



Gobot Meets IoT

**Using the Go Programming Language to Control The
“Things” Around Us.**

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Outline

- Define IoT & History of the Internet of Things (IoT)
- Predicted growth of the IoT
- Go Programming Language
- Gobot Examples:
 - Arduino, Sphero, ArDrone

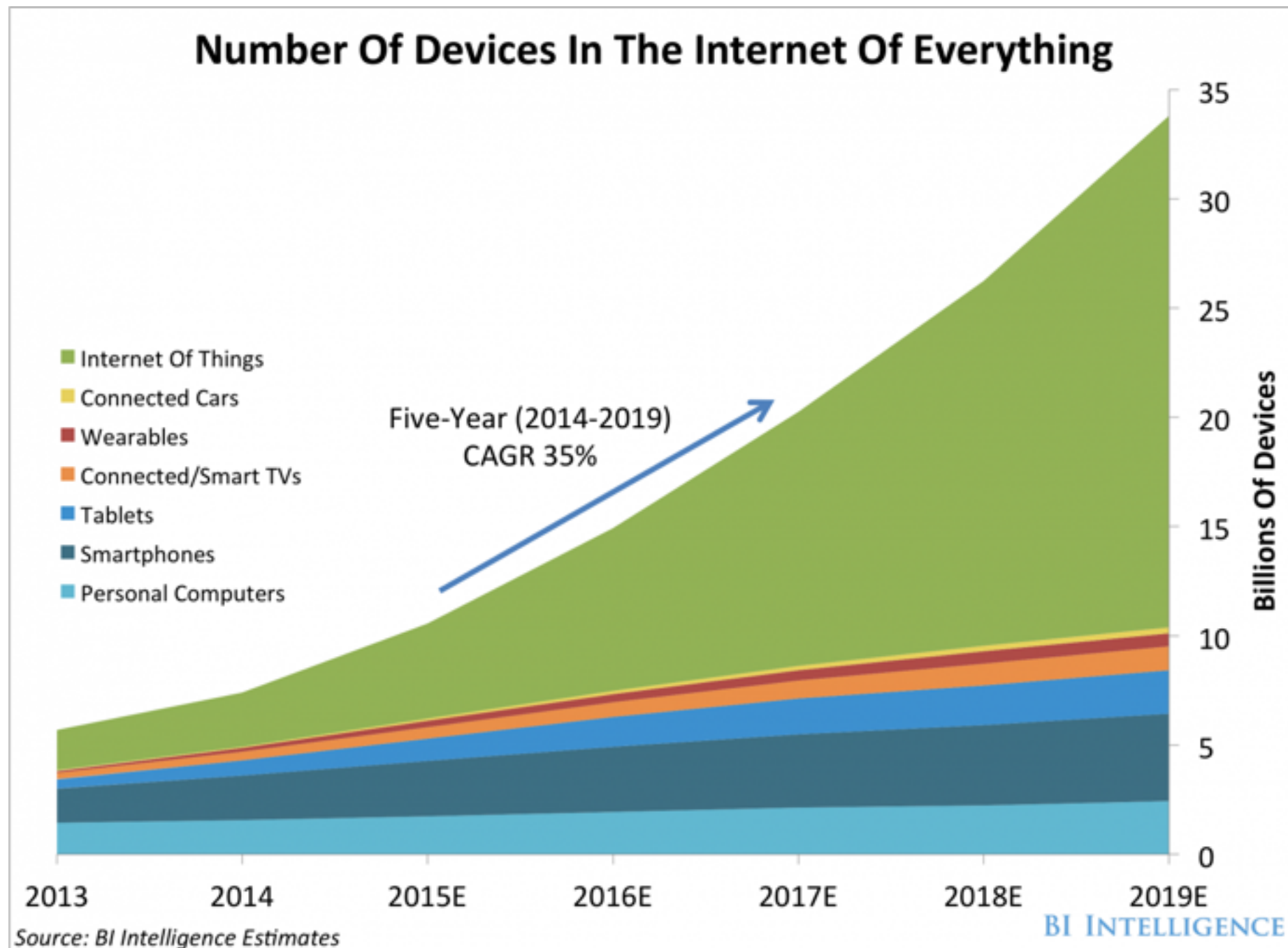
“Things”

- Wikipedia : Interconnection of uniquely identifiable embedded computing-like devices within the existing Internet infrastructure (source: Wikipedia)
- Around 6 billion devices in 2013
- Forecasting 35 billion or more devices by 2020
- Huge opportunity for new markets, ideas and products

History

- Coke machine in 1982 was able to report whether drinks were cold or not
- Device to device communication discussed in 1999 at the economic world forum
- Concepts became popular in 1999 though RFID and sensor tracking points.
- Has roots in industry and business (M2M)

