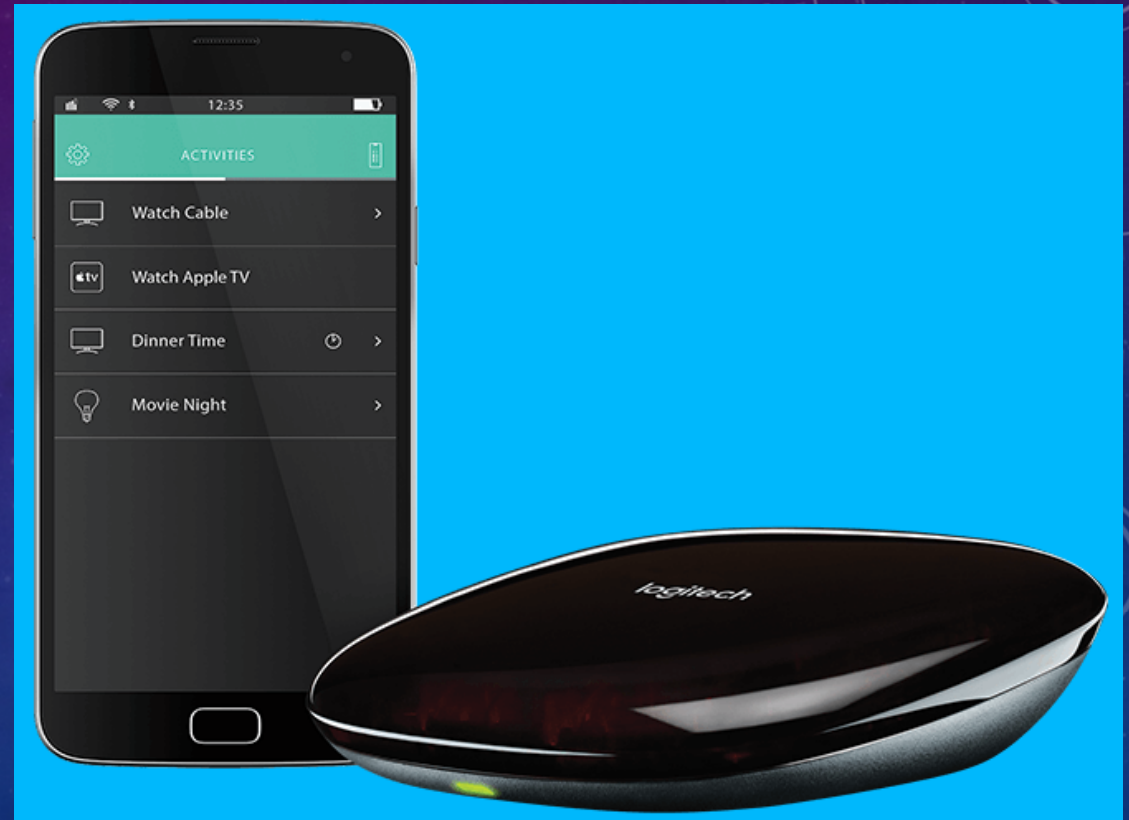
Remote Control – Software For Mobile & PC

DIY for the advanced -> Home Automation Software - Lets you design your own custom control

- Mobile Apps for remote control
- OpenRemote
- IFTTT
- AllConnect
- SMB, UPnP, DLNA, Miracast, File & Media Servers, Streaming
- Network Discovery Protocols
  - Link Layer Discovery Protocol (LLDP)
  - Link Layer Topology Discovery protocol(LLTD) (Windows)
  - Windows Vista and Windows 7 continue to use the Computer Browser service and NetBIOS broadcasts
  - Bounjor

IFTTT Applets

Turn off WiFi on your Android when you leave home to save power — On — works with

Automatically unmute your Android when you get back home — On — works with

Automatically turn your Android device's WiFi on when you get home — On — works with

Rain tomorrow? Get a mobile notification — On — works with

Turn bluetooth off when you disconnect from bluetooth device — Off

If connect to any Bluetooth device, then send GET GAS to 19499339881 — Off — works with

