

# Innovative Technologies and Tech Trends

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Brian Pichman @BPichman

Evolve Project

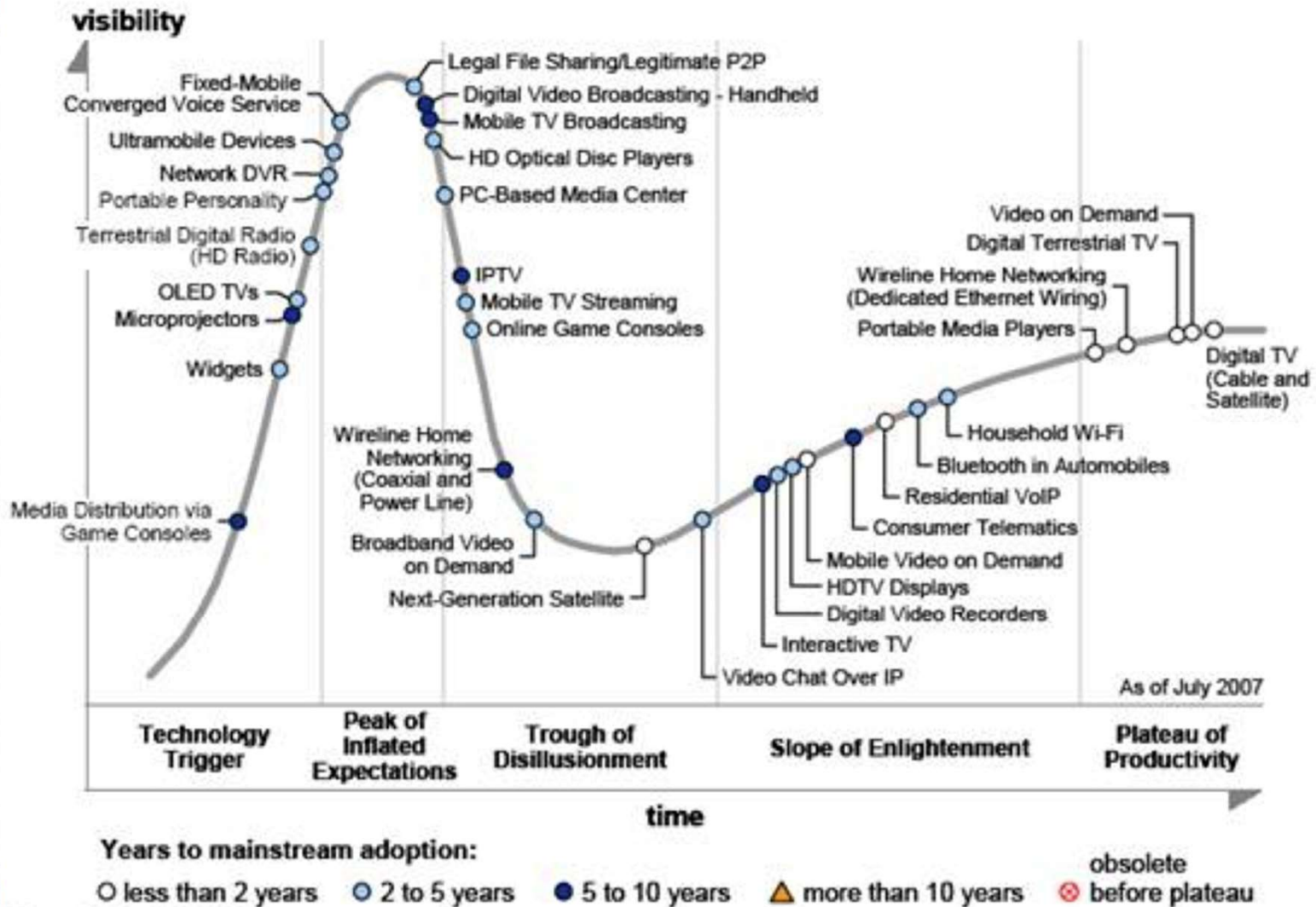
## Technology Is All Around Us

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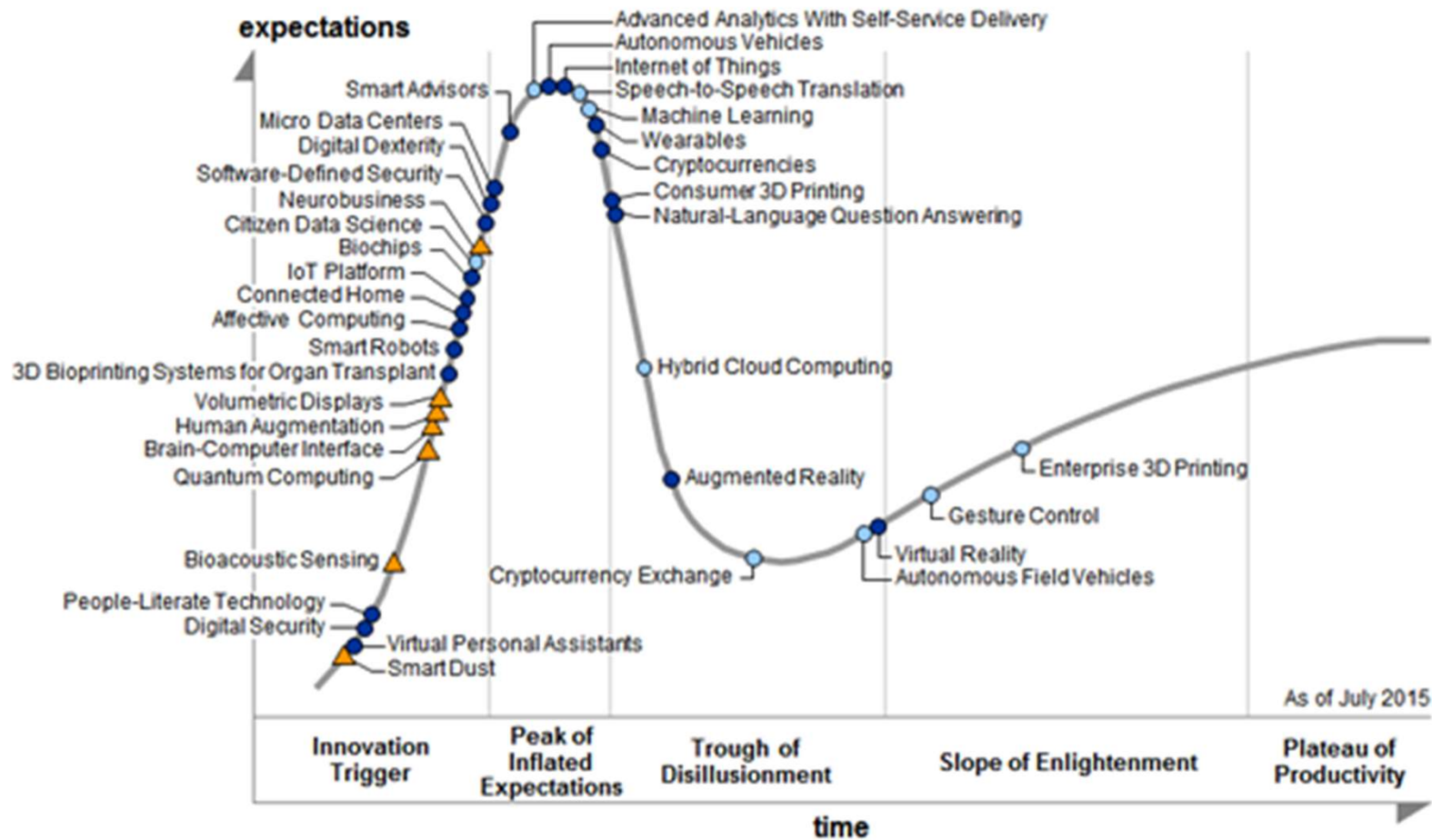
- **Connected Lives**
  - “internet of things” – Smart Homes, Smart Cars, Smart Classrooms
- AIs, Robots
- Big Data and Security
- New Technology



Figure 1. Hype Cycle for Consumer Technologies, 2007



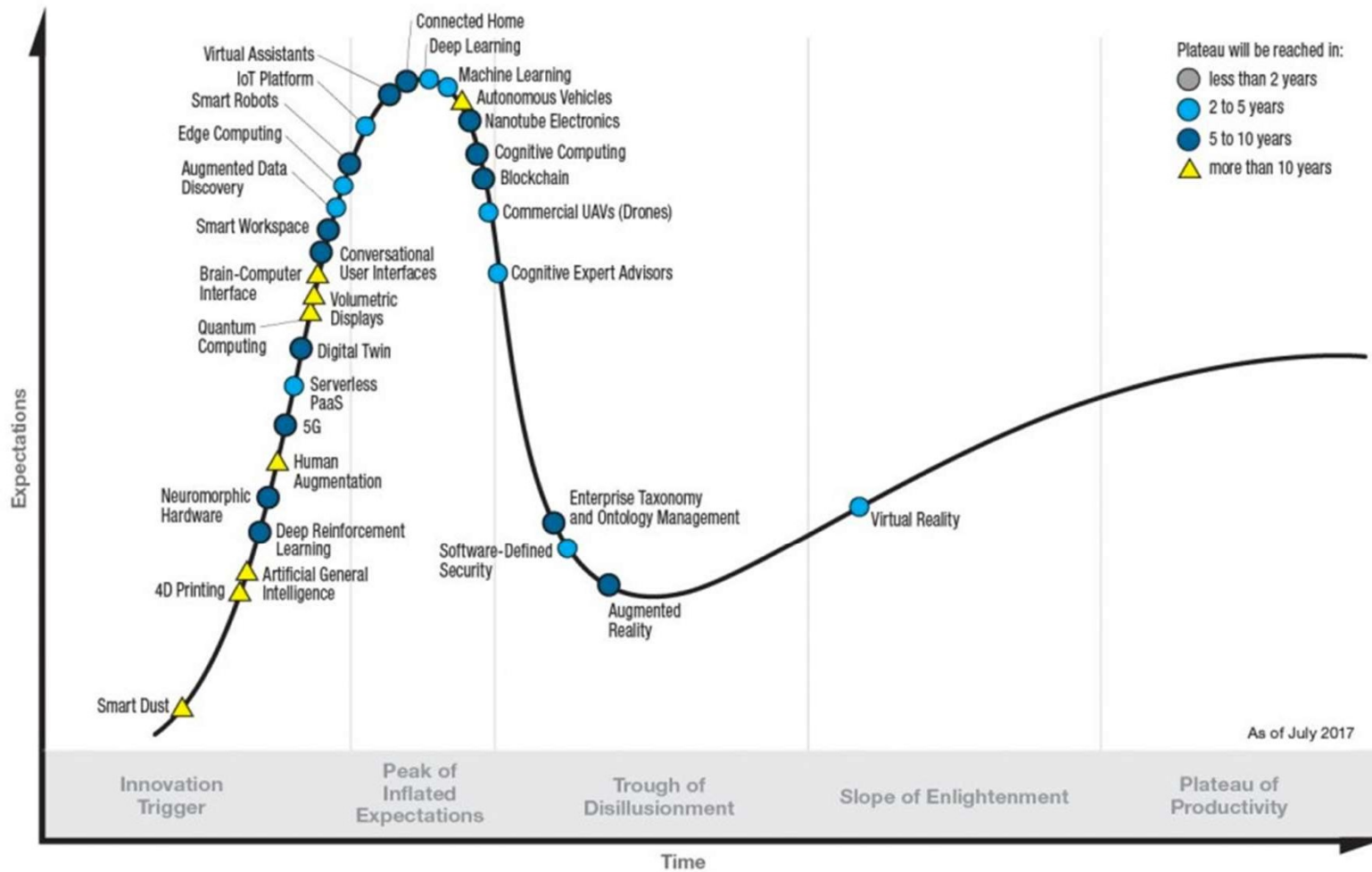
Source: Gartner (July 2007)