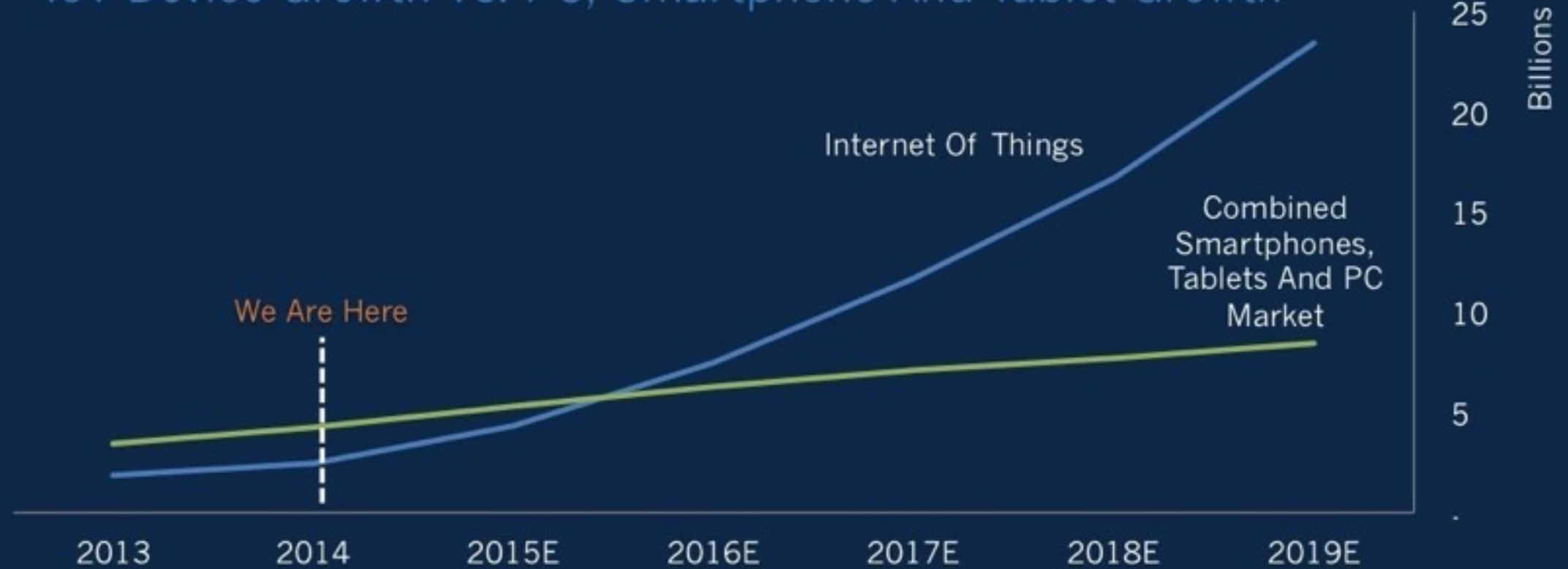
Devices



CAGR = Compound Annual Growth Rate

Growth

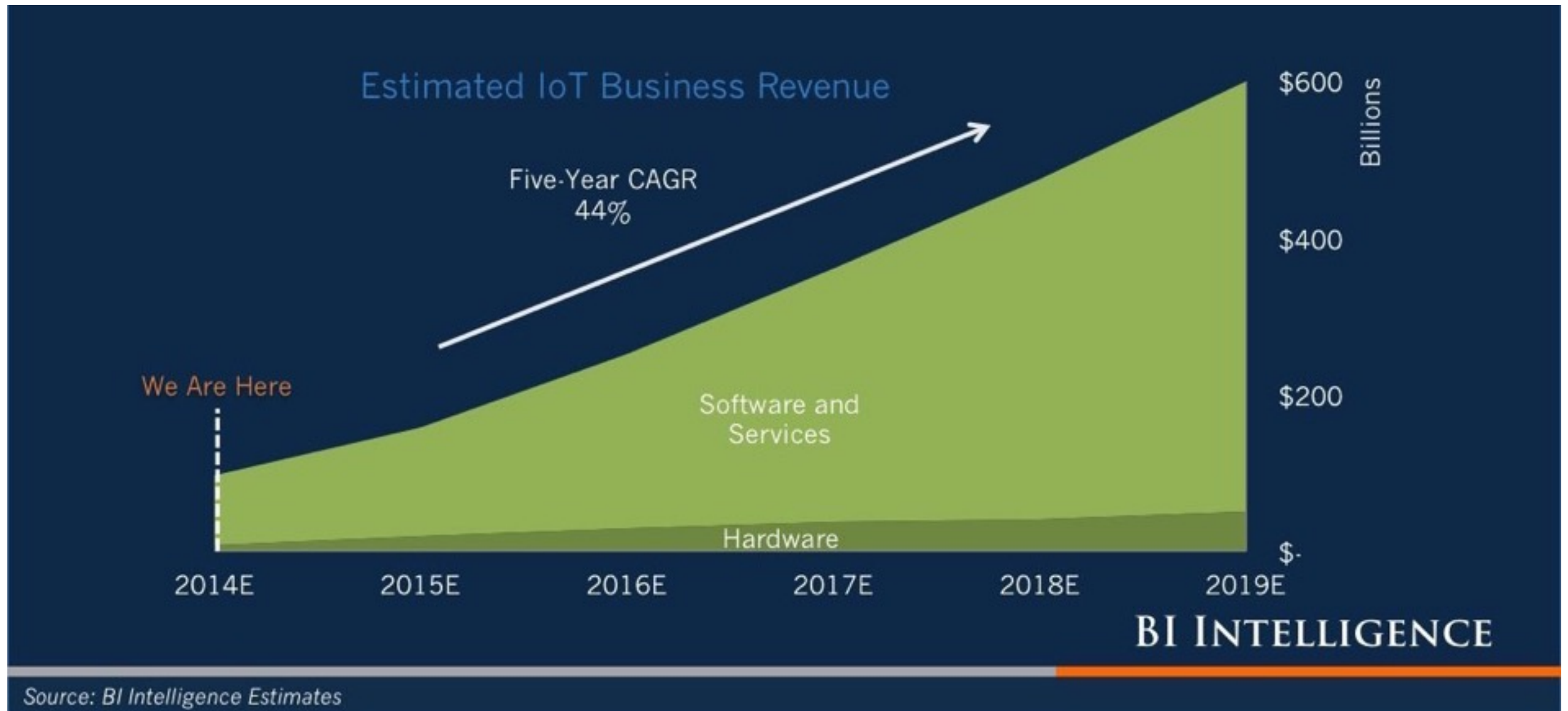
IoT Device Growth Vs. PC, Smartphone And Tablet Growth



