Welcome!

http://madlab.org.uk
@madlabuk

The Internet of Things!

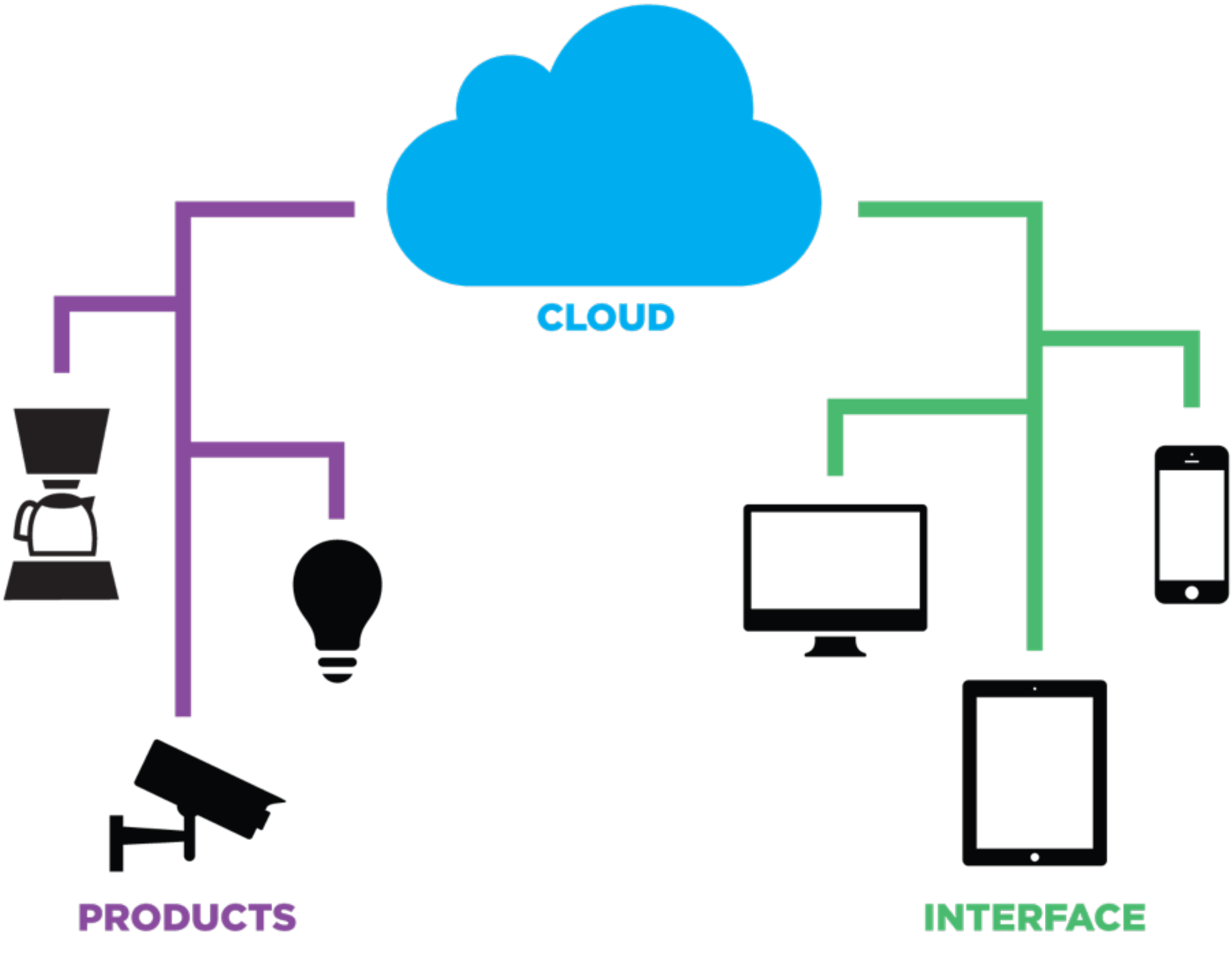
"Hardware. Software. Everywhere"

IoT Design, Some considerations

- Power: batteries or mains?
- Communication: how far, how often, how much?
- Security
- Network topology (and backhaul?)
- Where does processing take place? How constrained?
- Size & cost
- Ease of development
- Design for manufacturing?