**Plateau will be reached in:**

○ less than 2 years    ● 2 to 5 years    ● 5 to 10 years    ▲ more than 10 years    ⊗ obsolete before plateau

# Gartner Hype Cycle for Emerging Technologies, 2017



## Three Trends

### AI Everywhere

Deep Learning  
Deep Reinforcement Learning  
Artificial General Intelligence  
Autonomous Vehicles  
Cognitive Computing  
Commercial UAVs (Drones)

Conversational User Interfaces  
Enterprise Taxonomy  
Ontology Management  
Machine Learning  
Smart Dust  
Smart Robots  
Smart Workspace



### Transparently Immersive Experiences

4D Printing  
Augmented Reality  
Brain-Computer  
Interface  
Connected Home

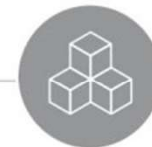
Human Augmentation  
Nanotube Electronics  
Virtual Reality  
Volumetric Displays



### Digital Platforms

5G  
Digital Twin  
Edge Computing  
Blockchain  
IoT Platform

Neuromorphic Hardware  
Quantum Computing  
Serverless PaaS  
Software-Defined Security



[gartner.com/SmarterWithGartner](https://gartner.com/SmarterWithGartner)

Source: Gartner  
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**Gartner.**

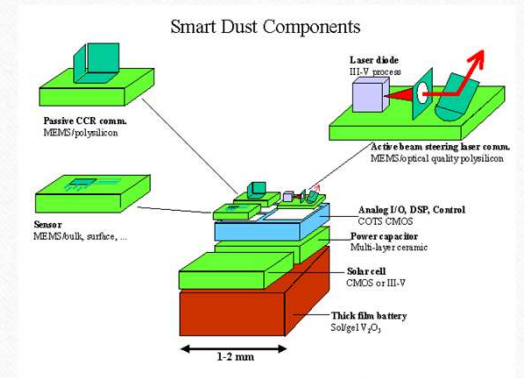
# Did that really say.....

- 4D Printing?

- [https://www.ted.com/talks/skylar\\_tibbits\\_the\\_emergence\\_of\\_4d\\_printing](https://www.ted.com/talks/skylar_tibbits_the_emergence_of_4d_printing)
- The idea of printing something that can change over time (so the fourth dimension would be time)
  - “ Think: a printed cube that folds before your eyes, or a printed pipe able to sense the need to expand or contract.”

- Smart Dust?

- is a system of many tiny devices that have sensors, cameras, and more that can detect light, vibration, chemicals, you name it.



# survey

## INTERNET OF THINGS & Quantified Self

Upcoming technologies

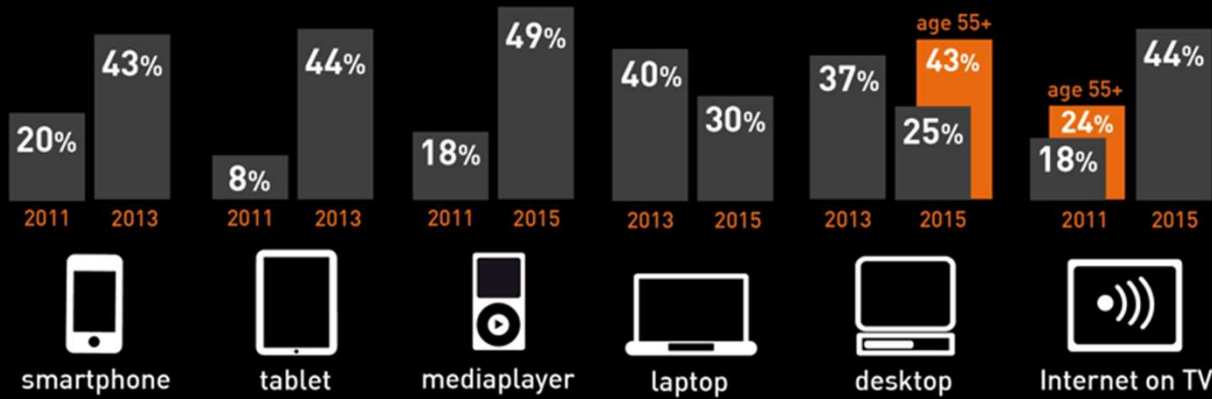


in 2015 **56%** connects lighting to the Internet



in 2015 **59%** connects thermostat to the Internet

Use of devices that are connected to the Internet



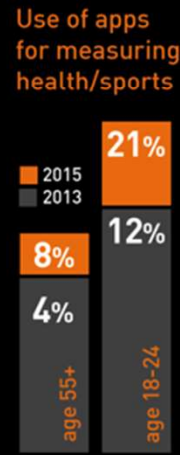
Positive attitude towards Internet of Things



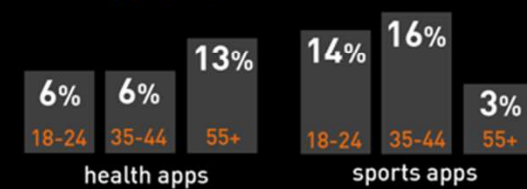
The Internet has changed life concerning:



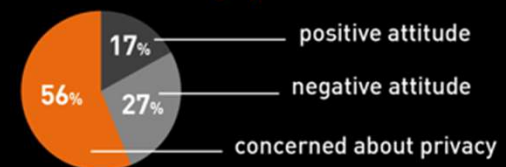
The Internet and health



Sort of apps people will use in 2015



Online monitoring by doctors





# What is Internet of things?- Different Definitions

## Definition: 9

Internet of Things will connect world's objects in both a sensory and intelligent manner through combining technological developments in

- Item identification ("tagging things")
- Sensors and wireless sensor network ("feeling things")
- Embedded systems ("thinking things")
- Nanotechnology ("shrinking things")

## Definition: 10

The Internet of things, also known as the Internet of objects, refers to the networked interconnection of everyday objects. It is described as a self configuring wireless network of sensors whose purpose would be to interconnect all things.



# Internet of Things - Home

---

- Convenience

- Automation
- Energy Savings
- Track Energy Usage

- Security

- Alarms, Lights, Cameras
- Log of who unlocked doors, walked past sensors, who arrived home all with time stamps.