BI INTELLIGENCE

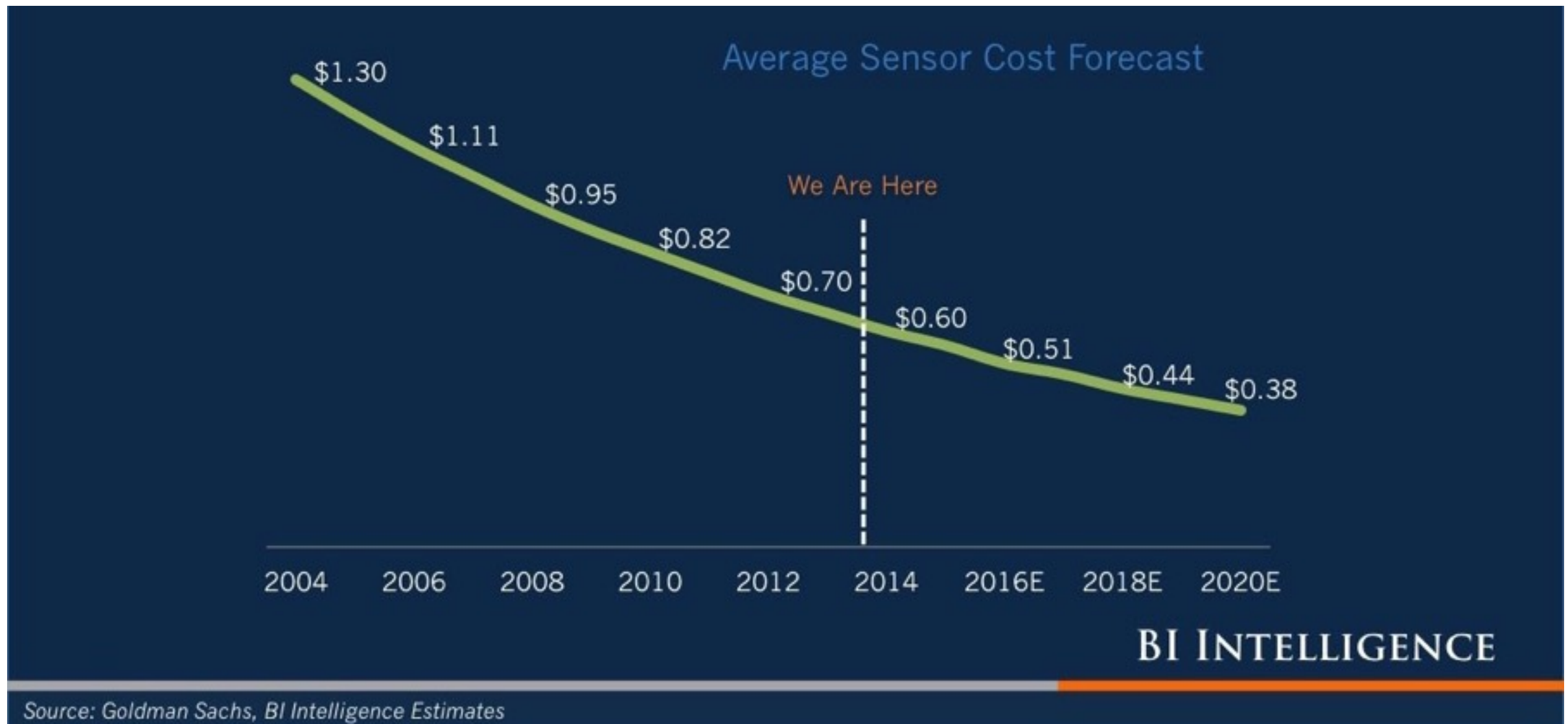
Source: BI Intelligence Estimates

Opportunity

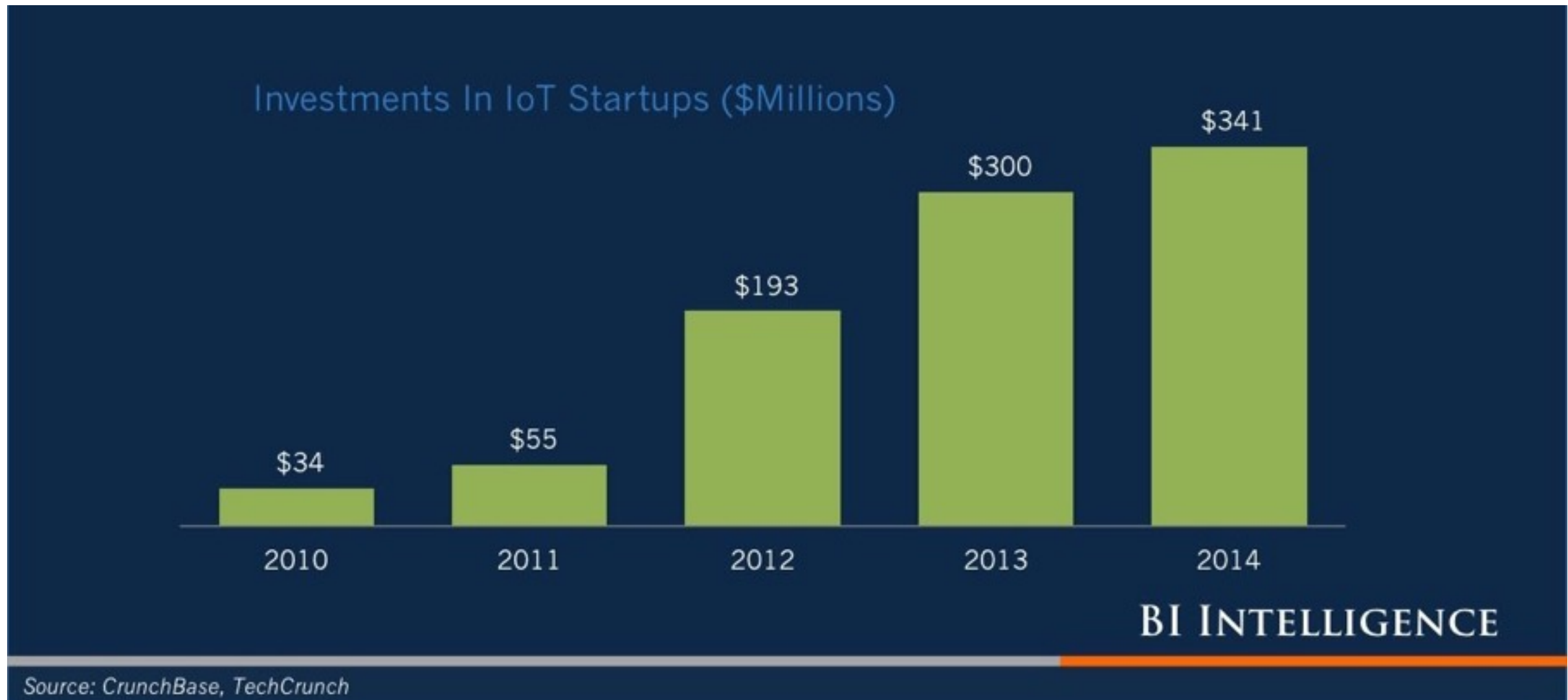


CAGR = Compound Annual Growth Rate

Costs



Investments



Why Now?

- Bigger than the explosion of mobile in 2007
 - Cheap hardware (drones from \$299)
 - Low cost cloud services
 - 3D printing & low volume runs
 - Consumer appetite to monitor and track things
 - Standards like BLE, NFC, WIFI help
 - Ubiquity of mobile devices
- Open Hardware is as disruptive as Open Source Software

Google is Getting In!



