

Building a Connected Product

Adam Dunkels

CEO

@adunk



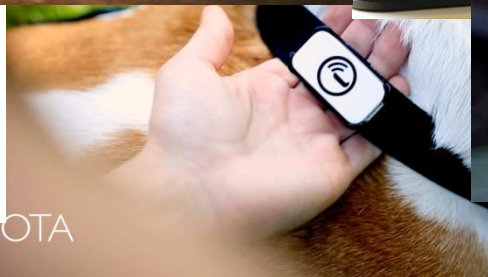


Works with your
Nest Thermostat.





TOTA

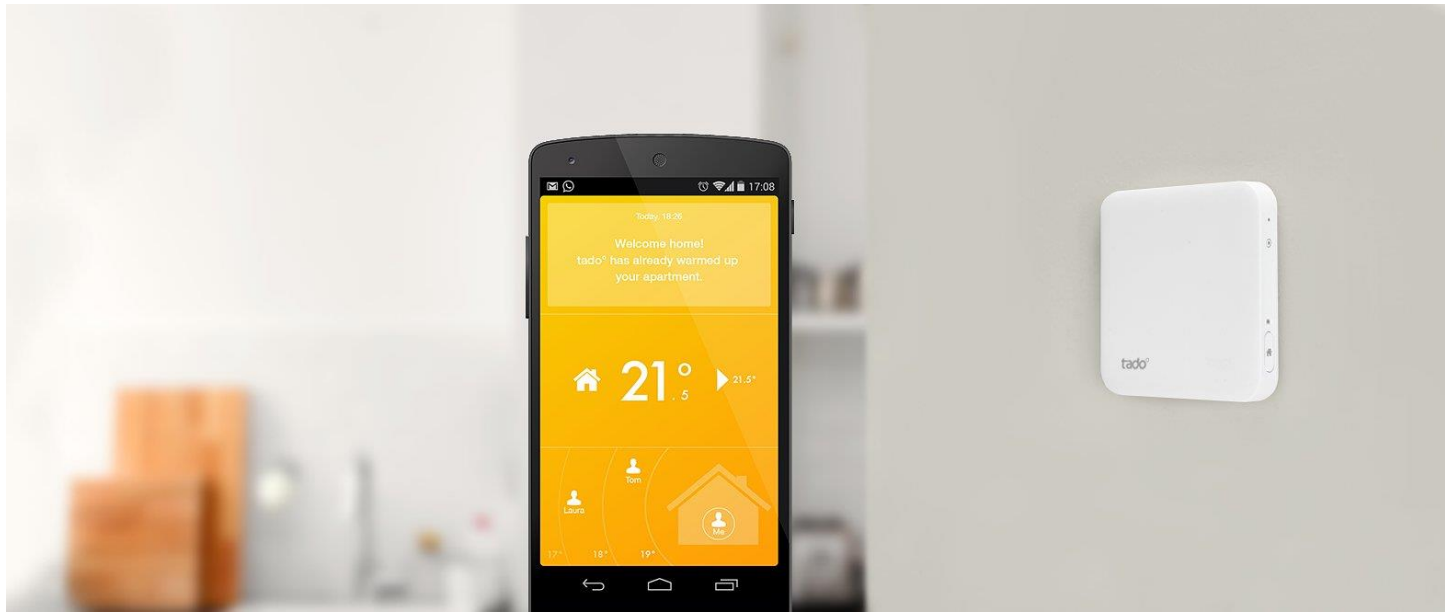


Connected Products

Close to us

Everyone has a smartphone

Change habits, lives



Tado





Soehnle



Koubachi

Connected Products

Not a specific category – they're everywhere!

... and not just consumer products

115,000,000 households (in the US)*

1,400,000,000 smartphones**

10,000,000,000 light bulbs***

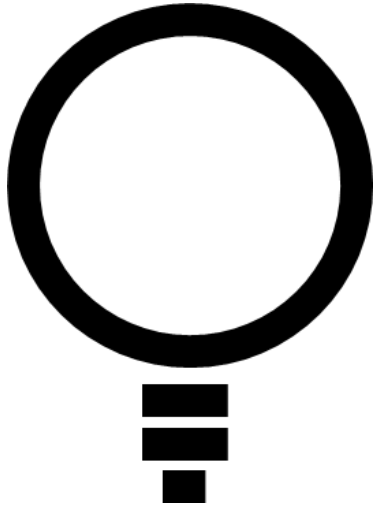
7,000,000,000 people on the planet

* US Census Bureau (2012)