## Samsung: SmartThings



Wink



Nest





# All In One Systems



PIPER



ZMODO PIVOT

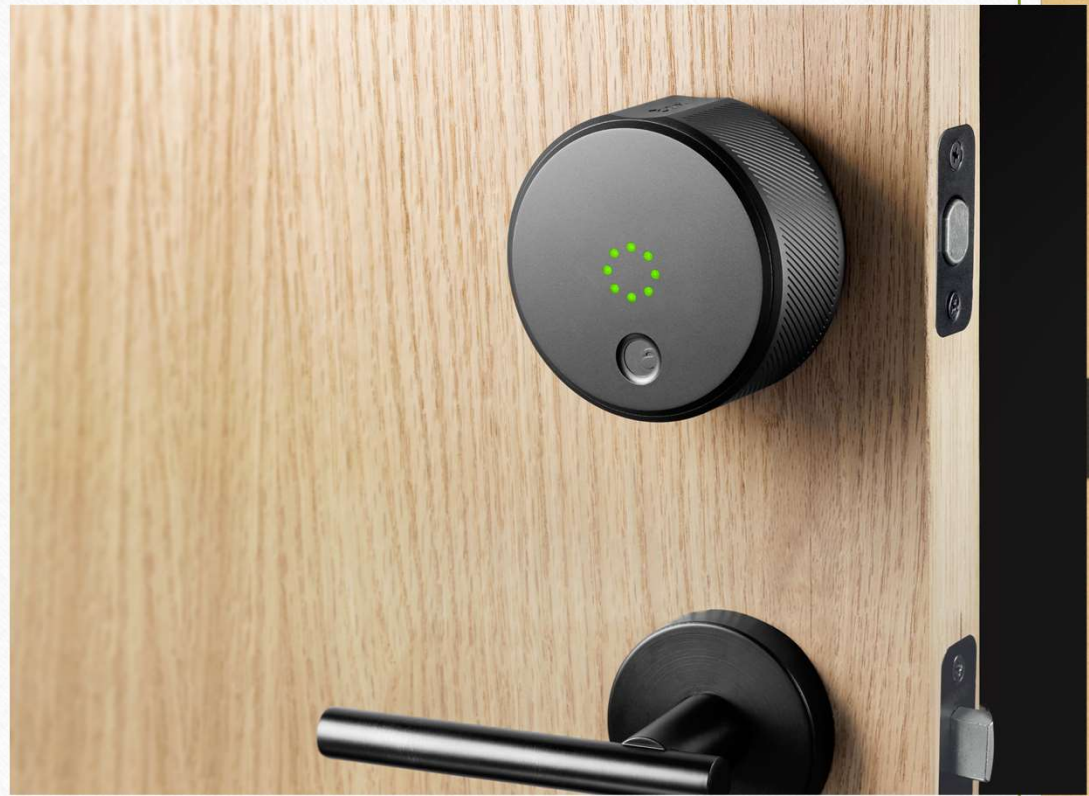


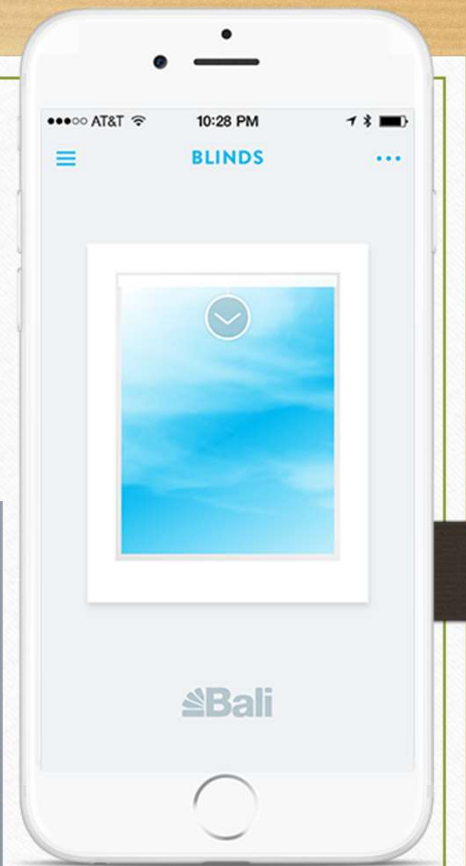
CANARY





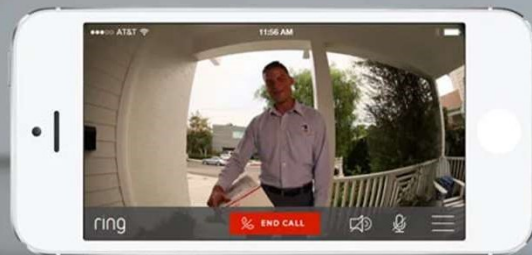


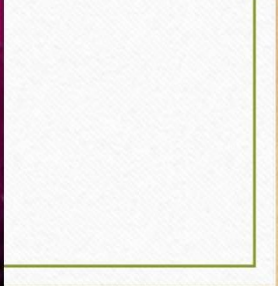
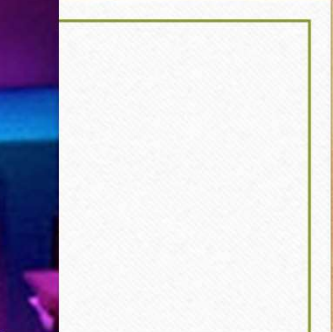




**Never miss  
a visitor.**

With Ring, you're always home.





# So many accessories. One easy way to control them.

No matter which compatible accessories you choose, the Home app makes it easy to set up and control all of them, all from one place. Over 50 brands worldwide are committed to providing products that are compatible with the HomeKit framework, and the number of available accessories is growing every day. And each of these products is reviewed and approved by Apple to help ensure your security when you use it.

[Shop the Apple site for HomeKit-enabled products >](#)



Lights



Locks



Thermostats



Window Shades



Security



Garage Doors



Humidifiers



Fans



Outlets



Cameras



Doorbells



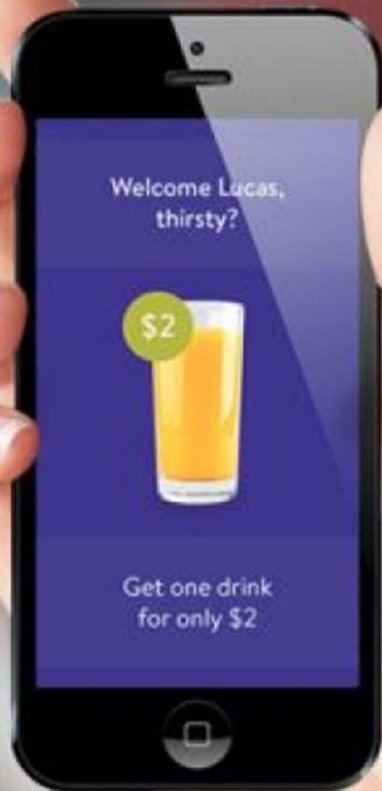
Air Purifiers



Air Conditioners



Sensors





amazon echo

Google Home

[google.com/home](https://google.com/home)







# Internet of Things - Self

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- Gamification of Health

- Compete with friends with:
  - Steps
  - Calories Burned
  - Food Eaten

- Tracking

- Movement
- Health
- Where you left “things”





Bluetooth  
SMART



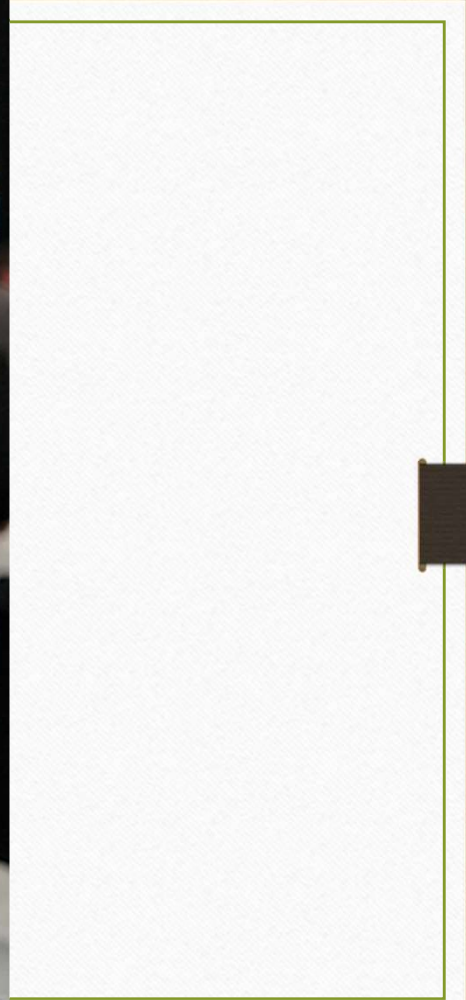
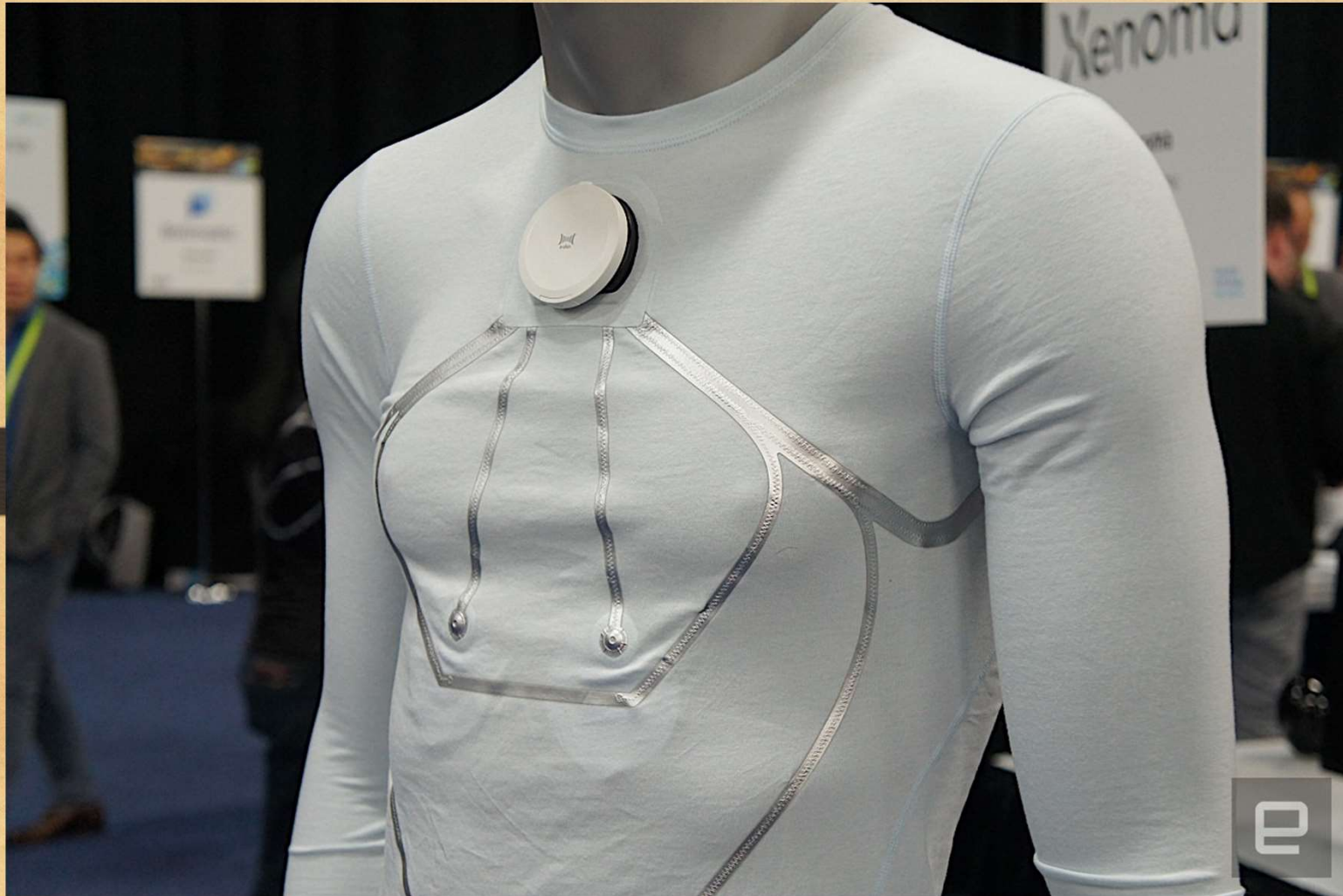
## Mimo Onesie