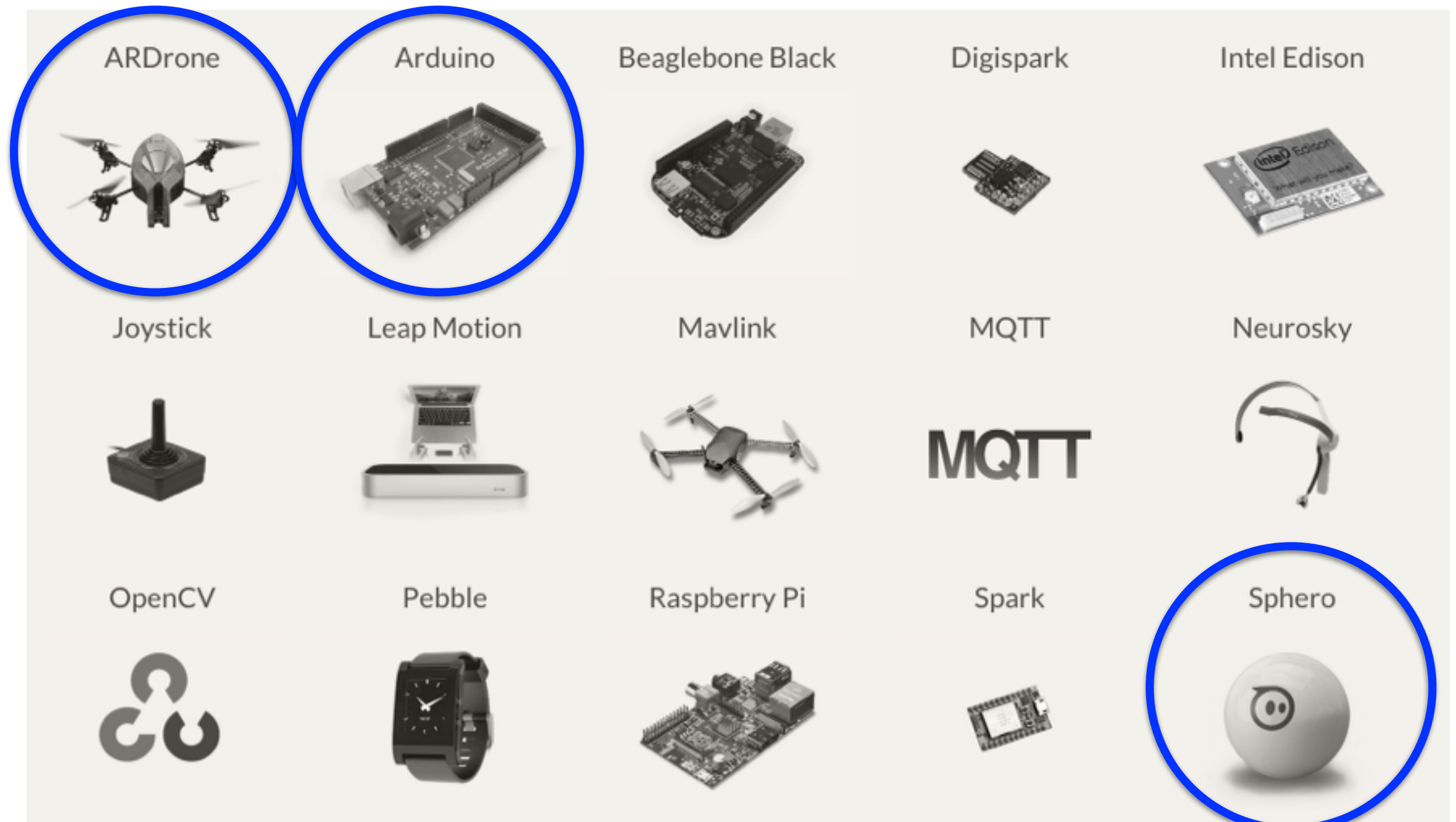
What's Go?

- Developed by Google in 2007
- Statically typed language, loosely derived from C
- Automatic memory management
- Strong support for concurrency
- Focus originally on server, but finding its way into device / hardware development as well