A0 A1 A2 A3 A4 A5 DAC WKP RX TX GND VIN
MODE
RST
D0 D1 D2 D3 D4 D5 D6 D7 GND VBAT RST 3V3


A11 A12 A13 RX TX GND VIN
SETUP
RST
ublox
Model: SARA-U260
830000.0404.000
IMEI: 352252060748325
FCC ID: XPYSARAU260
IC: 8595A-SARAU260
Made in Austria
3V3 RST VBAT GND D13 D12 D11


CLOUD
PRODUCTS
INTERFACE

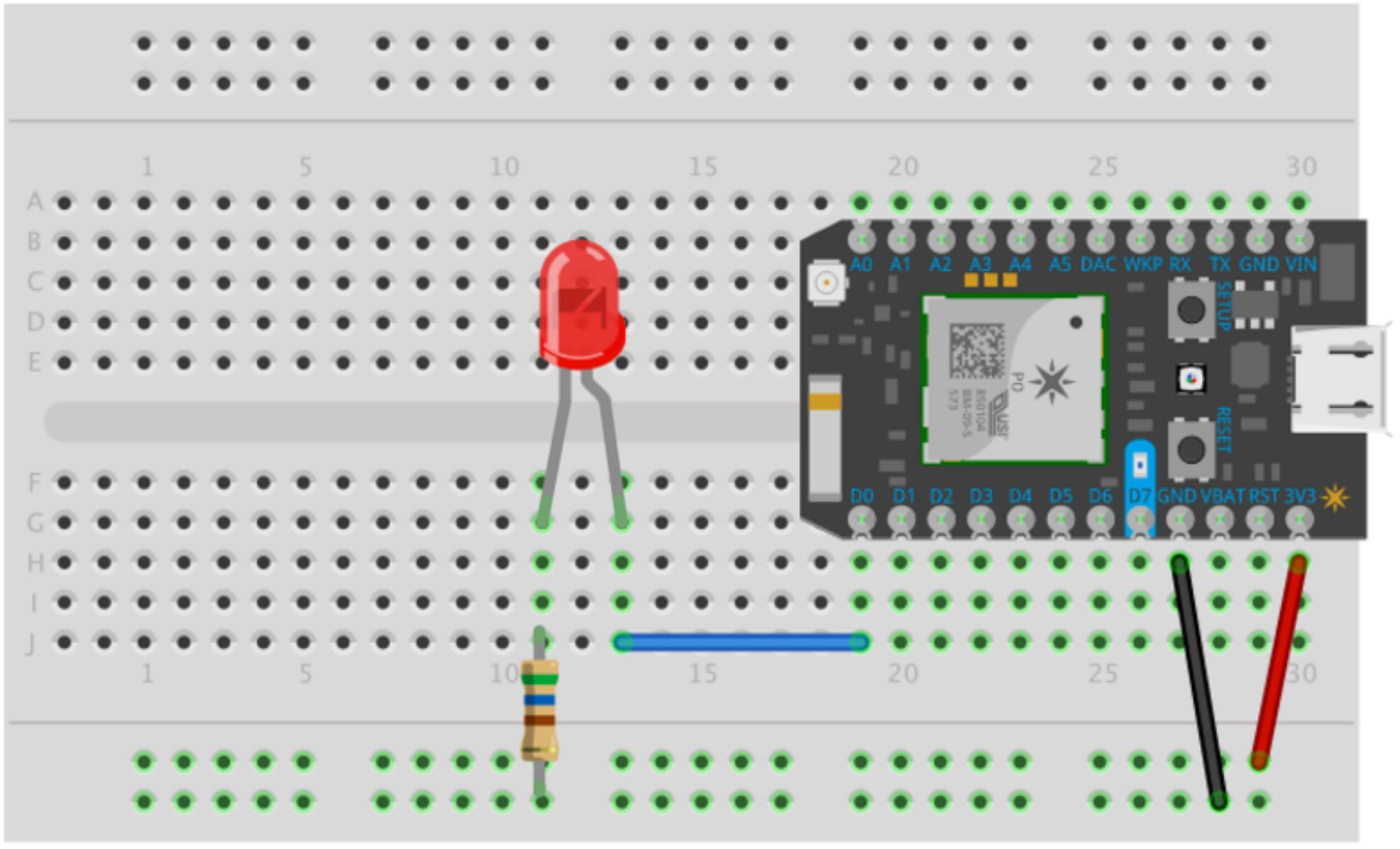
Let’s get started!

```
$ npm install -g particle-cli

$ particle setup

$ particle help
```