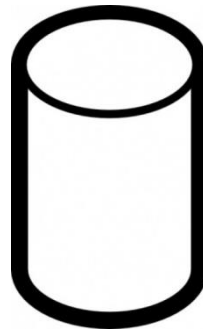
** ABI Research (2013)

*** Wall Street Journal (2007)

A Connected Product



1



3



2

I $\rightarrow$ P

$$I \rightarrow P$$

Idea to Prototype

Idea to Pitch

Idea to Product

Risks

Technology
Market

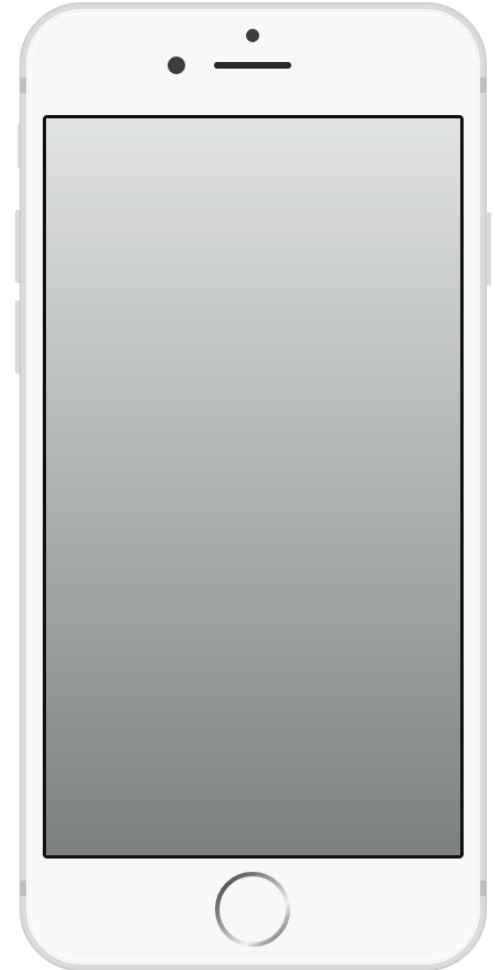
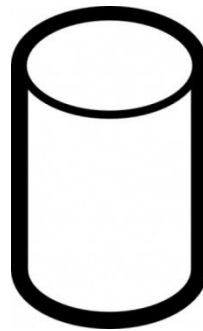
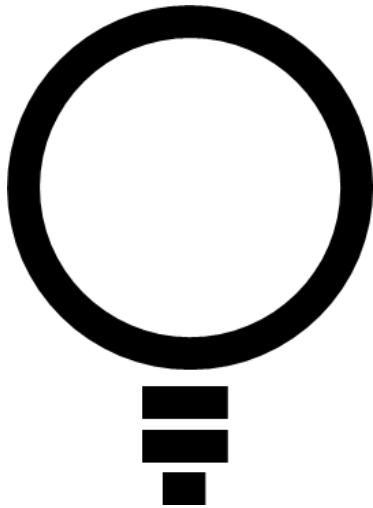
Market

Work With Users, Early

Crowdfunding

Technology

Wireless Technologies



Wireless Technologies



Bluetooth



WiFi



Something Else

Wireless Technologies



Bluetooth



WiFi



IEEE 802.15.4

Wireless Technologies

Range

Power

Cost

Support

Backend Access



Bluetooth



WiFi



IEEE 802.15.4



IEEE 802.15.4

ZigBee

6lowpan

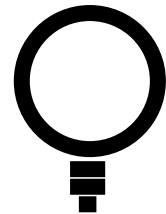
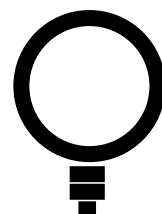
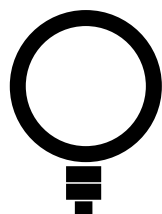
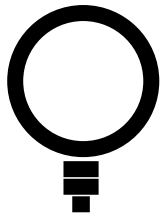
Thread