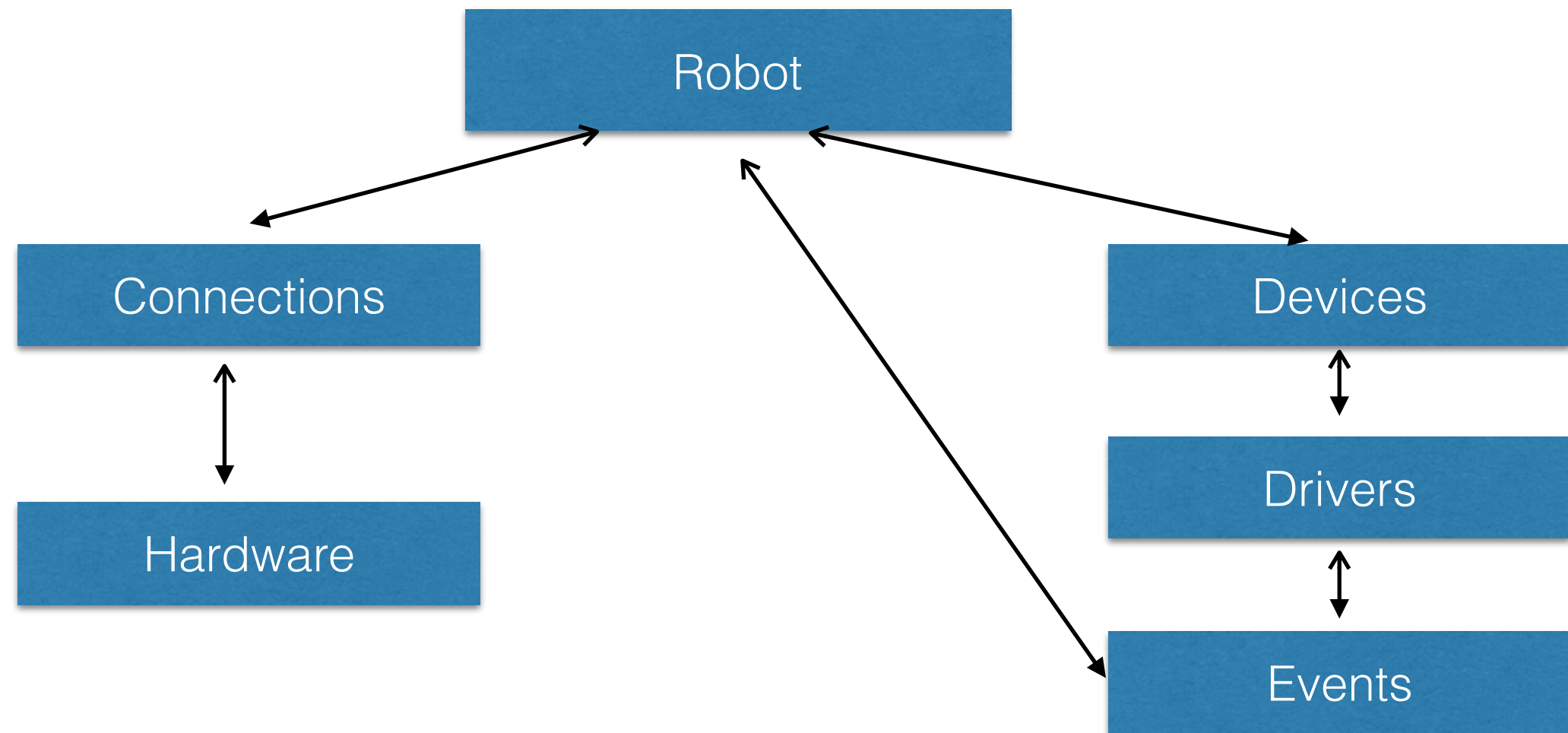
Gobot

- Framework for robotics, physical computing, and the Internet of Things
- Makes writing code to control hardware easier
 - Writing code in a higher level language
 - Modern language constructs
- Open source
- Supports 15 different platforms

Platforms



Architecture

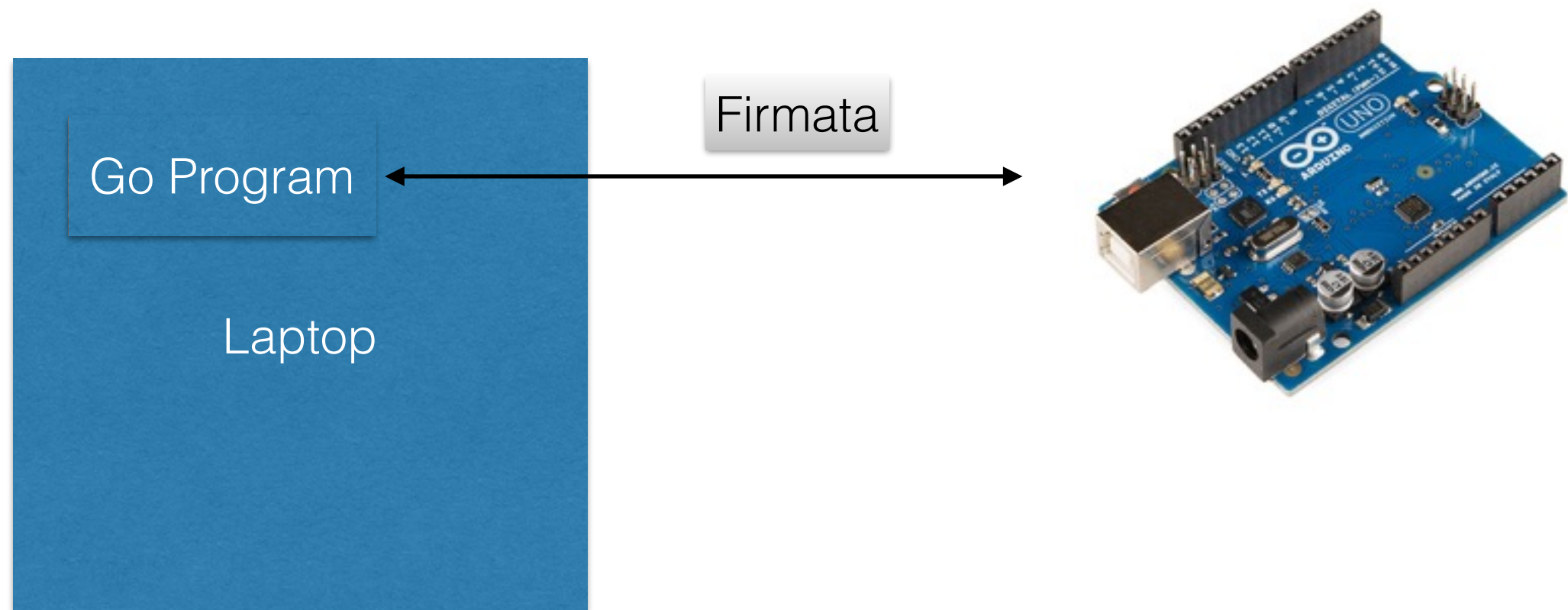


```
robot := gobot.NewRobot("device",  
    []gobot.Connection{spheroAdapter},  
    []gobot.Device{spheroDriver})
```

Gobot API

- `gobot.On()`
 - Process when certain events happen
 - `gobot.On(spheroDriver.Event("collision"), ...`
- `gobot.Every()`
 - Process on timer
 - `gobot.Every(3*time.Second,`