**muse**™

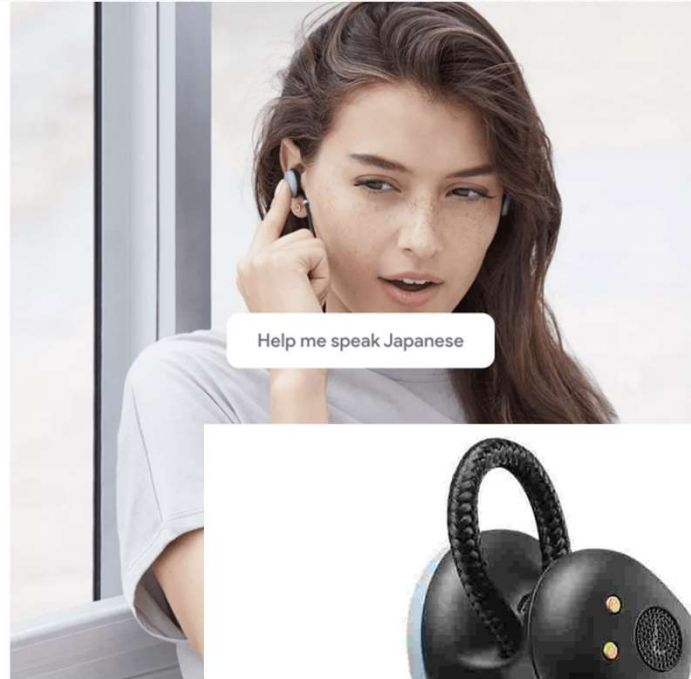
the brain sensing headband





## Talk to more people in more places with Google Translate.

Get real-time translation with Google Translate. Just touch and hold the right earbud to activate the Google Assistant on your Pixel.<sup>1</sup>











Glasses



Quantified Self



Smart fabrics

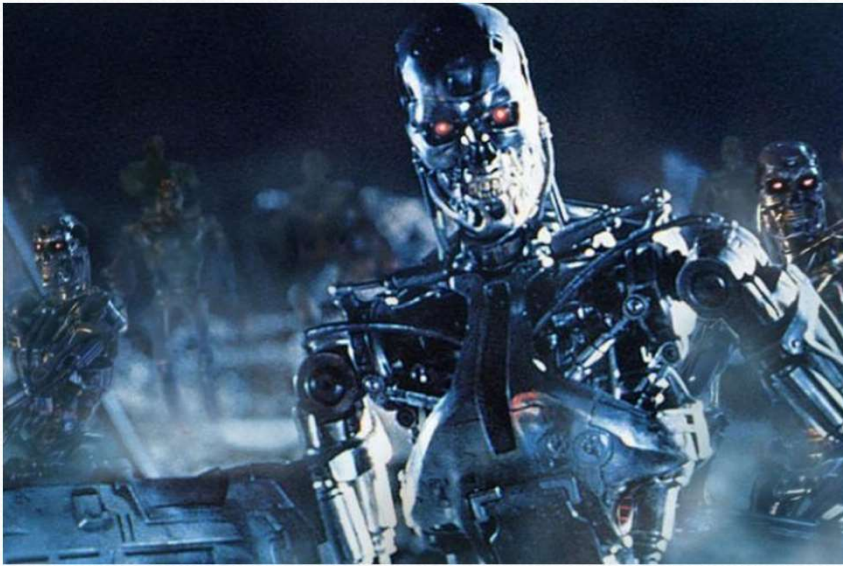


Pills

How we connect is going to change radically...

# Internet of Things - Robotics

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- Convenience and Efficiency
- Automatic and “Safe”

## dyson 360 eye

The most powerful suction of any robot vacuum.

## How the Dyson 360 Eye™ works



**Sensors**  
Detects objects and avoids obstacles ahead using proximity and infrared sensors.



**Panoramic lens**  
By shape and position gives the robot the ability to see all around the room at once.



**Live vision camera**  
Captures 30 images a second, to build complete and continuously updated picture of its environment.



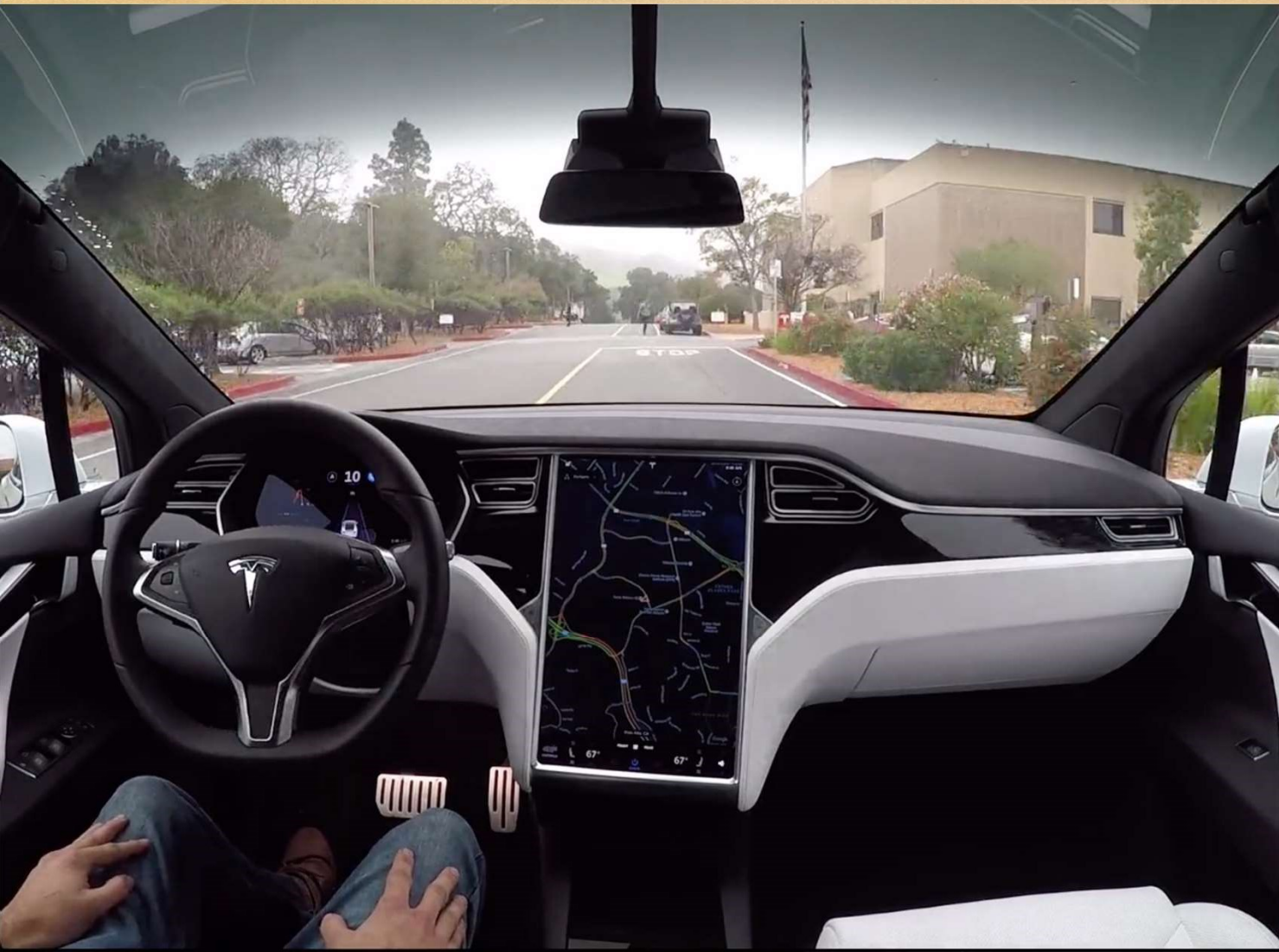
**SLAM**  
Simultaneous localization and mapping software to create a 360° view of the room.  
The Dyson 360 Eye™ robot identifies features within these images to triangulate its position relative to the room – like sailors using stars to navigate boats.