Contiki

IEEE 802.15.4/6lowpan/Contiki

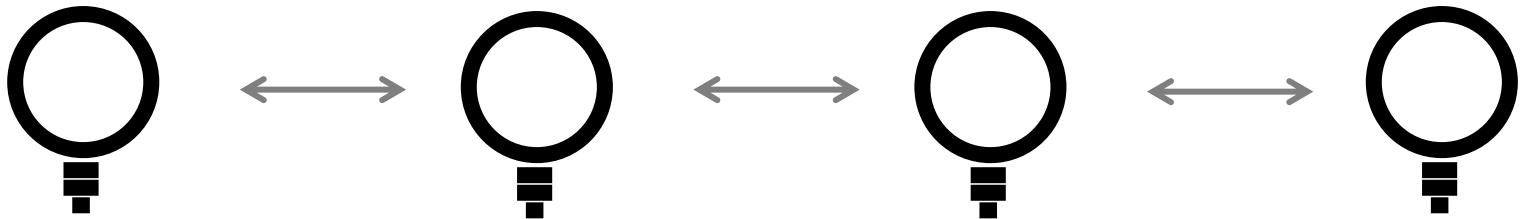
2.4 GHz & Sub 1-GHz

200+ Meter Range



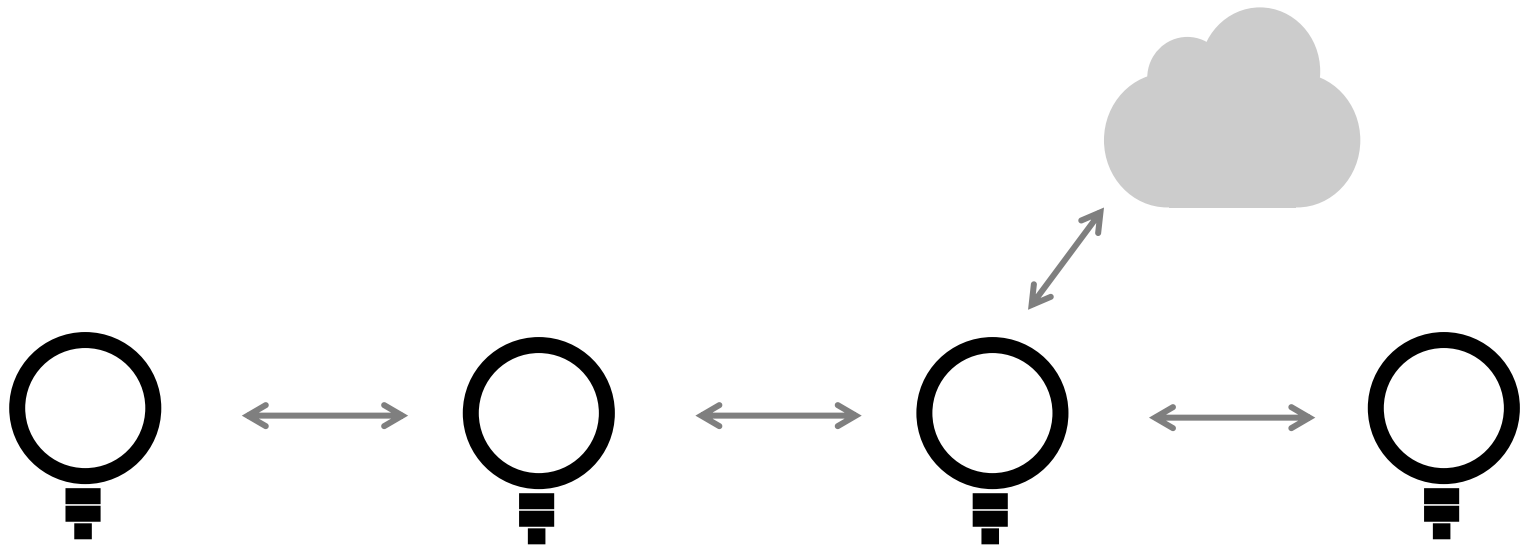
IEEE 802.15.4/6lowpan/Contiki

