IoT Business & Products
IoT Products & Services

IoT Products & Services

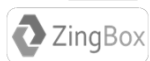❖ **IoT Products & Services**

- ▪ IoT companies

  - Atmel Corporation
  - Android Things
  - Samsara
  - ZingBox
  - Uber

IoT Products & Services

❖ **Atmel**

▪ IoT Hardware

- Semiconductor Manufacturer & Design Company
  - Microcontrollers, RF (Radio Frequency) devices,
    flash memory, application-specific products, etc.
- 2015 revenue was $1.17 billion
  - Large part of the revenue is from microcontrollers

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❖ **Atmel**

▪ IoT Hardware

- Atmel AVR: Atmel microcontroller family brand

- One of the first microcontrollers using
  on-chip flash memory for program storage
  - Other microcontrollers commonly used
    One-time programmable ROM, EPROM, or EEPROM

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❖ Atmel

- ▪ IoT Hardware
  - • megaAVR (ATmega) series are adopted as a Arduino physical computing platform

Arduino board	Description	Atmel AVR
Arduino Uno	Entry level	ATmega328P
Arduino Leonardo		ATmega32u4
Arduino Yun	IoT	ATmega32u4
Arduino Ethernet		ATmega328
Arduino Lilypad (USB, Mainboard, Simple)	Wearable	ATmega32u4 ATmega168 ATmega328

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❖ Android Things

- ▪ IoT Software

  - • Android-based embedded OS (Operating System)
  - • Android Thing from past Google Brillo Project
    - - C++ based (Brillo) ➔ Java-based environment
  - • Supports Raspberry Pi 3, Intel Edison for initial prototyping of Android Thing products
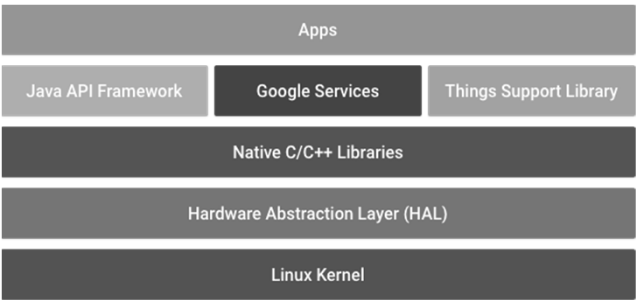
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❖ Android Things
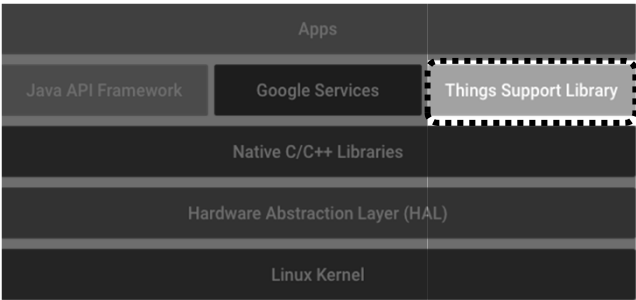
- ▪ IoT Software
  - • Architecture of Android Things

Apps
Java API Framework · Google Services · Things Support Library
Native C/C++ Libraries
Hardware Abstraction Layer (HAL)
Linux Kernel

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❖ Android Things

- ▪ IoT Software
  - • New feature: Things Support Library API

Apps
Java API Framework · Google Services · Things Support Library
Native C/C++ Libraries
Hardware Abstraction Layer (HAL)
Linux Kernel

IoT Products & Services
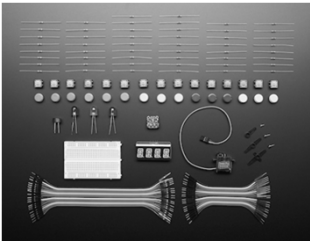
❖ Android Things