#DysonRobot



 Husqvarna



LEFT REARWARD VEHICLE CAMERA



MEDIUM RANGE VEHICLE CAMERA

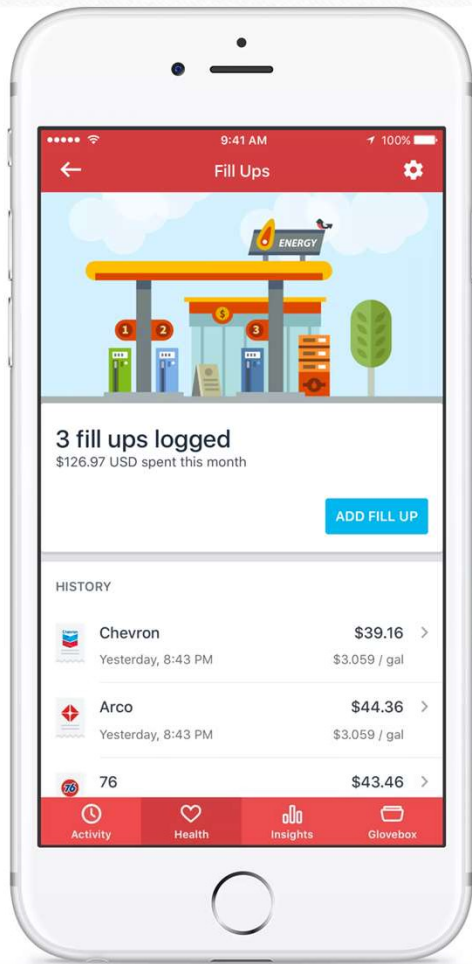
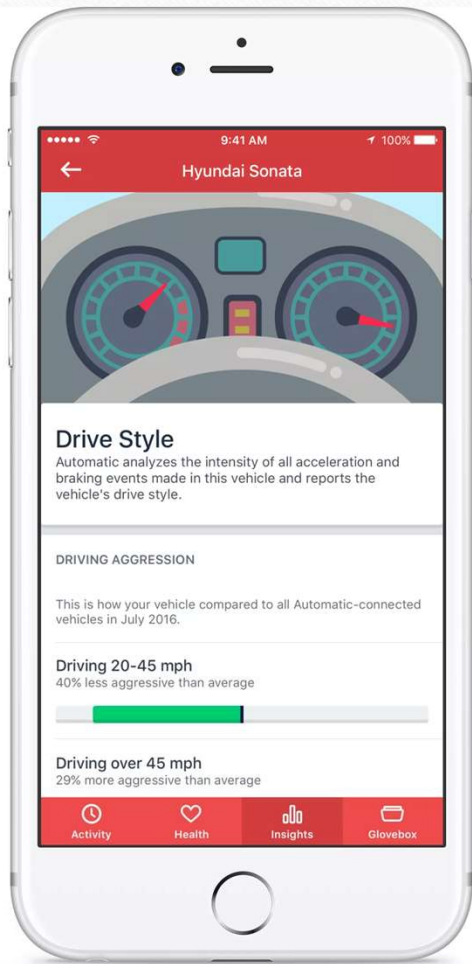
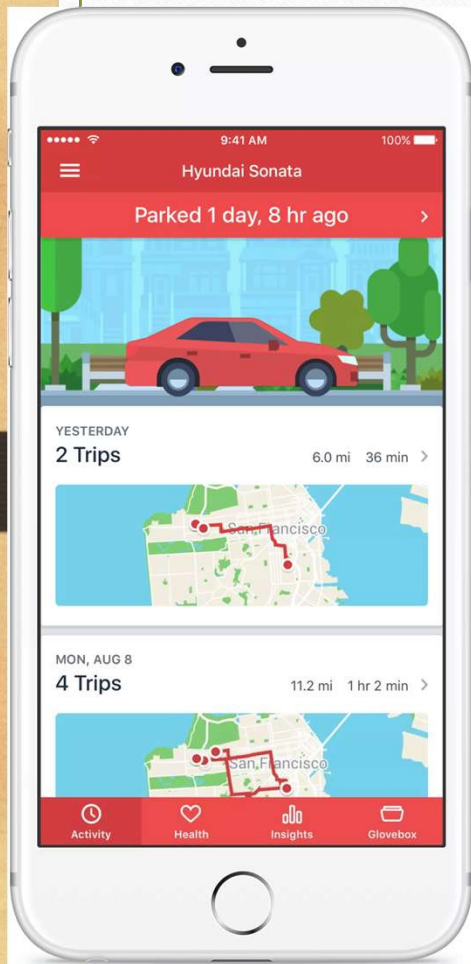








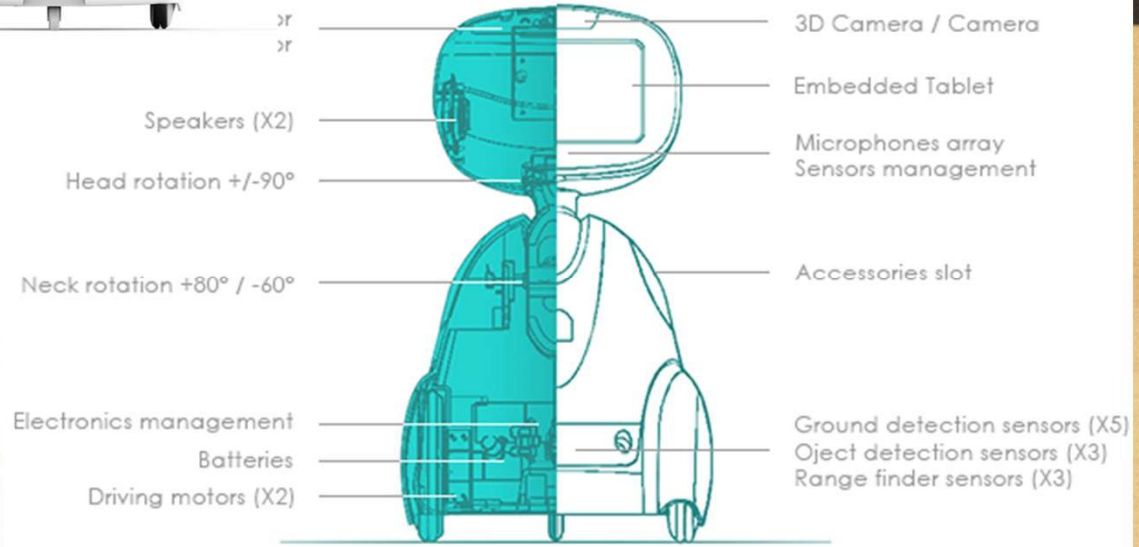
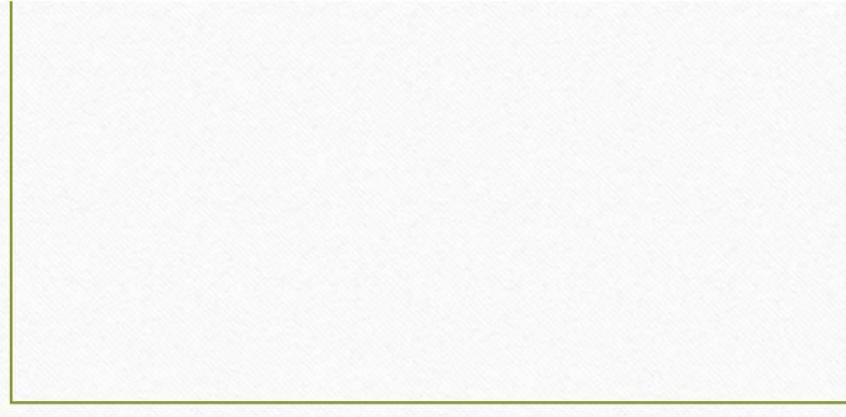
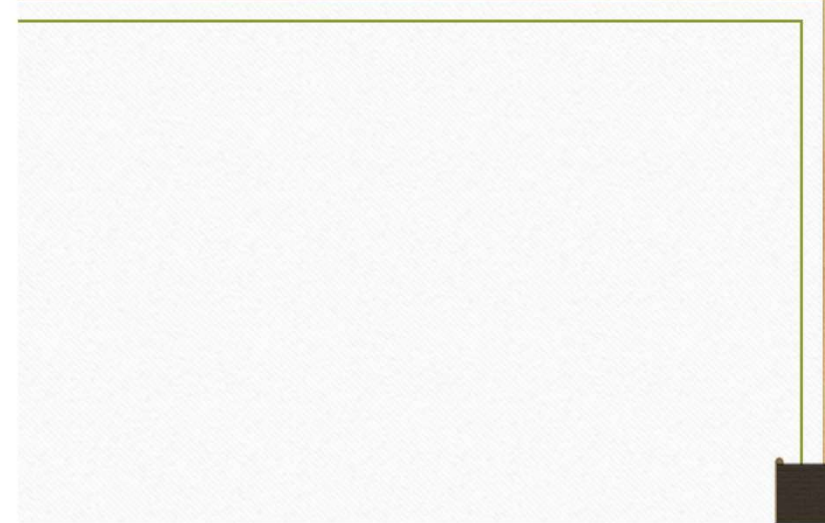
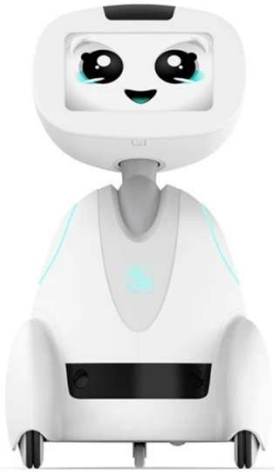








# THE COMPANION ROBOT



jibo



## MEET AIDO

AN INTERACTIVE & PERSONAL HOME ROBOT



FRIENDLY



CHARMING



PROTECTIVE

ENTERTAINER



HELPER



CARER

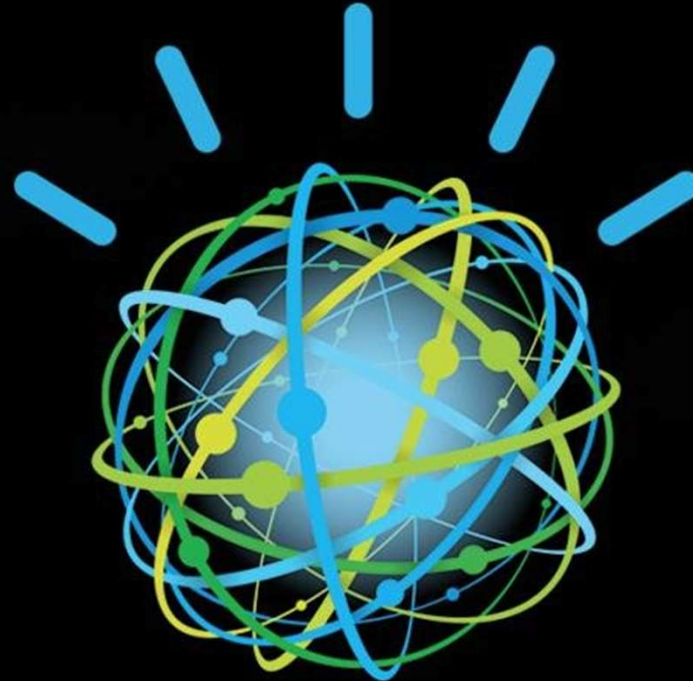


IBM

Cognitive computing

# IBM Watson

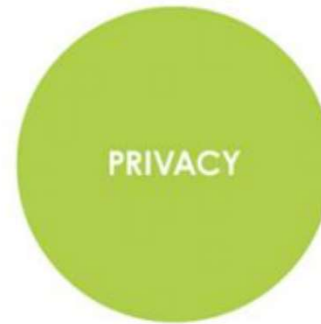
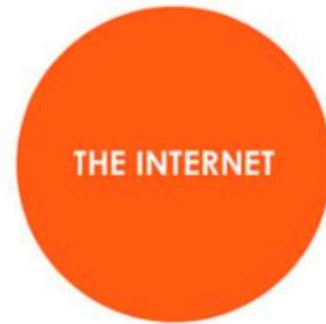
[IBM.com/developerWorks](http://IBM.com/developerWorks)



**Watson** is a question answering computer system capable of answering questions posed in natural language, developed in **IBM's** DeepQA project by a research team led by principal investigator David Ferrucci. **Watson** was named after **IBM's** first CEO, industrialist Thomas J. **Watson**.