…

```
$ particle call <id> “digitalWrite” “D7,HIGH”
```

http://github.com/madlabuk/hands-on-iot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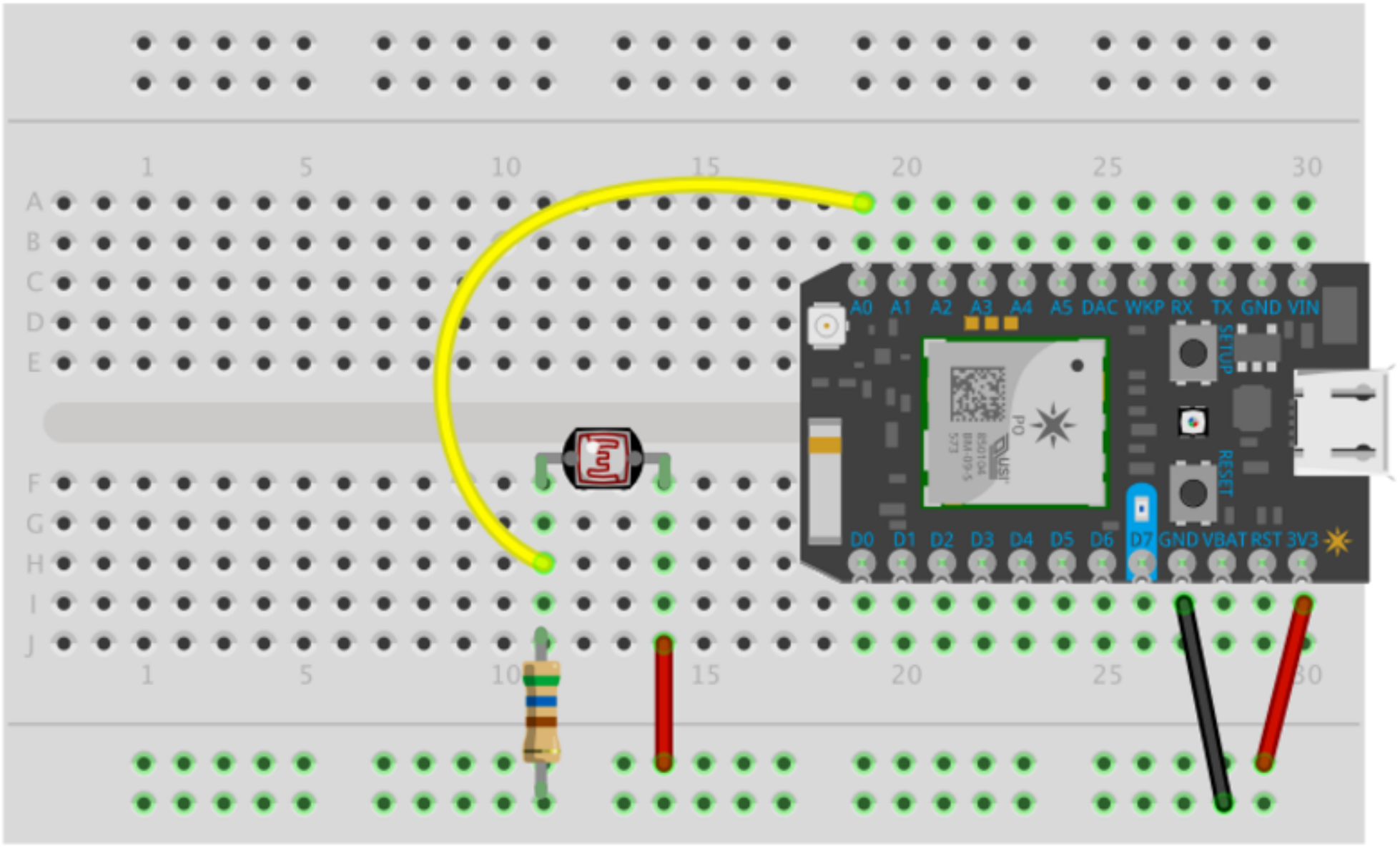
A0 A1 A2 A3 A4 A5 DAC WKP RX TX GND VIN
SETUP
RESET
D0 D1 D2 D3 D4 D5 D6 D7 GND VBAT RST 3V3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A0 A1 A2 A3 A4 A5 DAC WKP RX TX GND VIN
SETUP
RESET
D0 D1 D2 D3 D4 D5 D6 D7 GND VBAT RST 3V3

Human Web

Web Data (Human-readable – HTML, Text etc.)
HTTP
TCP/TLS
IP

Machine Web

Binary Data
CoAP
UDP/DTLS
???