Automatic RPL Meshing



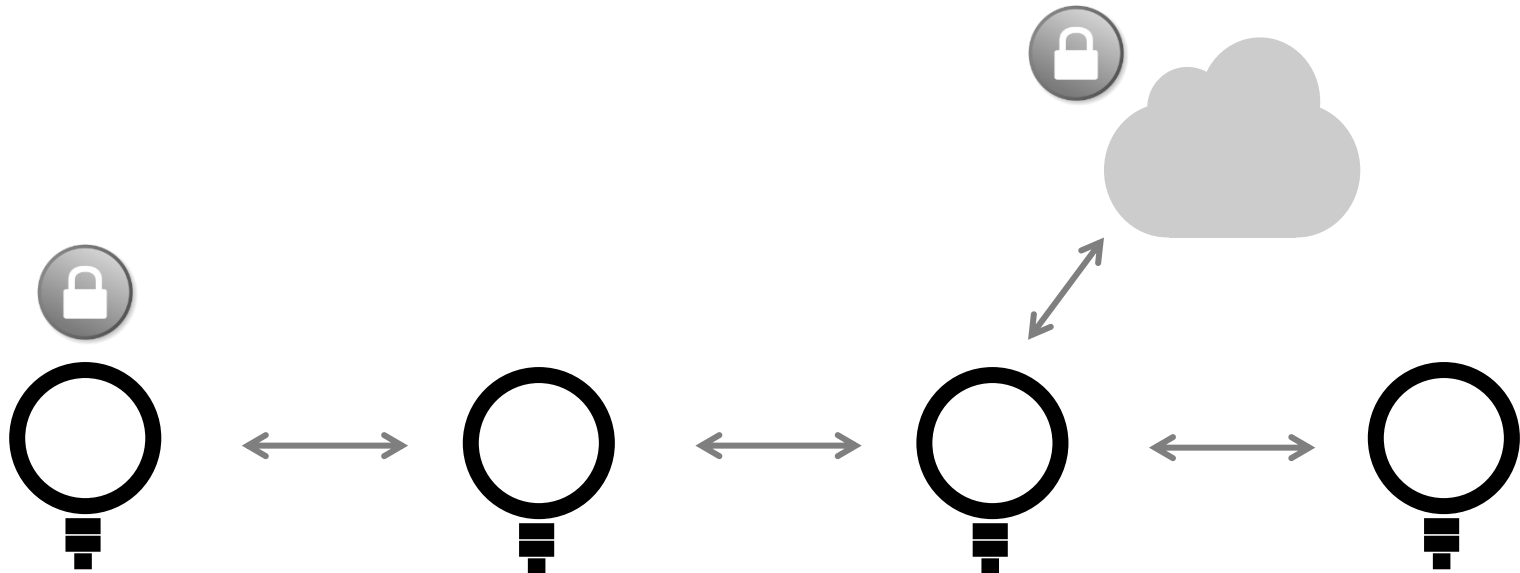
IEEE 802.15.4/6lowpan/Contiki

Internet IPv6/IPv4 Access



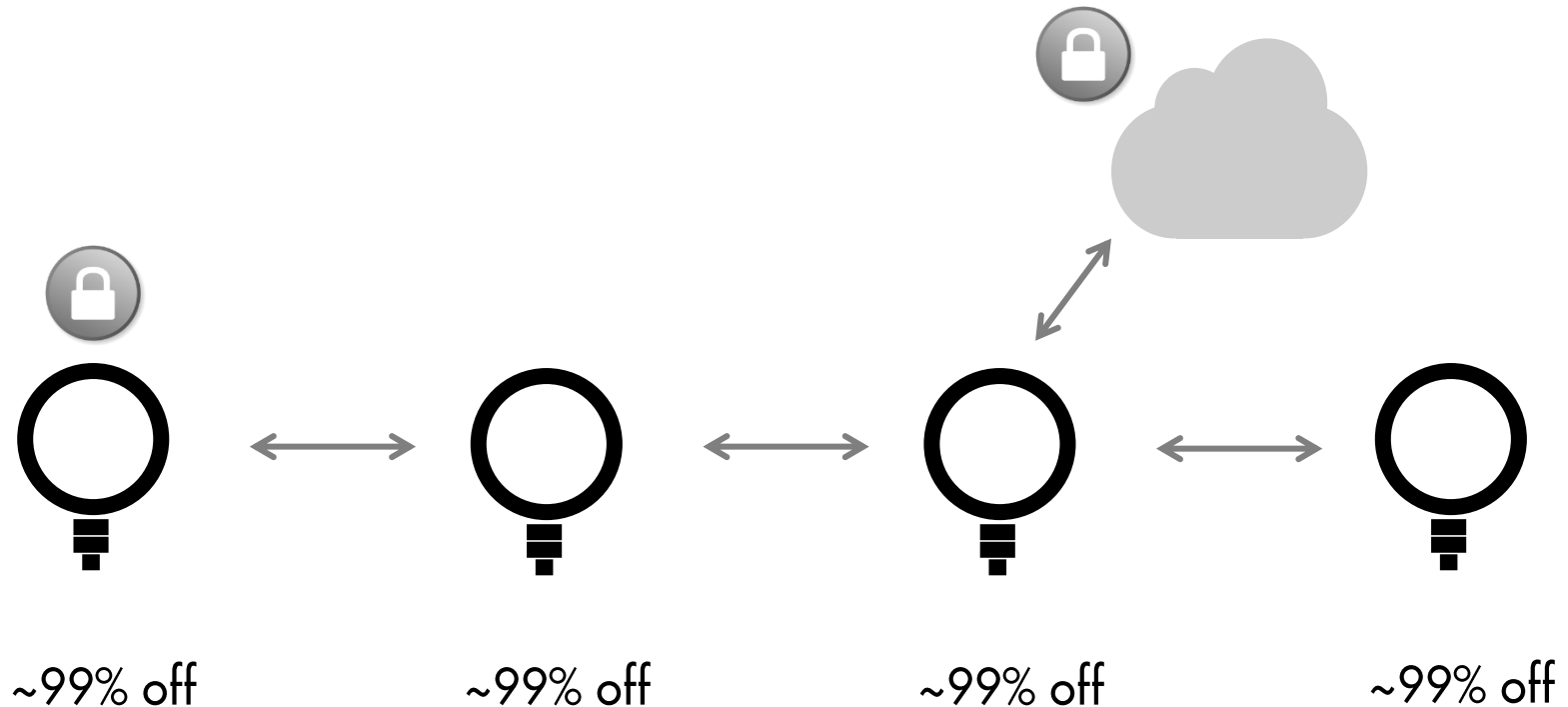