# Big Data

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**A HELPFUL VENN DIAGRAM**

# Everything is connected

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- Faster Internet Speeds for Mobile (5G)
- 77% of Americans own a Smart Mobile Device
- Check out your website statistics – how many mobile users versus desktop users visit your page.





**I DON'T KNOW HOW MUCH  
DATA I'VE USED**

**AND AT THIS POINT I'M TOO AFRAID  
TO CHECK**

memegenerator.net

**"90% of data today was  
produced in the last 2 years."**

-Renee James, President of Intel

# Augmented and Virtual Reality

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- Augmented

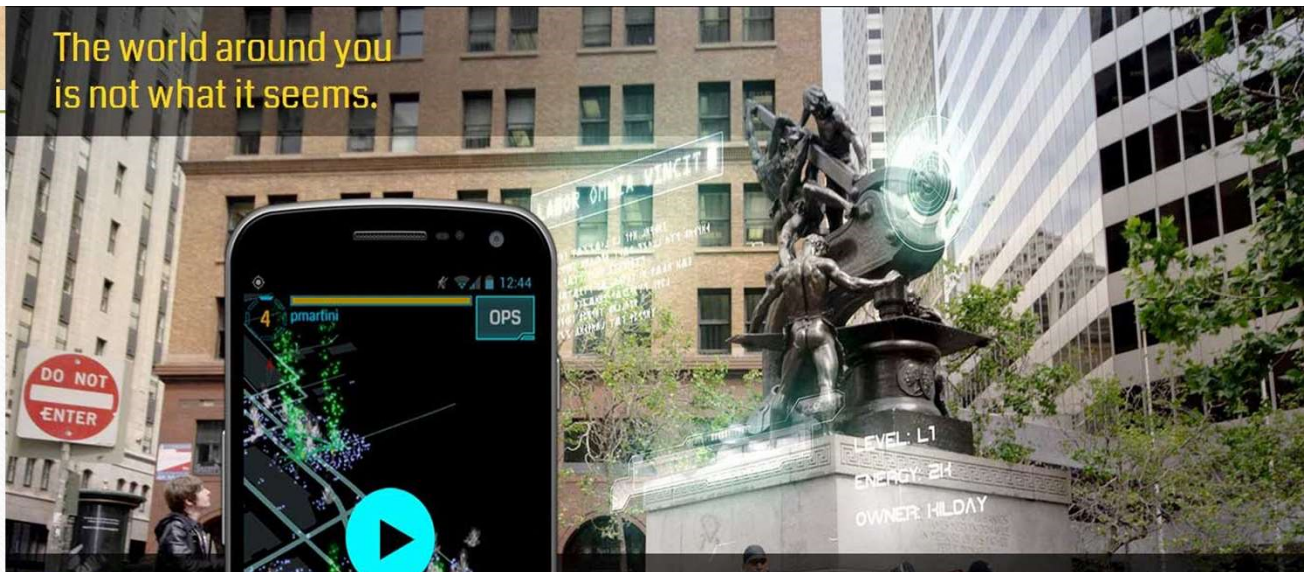
- Physical with Virtual Overlay

- Virtual

- Fully Immersive



The world around you  
is not what it seems.



**Ingress. The game.**

It's happening all around you. They aren't coming. They're already here.

Request an Invite

Email Address

ENTER

Have an invite already? Get the App from the Play Store

Copyright 2012, NianticLabs@Google. All rights reserved. Privacy & Terms Help

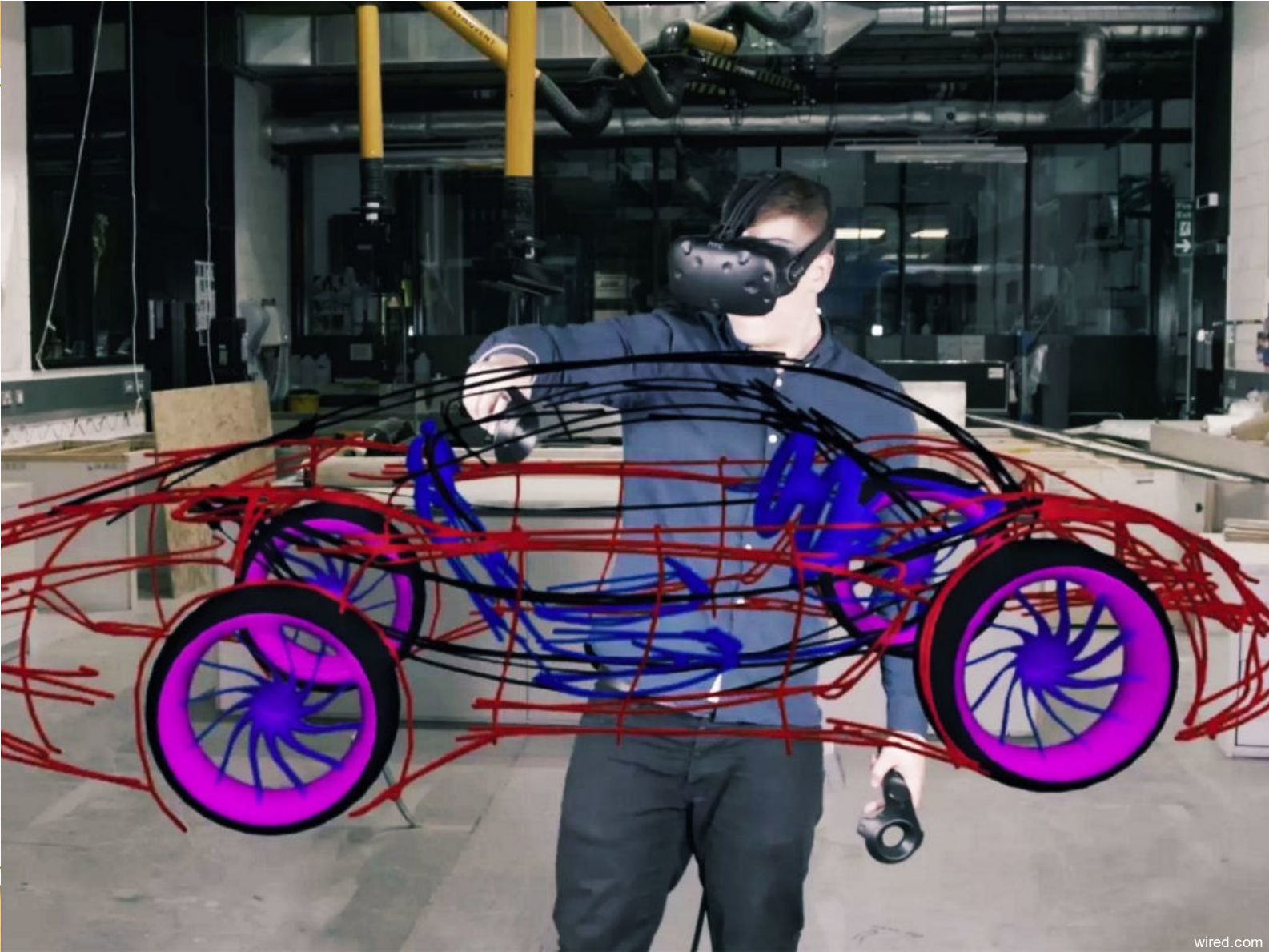
GET IT ON  
Google play













# Magic Leap One™

## Creator Edition

We're adding another dimension to computing. Where digital respects the physical. And they work together to make life better. Magic Leap One is built for creators who want to change how we experience the world.



# Smarter Classrooms and Education Shifts

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- Online Learning is Changing
  - Competency Based Education
  - Project Based Education
  - Online Classrooms:
    - Live Lectures
    - Platforms to submit assignments/quizzes (LMS – Learning Management System)
    - Self Guided / Pre-Recorded.



# Dashboard



Dashboard



Courses



Groups



Calendar



Inbox



Account



Help

**Biology 101**  
BIO-101  
2015 Fall

📁 🗂️ 📢 🗨️

**History 101**  
HIST-101B  
2015 Fall

📁 🗂️ 📢 🗨️

**Intro to Communications**  
COMM 1010

📢 📄 🗨️ 📁

## To Do

- 📢 Turn In Group Assignment ✕  
*due: Oct 5 at 11:59pm*
- 📢 Turn In Video Assignment ✕  
*due: Oct 8 at 11:59pm*

## Coming Up

[View Calendar](#)

- 📢 Group Assignment  
*Monday*
- ✅ Unit 2 Discussion  
*Tuesday*
- ✅ Midterm Assignment  
*Thursday*
- 📢 Video Assignment  
*Thursday*

## Recent Feedback

- ✅ Pass/Fail  
*Complete*
- ✅ Croc O Group Assignment  
*10 out of 10*

[View Grades](#)

# Smart Boards / Interactive TVs



# Educational Technology

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- Moving from “books” to “hands-on” applications.
  - Will see a continual rise in devices that supplement or even augment text book education... “edu-tech”.
  - Teaching STEM Principles –
    - Creation (3D Printing, Sewing, CNC, etc)
    - Lots of Programming!

## ROBO 3D C2

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3Doodler  
MSRP: \$100

---

Draw in 3D!