Human Web

Web Data (Human-readable – HTML, Text etc.)
HTTP (& REST)
TCP/TLS
IP

Particle Web

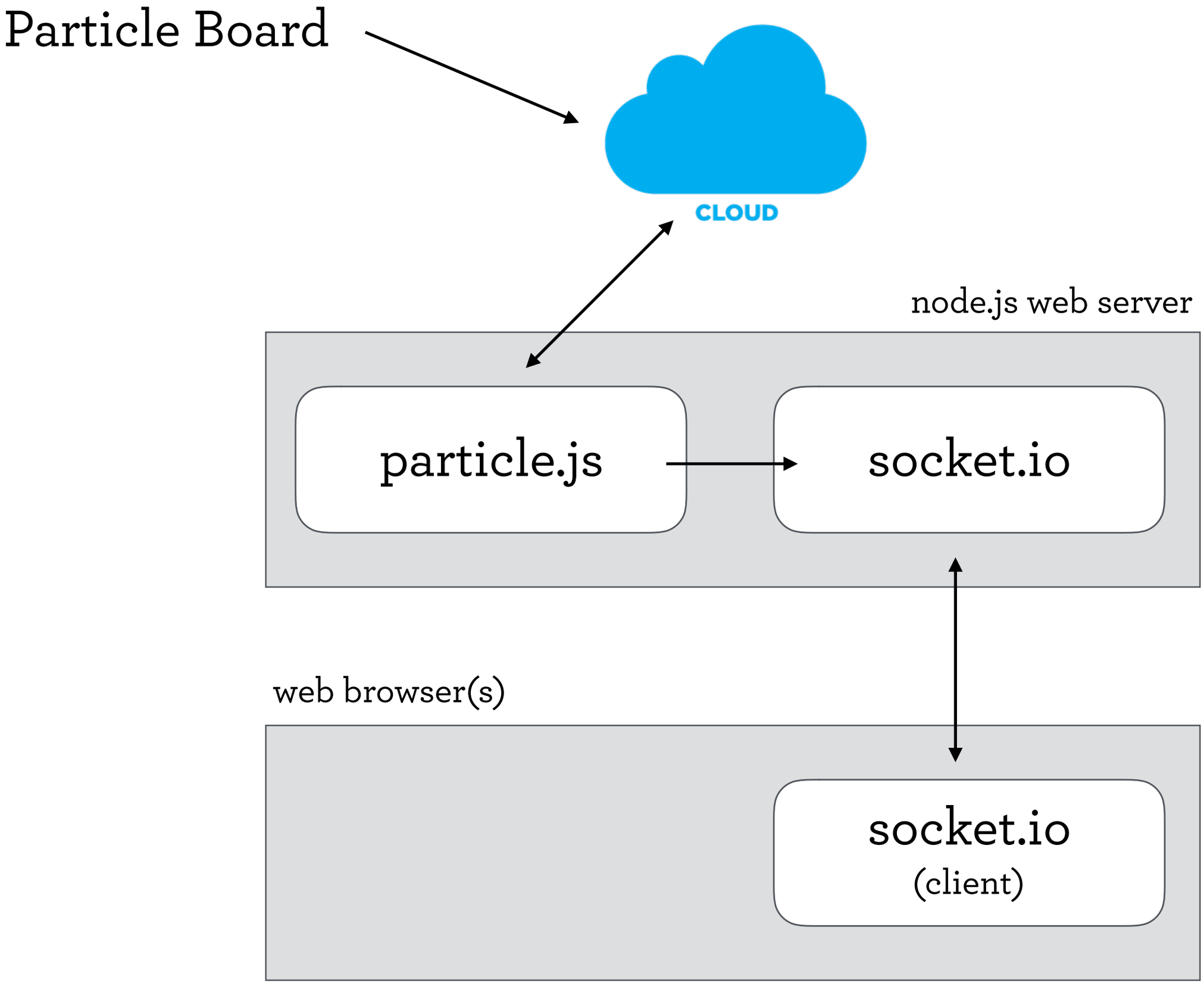