IEEE 802.15.4/6lowpan/Contiki

End-to-End TLS Encryption



IEEE 802.15.4/6lowpan/Contiki

Low Power



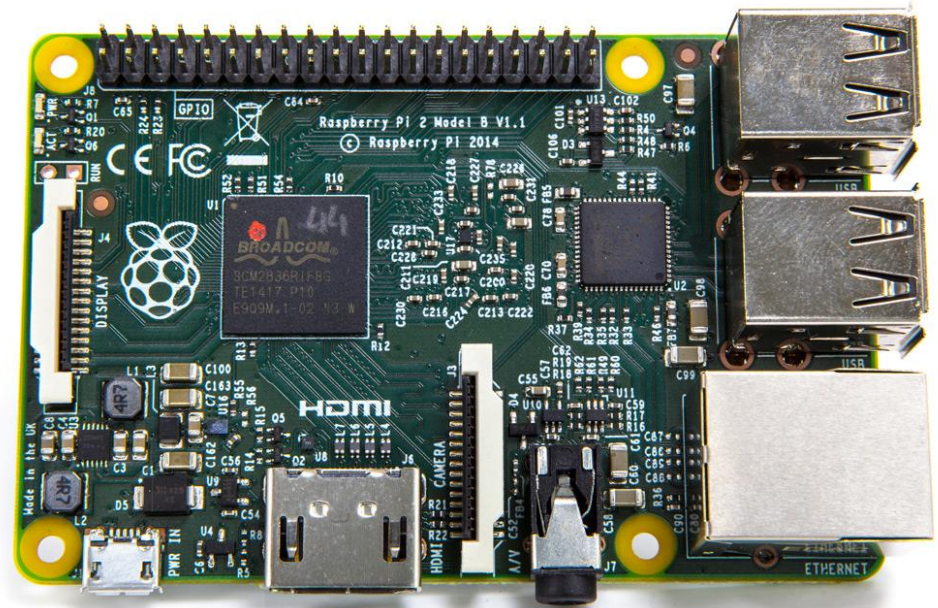
Wireless Prototyping

Mock-up

Arduino