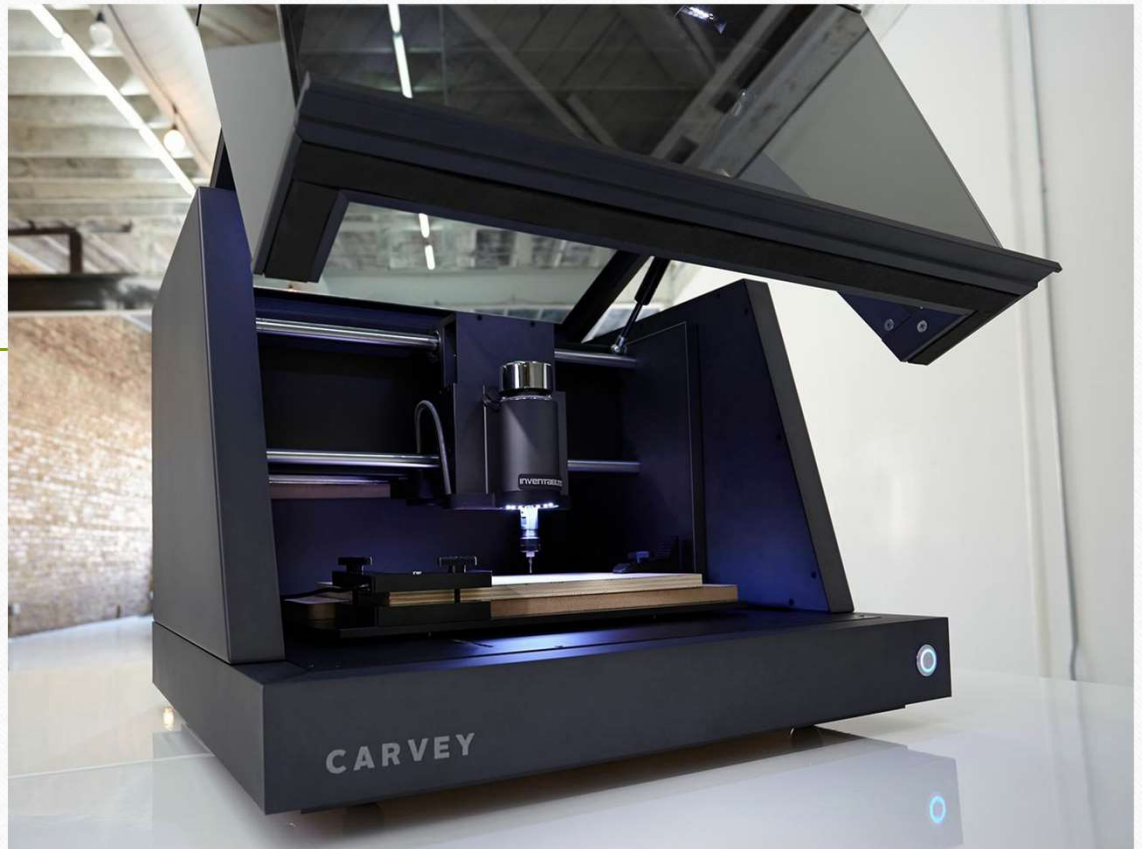






## Carvey by Inventables

Carving machine – easy to use and safe





ALUMINUM  
COPPER

MDF

PLASTICS  
ACRYLICS

WOODS



# OZOBOT

MSRP: \$50

---

Learn how to program by drawing





Color code reference chart

# OzoCodes

## SPEED



SNAIL DOSE



SLOW



FAST



TURBO

## DIRECTION



GO LEFT



GO STRAIGHT



LINE JUMP LEFT



LINE JUMP STRAIGHT



U TURN



U TURN (LINE END)

## OZO Blockly

Beginner

1 2 3 4 5

Movement

Light Effects

Timing

Loops

```
disco
set light color [ ]
spin right
wait 1 second(s)
repeat 5 times
do
  set light color [ ]
  big circle fast forward left 1 second
  set light color [ ]
  small circle fast forward right 2 seconds
  rotate slight left
  set light color [ ]
  big circle fast backward left 1 second
  set light color [ ]
  small circle fast backward right 2 seconds
  rotate slight left
wait 1 second(s)
disco
set light color [ ]
spin left
```

# Finch

MSRP: \$99

---

The Finch was designed to allow students to write richly interactive programs. On-board features include:

Light, temperature, and obstacle sensors, Accelerometers, Motors, Buzzer, Full-color beak LED, Pen mount for drawing capability, Plugs into USB port - no batteries required



when space key pressed



when space key pressed

repeat until key q pressed?

Move Finch Left: 50 Right: 50

wait 1 secs

Move Finch Left: -50 Right: -50

wait 1 secs

Stop Finch

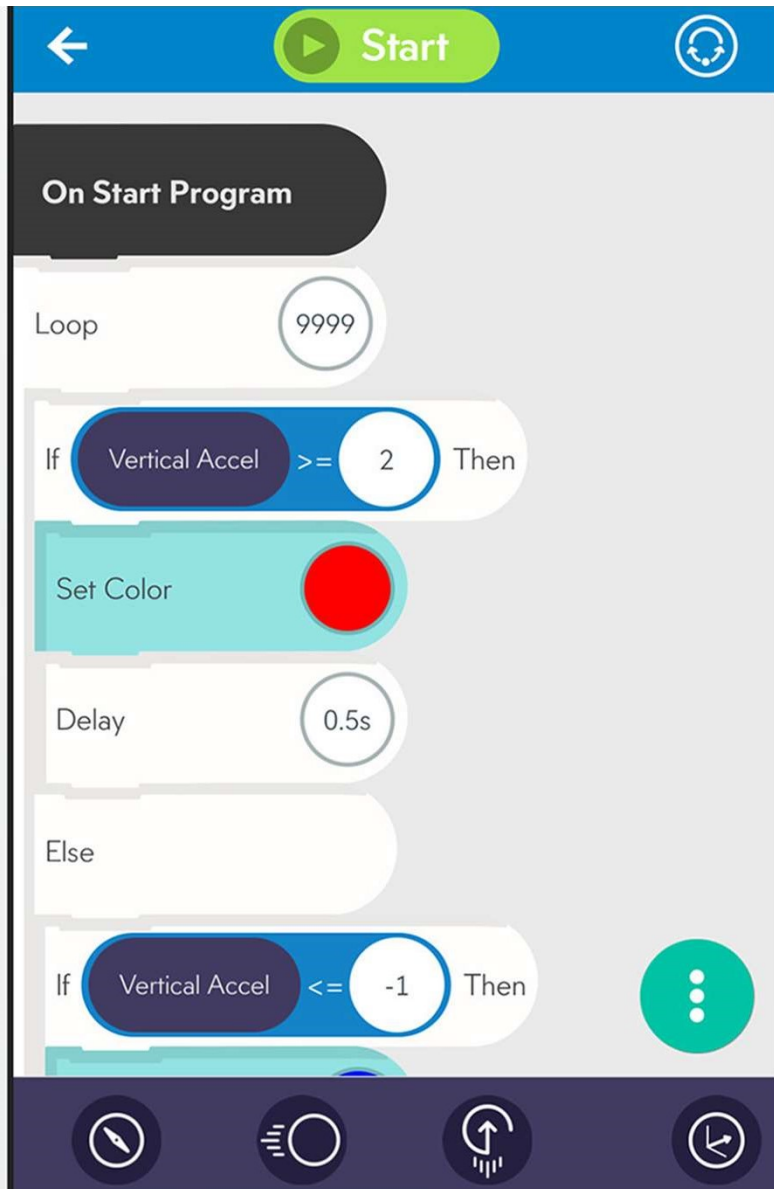
# Sphero Ball

MSRP: \$130

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Guide Through Library (Follow  
The Ball)  
People Approach The Ball –  
Curiosity  
Easily Programmable





```
void HandleFreeFall()  
{  
    setRgbLed( 255,22,21 );  
}  
OnFreeFall = HandleFreeFall;  
  
yield StartProgram()  
{  
    int loopCount_988 = 0;  
    while (loopCount_988 < 10000)  
    {  
        loopCount_988 = loopCount_988 + 1;  
        if ( verticalAcceleration >= 2 )  
        {  
            setRgbLed( 255,0,0 );  
            yield DoDelay( 250 );  
        }  
        else  
        {  
            if ( verticalAcceleration <= -2 )  
            {  
                setRgbLed( 255,255,0 );  
                yield DoDelay( 250 );  
            }  
            else  
            {  
                setRgbLed( 255,255,255 );  
            }  
            yield DoDelay( 50 );  
            controlSystemTargetSpeed = (69 + 8);  
        }  
    }  
    controlSystemTargetYaw = controlSystemTa  
}  
yield StartProgram();  
...
```



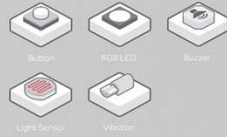
SAM Labs

Circuits and Programming!





Live SAMs



Sleeping SAMs

Apps

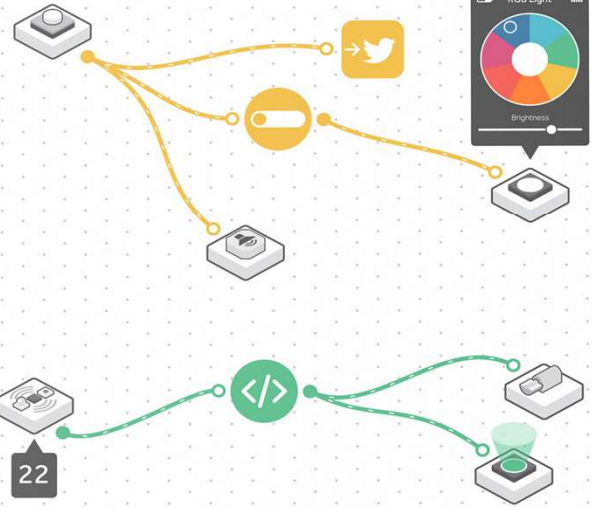


Behaviours

Timing

Logic

SAM Labs



# WINK

MSRP: \$50

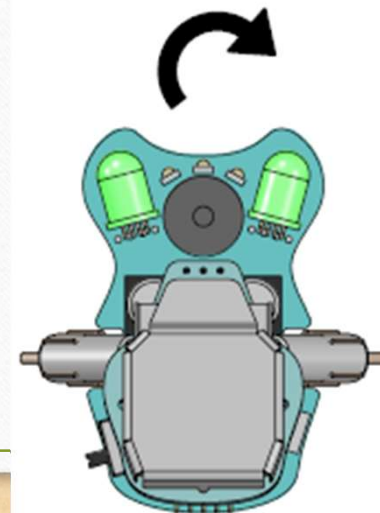
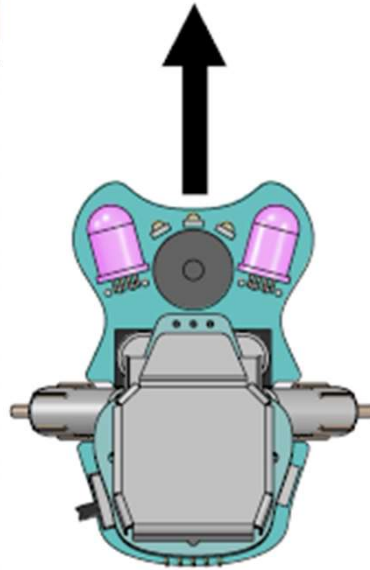
Fun activities to program a robot using Arduino.