- IoT software
  - **Things Support Library API**
    1. Peripheral I/O API
       - Support GPIO, PWM, UART, SPI physical connectivity
    2. User Driver API
       - App becomes able to communicate with hardware events
       - Touch pads, keyboards, game controllers, and physical motion sensors
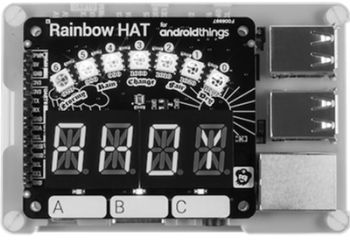
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❖ Android Things

- IoT Software
  - **Things Support Library API**
    - Featured peripheral kits for the Android Things developers offering Android code examples
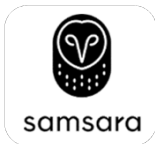
Adafruit Project Kit

Pimoroni Rainbow HAT
(Hardware attached on Top)

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❖ **Samsara**

▪ IoT Solutions (HW, SW, Network)

- Founded in 2015
- Introduced in Forbes and Fortune as a future leading IoT company in 2015
- Provides IoT integrated platforms
  - IoT Gateway, Camera & Sensor modules
  - Software for Mobile Apps & Cloud-based Dashboards

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❖ **Samsara**

▪ IoT Solutions (HW, SW, Network)

- Provides easy to deploy IoT technologies for Industries
- Supports under 15 mins. intuitive installation by adopting plug-and-play technology

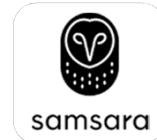IoT Gateway for Vehicles   Wireless Environmental Monitor   Software Solution (Driver App, Dashboard)
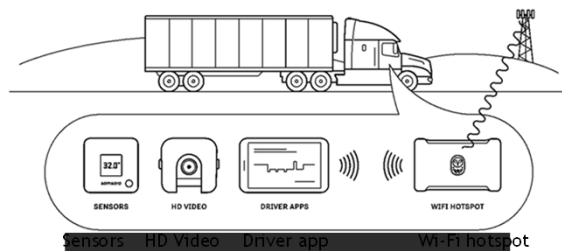
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❖ Samsara

- ▪ IoT Solutions (HW, SW, Network)
  - • Fleet management industry IoT solutions
    - - GPS Tracking, Dash Cam, Wi-Fi Hotspots, etc.

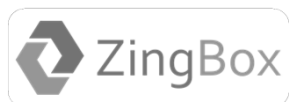Author: Samsara, Source: https://www.samsara.com/fleet/wifi-hotspot

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❖ ZingBox
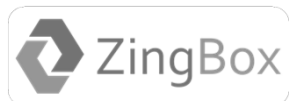
- ▪ IoT Security

  - • Startup company that develops enterprise
    IoT security solutions
  - • Discovers & protects connected IoT equipment
  - • Nominated as one of the
    "Gartner's Cool vendors in IoT Security 2017"

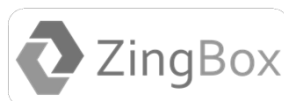## IoT Products & Services

❖ **ZingBox**

- IoT Security

- Founded in 2014
- $2.3 million in angel investor funding
- Raised $22 million in Series B funding round from Dell Technologies Capital and Tri Ventures
- Launched IoT security solution 'IoT Guardian' on February 9, 2017

IoT Products & Services

❖ **ZingBox**
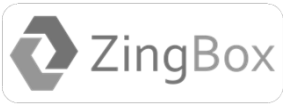
- IoT Security

  - IoT Guardian
    - Claims to be the first deep-learning algorithm based industry security solution
    - Deep scale data of each IoT device's trusted behavior is monitored
    - Enforces a trusted behavior to IoT devices
    - Focuses on data protection

IoT Products & Services

❖ ZingBox

- **IoT Security**
  - IoT Guardian

	Previous solutions	ZingBox
Purpose	Detecting malware and data protection	Defending deviation from IoT devices' non-standard behavior
Method	Rule-based detection & Database update	Unsupervised deep learning & enforcing trusted behavior
Operation	End-point installment of products	Clientless (no install and management of software agent)