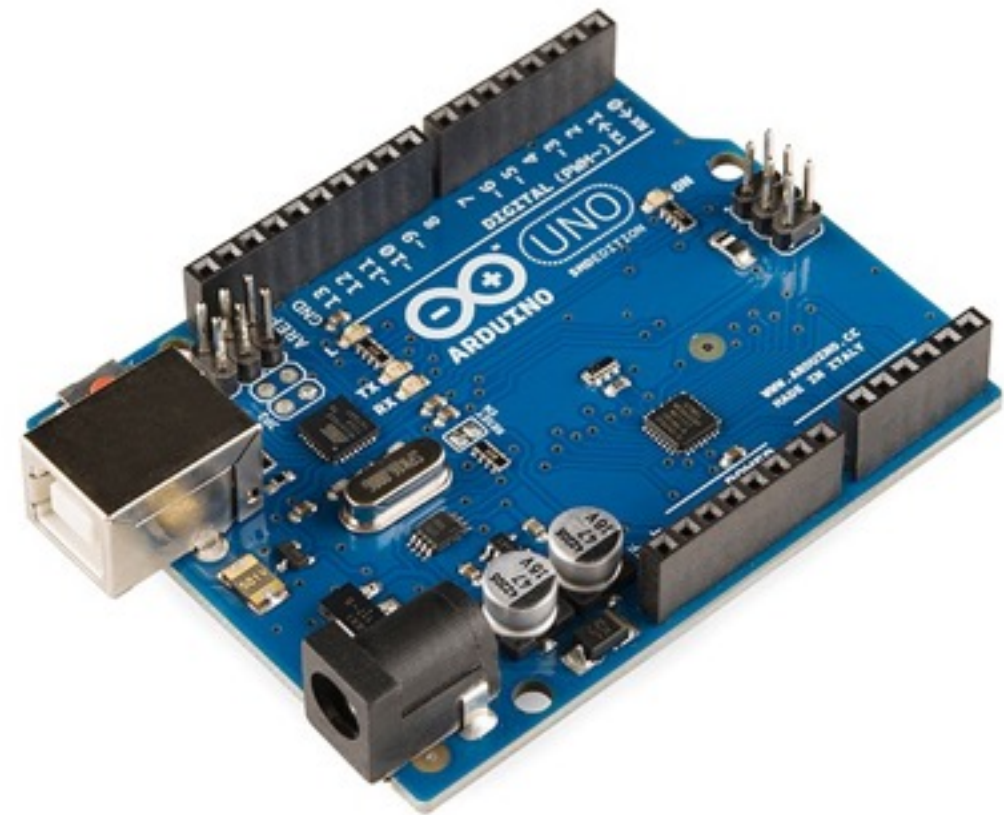
Arduino



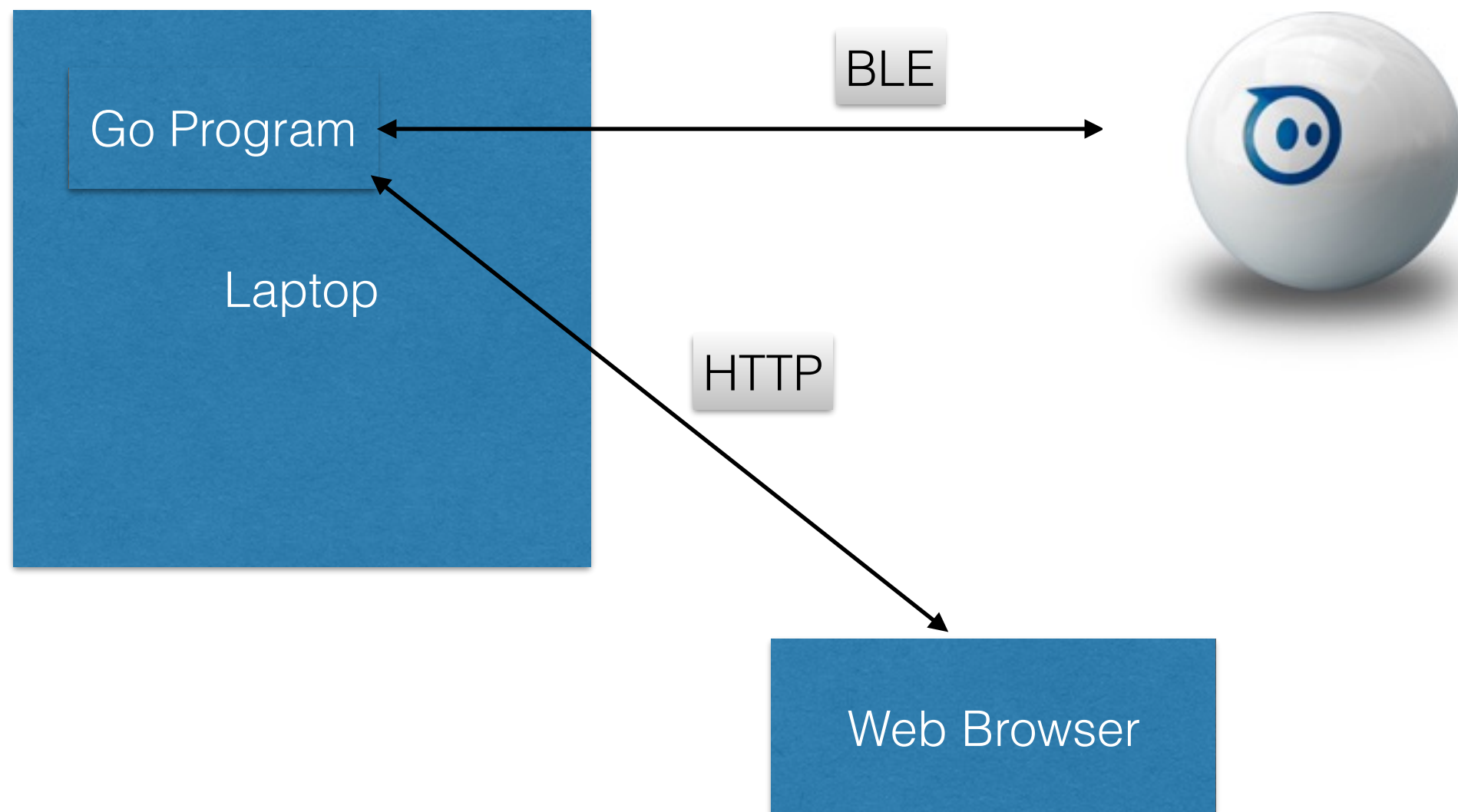
Note: We are not loading the program to the microcontroller, but sending commands realtime