This low cost robot allows students to program common robotic tasks such as:

- Line Following
- Light Seeking
- Barrier Detection
- Autonomous Roaming
- Creative Experimentation



```
void loop(){  
  eyesPink(70);  
  motors(120,120);  
  delay(300);  
  eyesGreen(70);  
  motors(120,-120);  
  delay(200);  
}
```



## Little Robot Friends

LRF are cute social robots that can be programmed wirelessly and interact with each other.



**VERY HAPPY**

Patterns

Sound

1.0.6

MyLRF01\_Blink | Arduino 1.0.6

```
MyLRF01_Blink §  
#include "LRF.h"  
  
// Create a light pattern for the eyes  
LRFPattern myPattern = {  
    LRFColor_Blue,           // starting color  
    LRFColor_Green,        // target color  
    LRFPatternMode_Fade     // pattern behaviour (see LRF.h)  
};  
  
// ----- everything below this point runs the program -----  
  
void setup(void) // Arduino setup routine that gets called ONCE when  
{  
    lrf.setup(); // lrf library should be set up before anything else  
    delay(1000);  
  
    lrf.blink(myPattern); // let's try blinking our pattern  
    delay(1000);  
}  
  
void loop(void) // Arduino loop routine that gets called OVER AND OVER  
{  
    lrf.loop(); // run the lrf library  
}
```



# Other Technology and Topics!

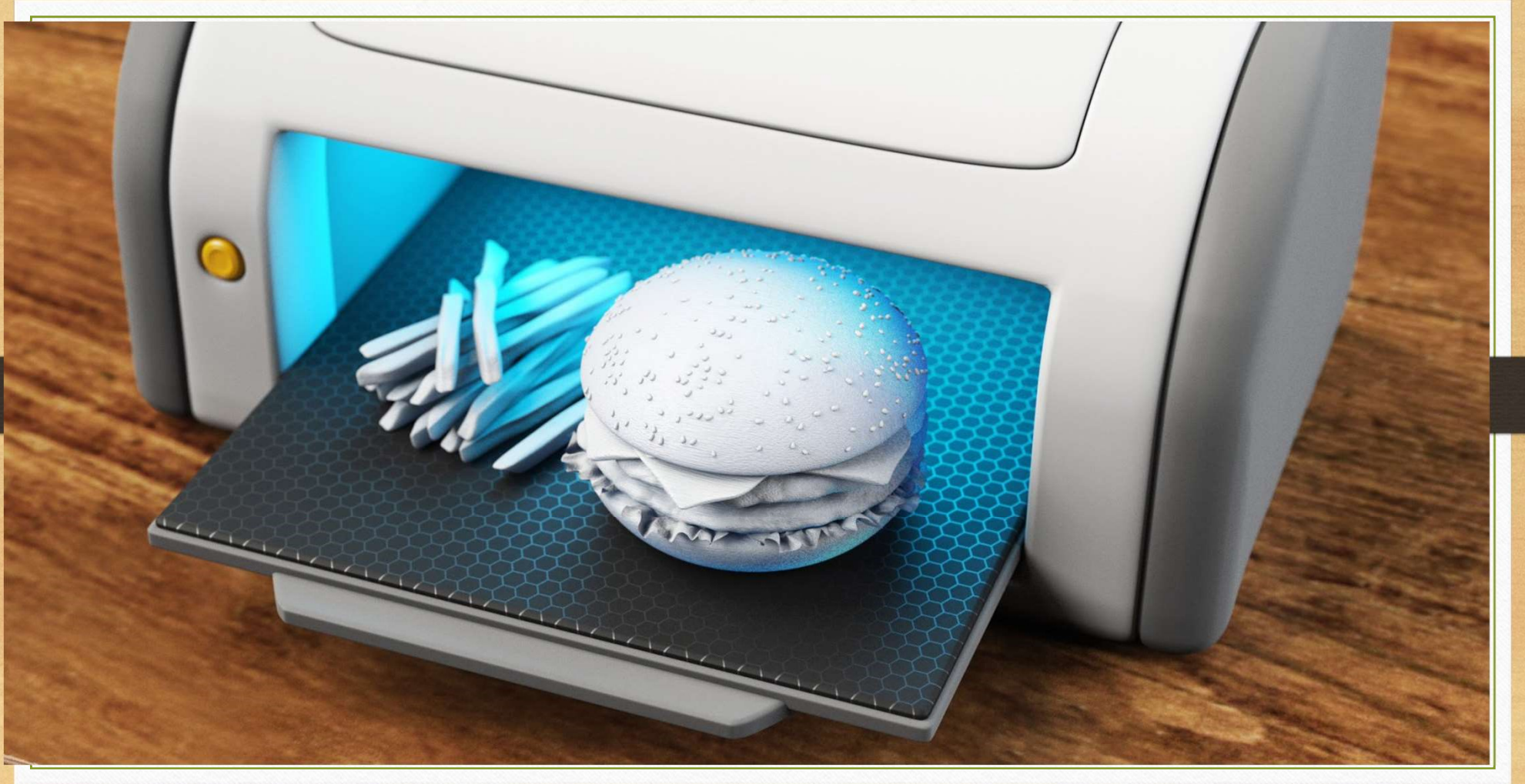
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Giroptic's iO







# CGI & AI PROMOTE FAKE NEWS & CREATE FAKE VIDEOS

<https://www.nytimes.com/2018/03/04/technology/fake-videos-deepfakes.html>

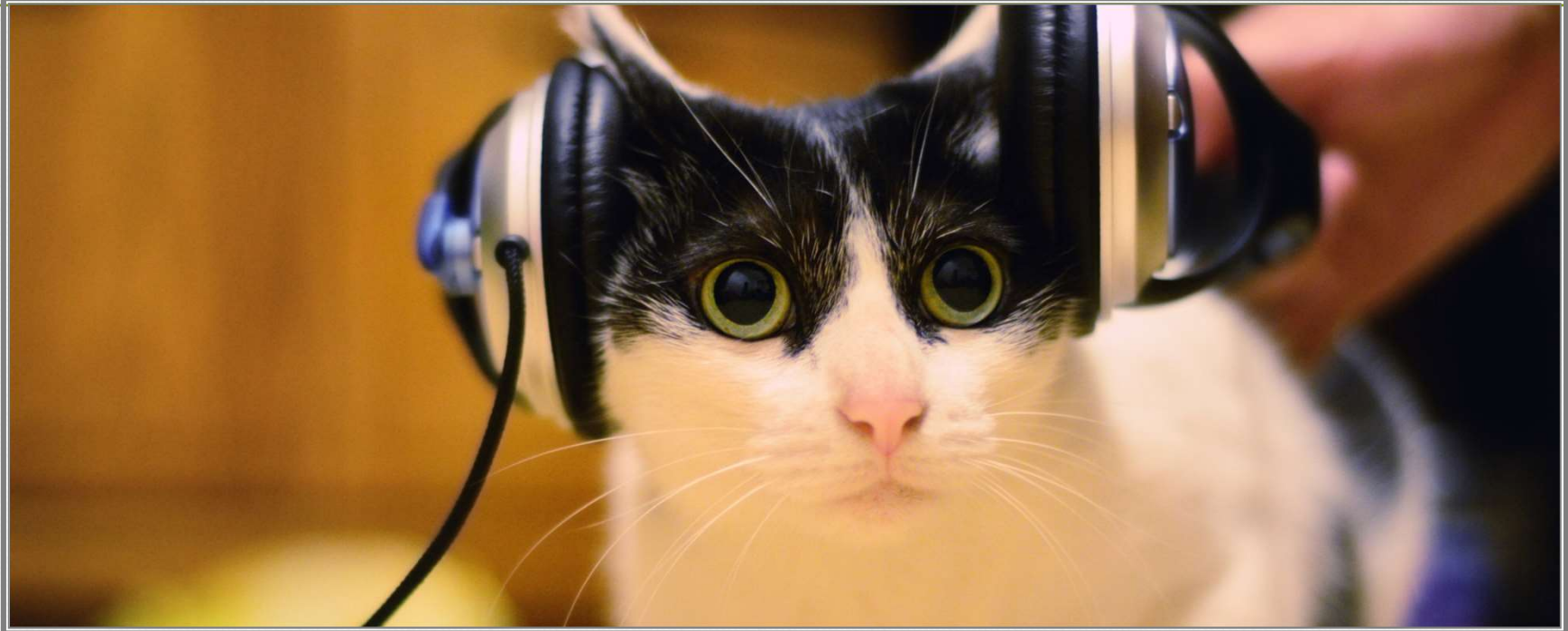
<http://www.graphics.stanford.edu/~niessner/thies2016face.html>



# Mobile Devices Impact

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- Websites – Responsive, light weight (quick to load)
- Apps
- Social Connections



What have you heard?

# Staying Informed

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- CES Conference (Consumer Electronic Show)
- Attend Technology Conferences and Events
  - Meet Up Groups
- Watch Kickstarter/Indiegogo
- Online/Print Publications: TechCrunch, Forbes, Fast Company

# Questions?

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- Brian Pichman
- [bpichman@evolveproject.org](mailto:bpichman@evolveproject.org)
- [@BPichman](#)