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❖ Uber

- **IoT Applications**

  - Connects Cars (Things) to a Server (Internet) and Users
    - Location sensor data of the Driver's and Passenger's mobile device is transmitted to the Uber system
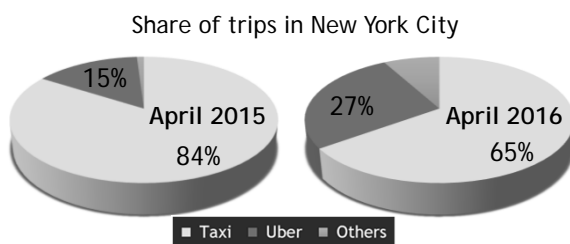   - Uber 'back end' cloud system provides analytics for the optimized driver/passenger pair

9

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❖ **Uber**

▪ IoT Applications

- In 2018, supports services in
  84 countries and over 760 cities

- Uber owns a 77% share of the ride hailing
  market in the United States

Share of trips in New York City

15%
April 2015
84%

27%
April 2016
65%

■ Taxi ■ Uber ■ Others

Source: New York City Taxi & Limousine Commission, July 2016, Morgan Stanley Research

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❖ **Uber**

▪ Funding & Value & Revenue

- Total funding amount from VC is $22.2B

- Uber's gross revenue in 2016 is $20B

- Uber's net revenue in 2016 is $6.5B

- Uber's company valuation in 2017 is $69B

- Uber driver's average income is
  $364/month in 2017

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❖ IoT Economic Impact

- Predictions have been made that IoT has
  the potential to increase global
  corporate profits by 21% (in aggregate)
  by 2022

Asset Utilization	$2.5T	
Employee Productivity	$2.5T	
Supply Chain & Logistics	$2.7T	$19 Trillion Market
Customer Experience	$3.7T	
Innovation	$3.7T	

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❖ IoT Economic Impact: M2M, M2P, P2M, P2P

- M2M (Machine-to-Machine) connections
  are increasingly important
- P2P (Person-to-Person) as well as
  P2M (Person-to-Machine) &
  M2P (Machine-to-Person) still represent
  the majority of IoT's economic value

M2M	$6.4T	45%
M2P or P2M	$3.5T	55%
P2P	$4.5T	

11

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❖ **IoT Applications**

- Security
  - Surveillance applications, alarms, real-time object/people tracking and monitoring

- Transportation
  - Fleet management, road safety, emission control, toll payment, real-time traffic monitoring, and many more ITS (Intelligent Transport Systems) applications

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❖ **IoT Applications**

- Manufacturing
  - Monitoring and automation of a production chain

- Supply & Provisioning
  - Freight supply, distribution monitoring, and vending machines

- Facility Management
  - Home, building, and campus automation

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❖ IoT Applications

- Utilities
  - Measurement, provisioning, and billing of utilities (e.g., gas, water, electricity, etc.)

- Healthcare
  - E-health, personal security, body-sensor based customized healthcare systems

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❖ IoT & M2M Ecosystem

Segment	Description	Companies / Organizations
Services	BSP (Business Service Providers / Business Solution Providers)	jasper wireless ECHELON KORE Axeda ei 3.
Services	System integrators and IoT solution providers for enterprises	hp QUALCOMM Deloitte. IBM accenture CSC
Network	Network operators, communications service providers, and transport infrastructure providers	verizon Sprint at&t CISCO vodafone T Deutsche Telekom

IoT Products & Services

❖ **IoT & M2M Ecosystem**

Segment	Description	Companies / Organizations
Software	Software manufacturers, middleware and application infrastructure vendors, IoT OS providers	ORACLE, Google, Honeywell, SAMSUNG, QUALCOMM, GE, SAP, vmware
Hardware	Manufacturers of GPS chips, wireless sensors, wearable devices, actuators, and embedded hardware devices	QUALCOMM, Sixnet, SIERRA WIRELESS, SONY, SAMSUNG, MOTOROLA, LG, TEXAS INSTRUMENTS

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