Binary Data
CoAP
TCP/TLS
IP

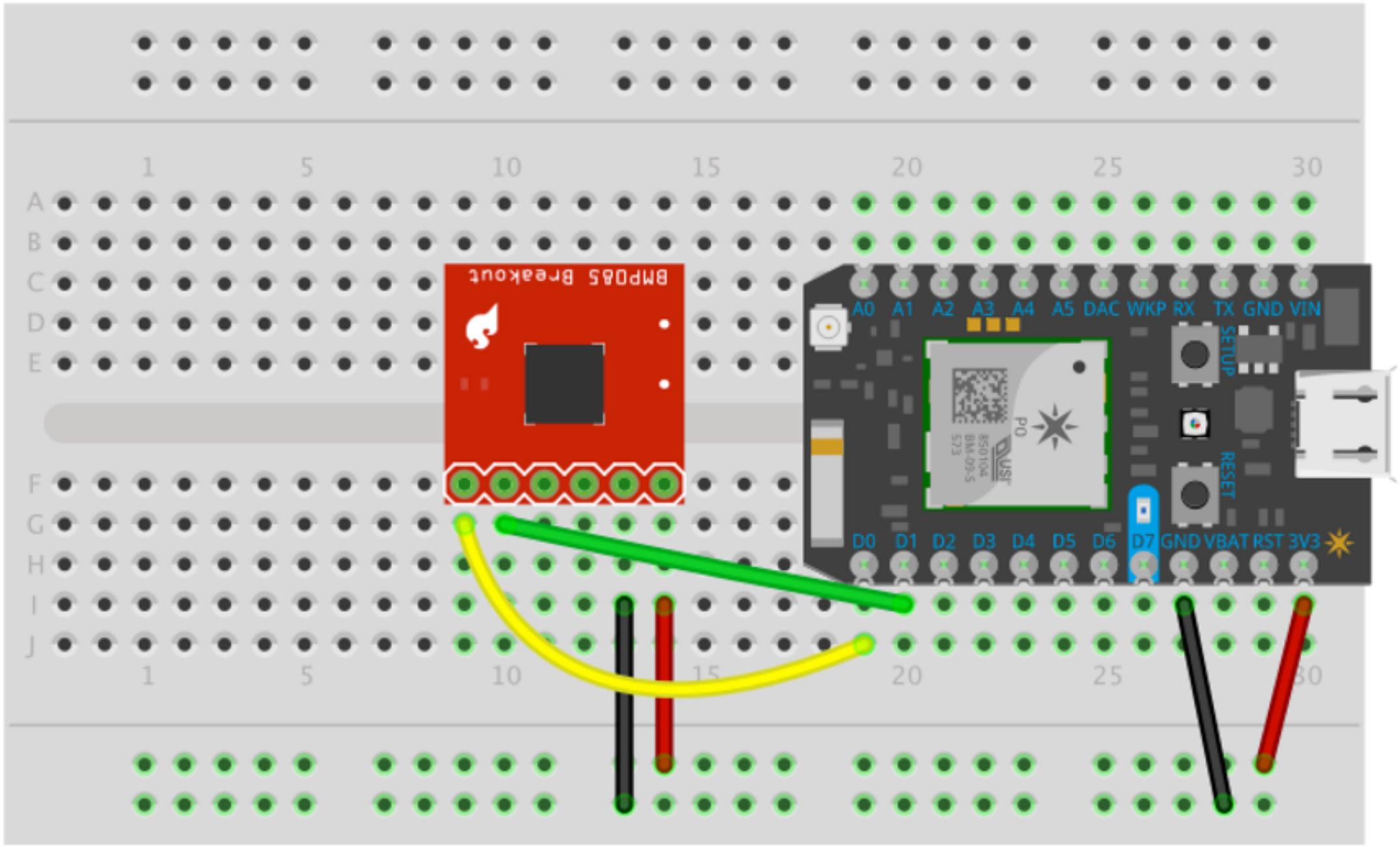
Machine Web

Binary Data
CoAP
UDP/DTLS
???