Open Source Home Automation Software

- For your computer or tablet:
  OpenHAB, Home Assistant, Domoticz, Calaos, OpenMotics
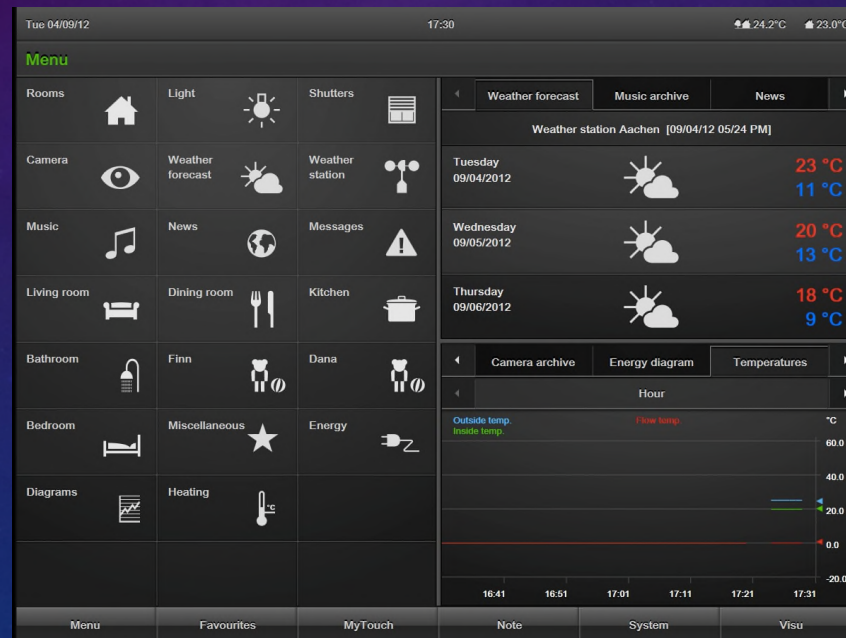
How Everything Communicates

Home Automation & Voice Assistants (C) 2017-2018 Joe Melfi

Automation Communication Technologies

- RS-232, RS-422, RS-485
- X10
- Powerline, Phoneline, Cable/Coax
- Wi-Fi
- Bluetooth
- IrDA
- Ethernet
- Canbus
- Z-Wave wireless
- Zigbee
- Insteon
- Mobile/Cellular Data

Internet of Things (IoT)

- Anything connected to a private network that is designed to be accessible and controlled via the public Internet can be considered to be a part of the IoT

- The IoT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, virtual power plants, smart homes, intelligent transportation and smart cities.

Applications & Projects

Some examples of using Smart Home Automation

Home Automation Projects

- HVAC Zone Control
- Wi-Fi thermostat
- Water heater temperature monitoring
- Surveillance and home security
- Garage door monitor and control
- Entry door/doorbell monitoring
- Home weather station
- Remote monitoring and management

HVAC 3-Zone Control & Energy Management

- Thermostats for each of 3 zones $60 and up /each x 3 = $200 or more
- Motorized Dampers $70-75/each x 3 = $225
- Zone Controller $237
- Wireless remote control for dampers $25 or more /each x 3 = $100
- Installation and supplies
- Sensors
  - Duct temperature
  - Duct pressure/vacuum
  - Room temperature
  - Room humidity
  - Water/flood/leak
  - Fire/smoke/CO
- Other

HVAC 3-Zone Control & Energy Management

- Electric utility company has provided me with a Smart Electric Meter (I understand there are ways to pull data from that)

- Electric utility company has programs to reduce power usage

- Smart Plug devices can monitor power usage

- Computer Uninterruptible Power Supply can monitor power usage

- Handheld instruments can gather additional power usage measurements

DIY solutions

- PC vs. Embedded, off the shelf vs. DIY
- Arduino
- Raspberry Pi
- Homemade custom DIY

How To Get Started,
And where to buy

Buying Options

- Retail Stores
  - Fry's, Micro Center, Best Buy, Home Depot, Lowes, many others
  - Ikea
  - Helpful to see product overall availability, easier returns
  - Watch for sales and promotions

- Online Shopping
  - Amazon

- Manufacturer Websites
  - Some provide ~10% discounts to sign up for their mail list
  - Read about features and specs
  - Download datasheets and User Manuals

Starting Your Home Automation Journey

- Which sounds more appealing and beneficial
  - Control, HVAC, Security/Surveillance, Entertainment, DIY

Some recommendations to consider

- Stand-alone control: TP-Link
- Full system control: Samsung SmartThings
- Smart lighting: Philips Hue or Lifx
- HVAC/thermostat: Ecobee
- Surveillance: Swann or Arlo
- Entertainment: Sony UHDTV with Android and Google Home, so many

Caveats

- Privacy
  - IoT is new and has security challenges
  - Voice Assistants can be activated by anyone (though some improvements)
- Can be costly
  - Smart Lighting in one room vs. whole house
- Compatibility/Interoperability
  - Getting better
  - Hub vs. Hubless
    - Hubless saves cost of hub
    - Hub provides more functionality and Compatibility/Interoperability

Summary – Home Automation & Voice Assistants

- Did You Get All That?

- It's affordable
- It's fun
- It's useful

- What are you waiting for?

Questions?

Make Your
Home Smarter

Create a Smart Home with
Home Automation & Voice Assistants

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