Arduino

- Make a light blink
 - Make a servo turn
-
- Note: Make sure you load the Firmata sketch first!



Sphero



Sphero

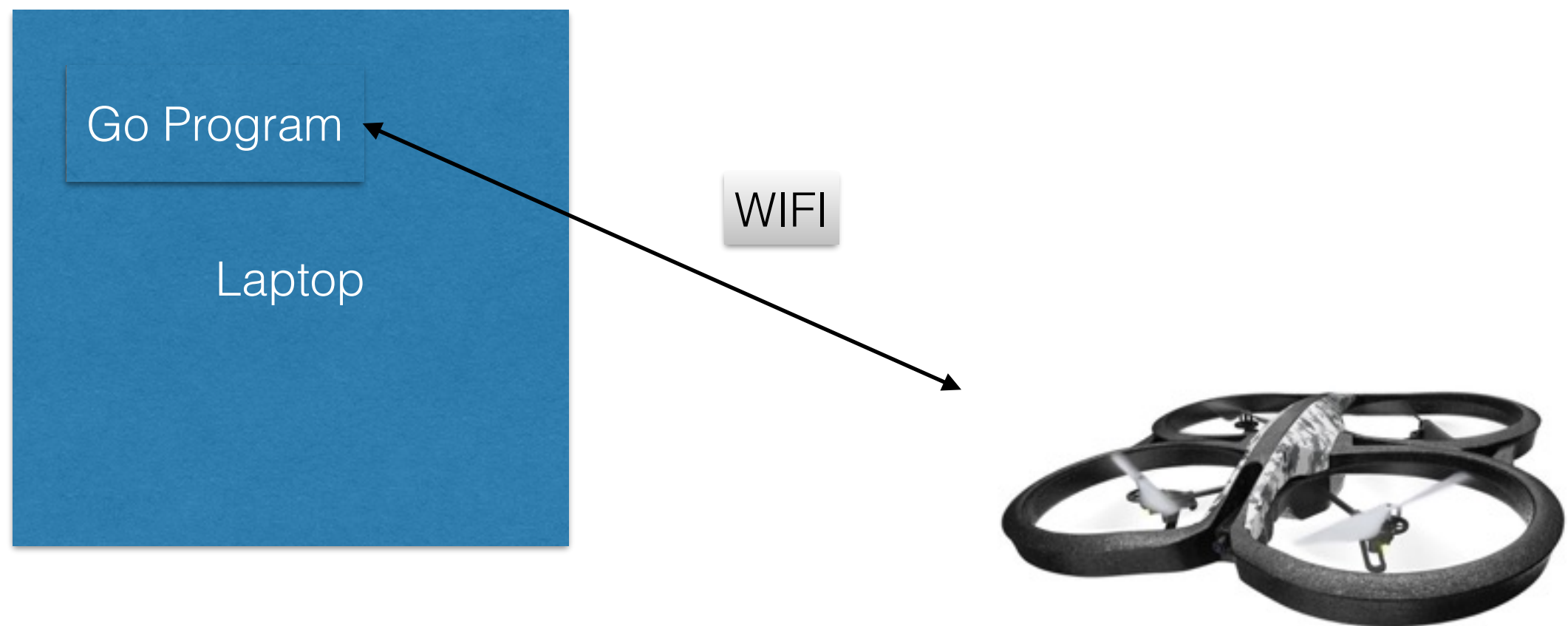
- Review API
- Control with Web Based API
 - Color & Direction
 - <http://localhost:3000>
- Roll in a Square



Product Ideas

- Drop in the sewer to collect data
- Mobile security system
- Toy for your pets to play with while you are gone
- Travel companion
- Tunnel / cave mapping
- Square footage of a room

ArDrone



AR.Drone

- Take off
- Wait 3 seconds
- Land



Summary

- Web 1.0 - Connecting People to the Internet (Browser)
- Web 2.0 - Connecting People to People (Social)
- Web 3.0 - Connecting Objects to People and Objects to each other (IoT)
- Gobot provides the automation to make those objects intelligent

References

- Go Programming Language: <https://golang.org/>
- Gobot: <https://github.com/hybridgroup/gobot>
- Firmata: <https://github.com/firmata/protocol>
- Arduino.MN: <http://arduino.mn>
- IoTWeeklyNews: <http://iotweeklynews.com>

Questions?

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