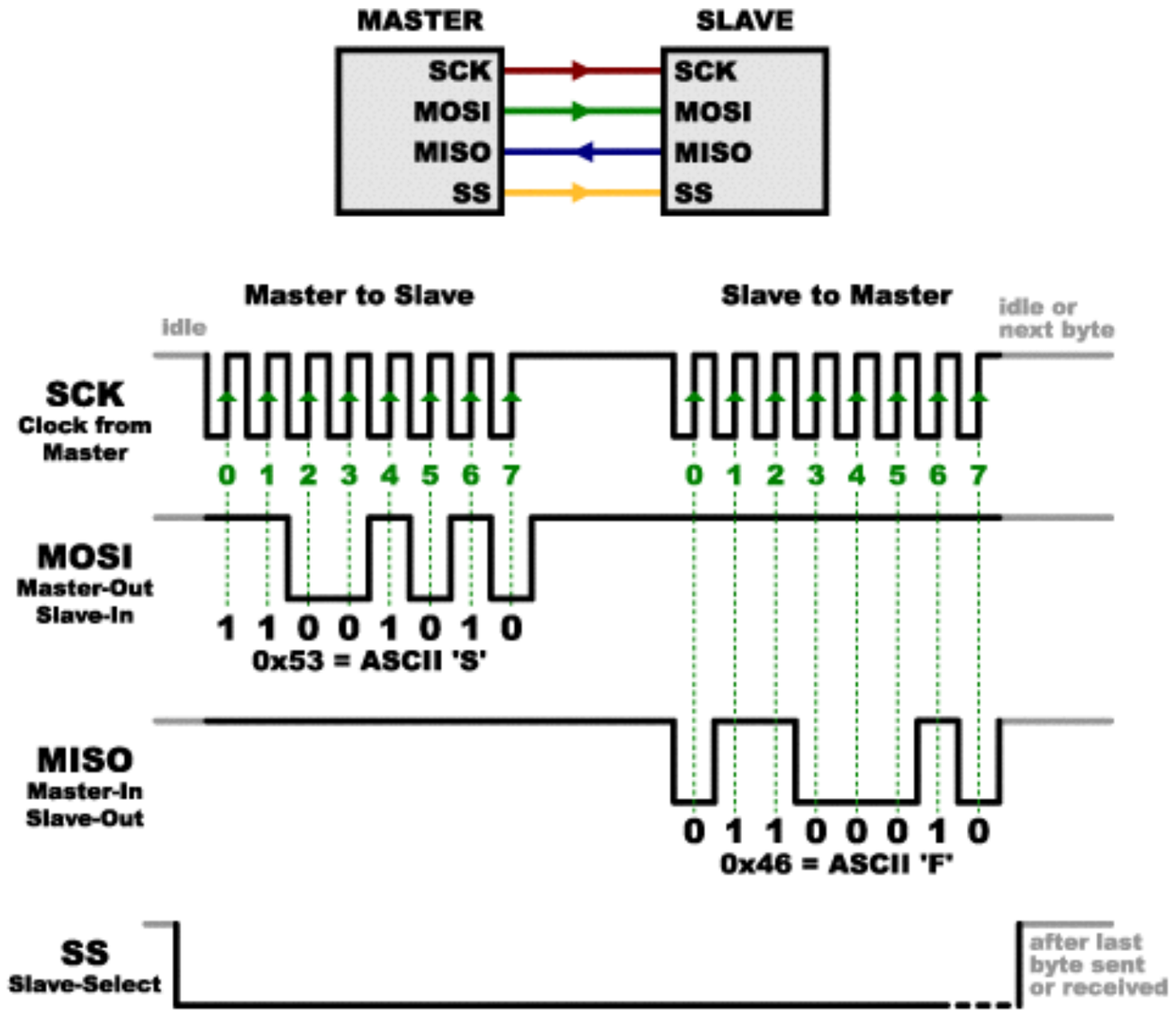
Humans + Machines

```
$ cd <download folder>/sokkit
$ npm install
$ node sokkit.js
```