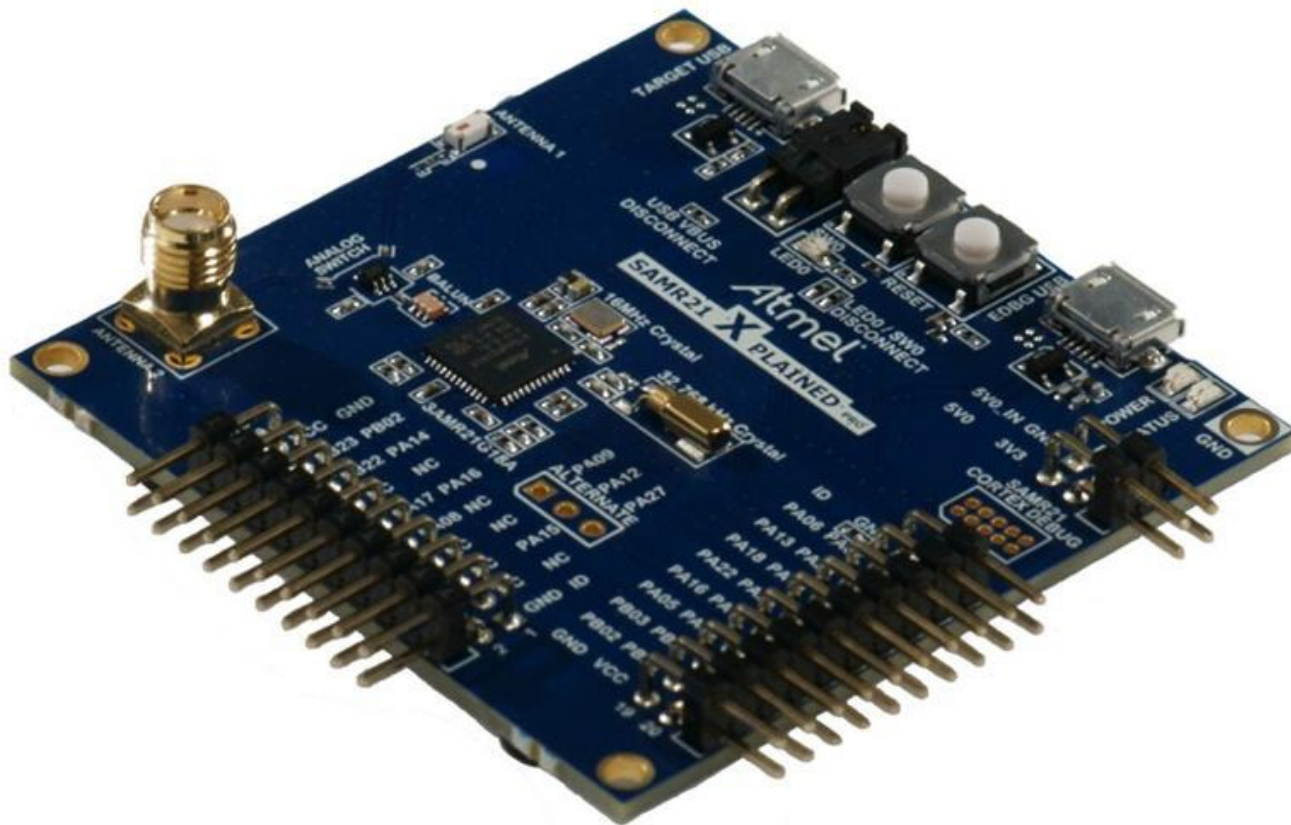


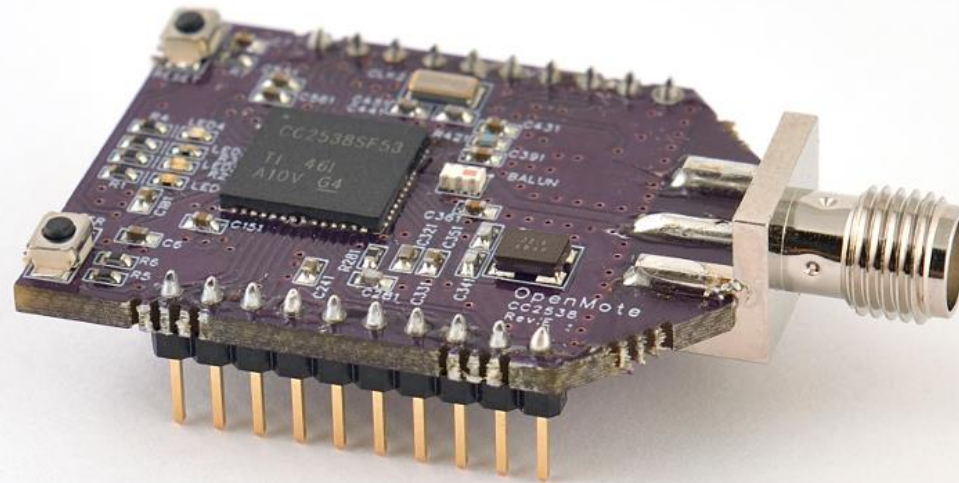
Raspberry Pi



Prototyping

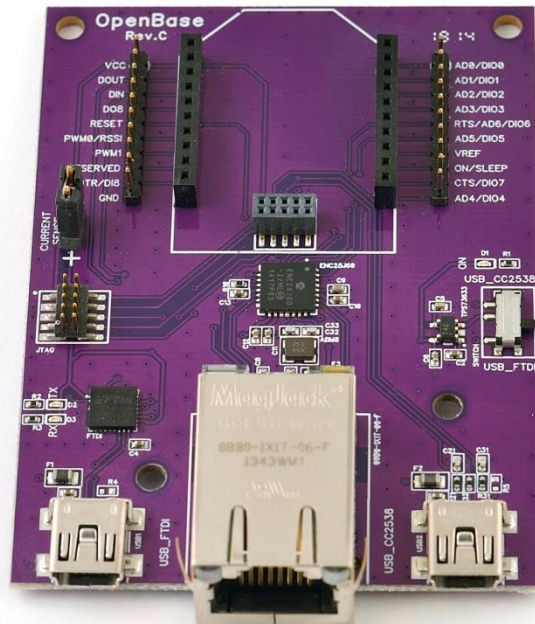
Atmel SAM R21