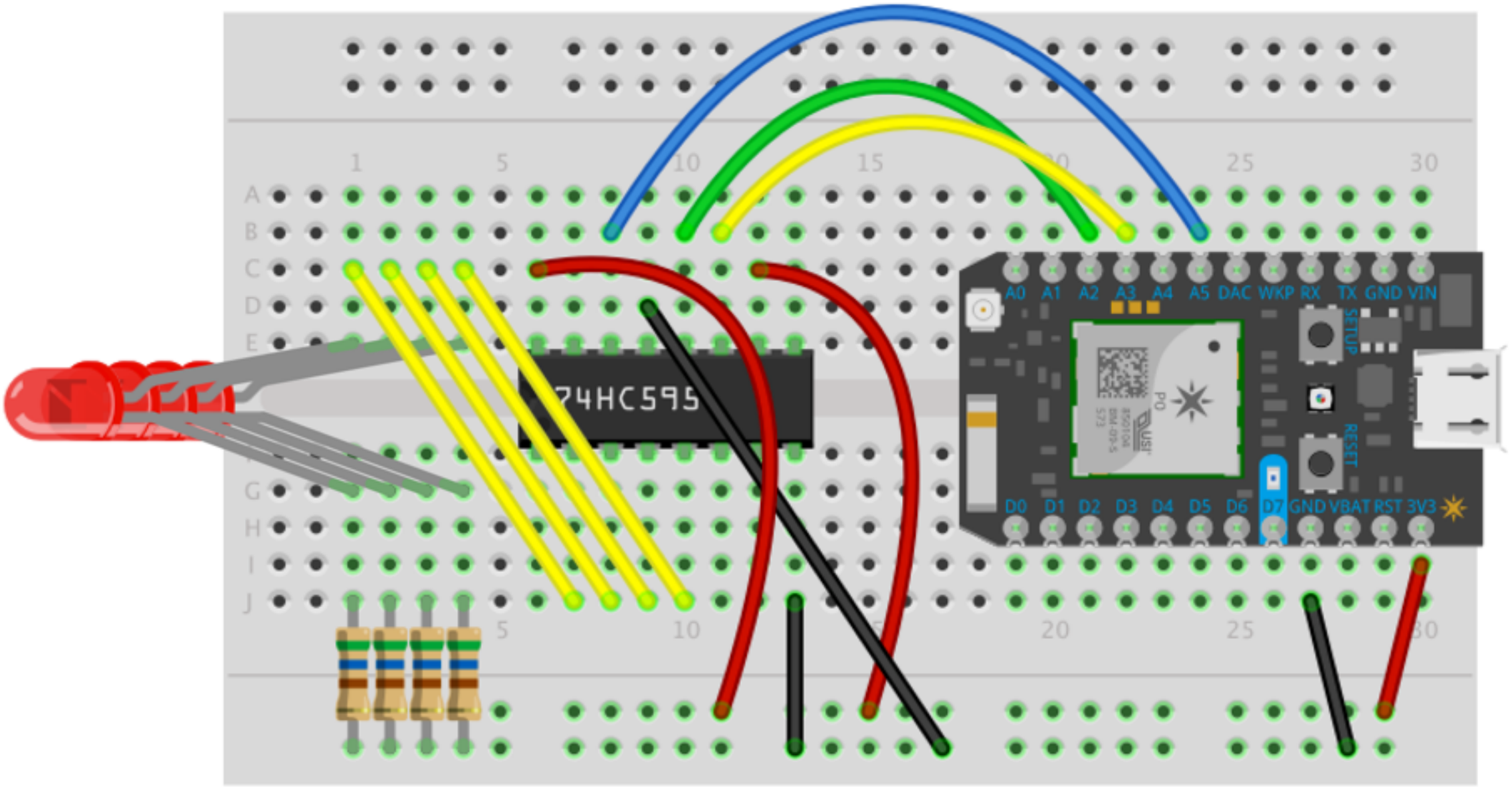

Particle Board
CLOUD
node.js web server
particle.js
socket.io
web browser(s)
socket.io
(client)


BMP085 Breakout
A0 A1 A2 A3 A4 A5 DAC WKP RX TX GND VIN
SETUP
RESET
D0 D1 D2 D3 D4 D5 D6 D7 GND VBAT RST 3V3
1 5 10 15 20 25 30
A B C D E F G H I J

Let's SPI!



https://learn.sparkfun.com/tutorials/serial-peripheral-interface-spi
http://docs.spark.io/firmware/#communication-spi


74HC595
A0 A1 A2 A3 A4 A5 DAC WKP RX TX GND VIN
D0 D1 D2 D3 D4 D5 D6 D7 GND VBAT RST 3V3
SETUP
RESET

Where to Next?

- Lots of alternative technology: microcontrollers & platforms, communication protocols, ...
  e.g. MQTT, BLE, Zigbee, 6Lowpan, LoRa, GSM. RedBear Labs, Waspmote, Arduino Yún, Contiki, ...

- Fun stuff! IFTTT, Hackster, Stores, Books, ...
  e.g. Oomlout (naturally!), Sparkfun, Adafruit. “Designing the internet of things”.