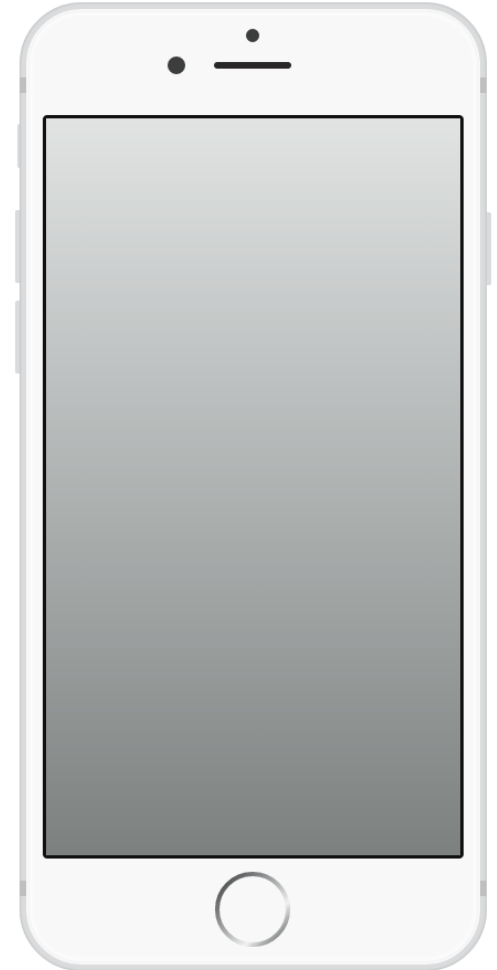
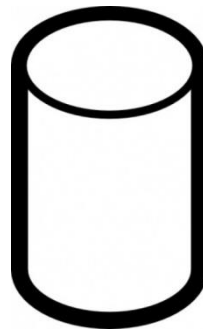
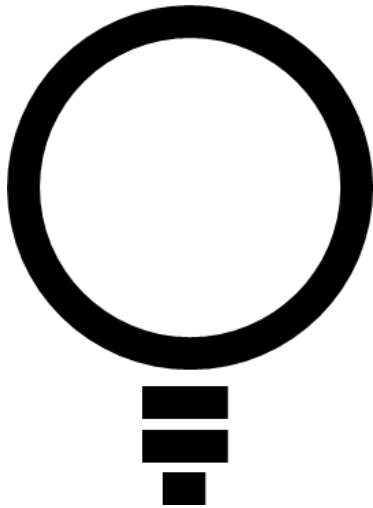


Prototyping

OpenMote with Internet Connectivity



Frontend



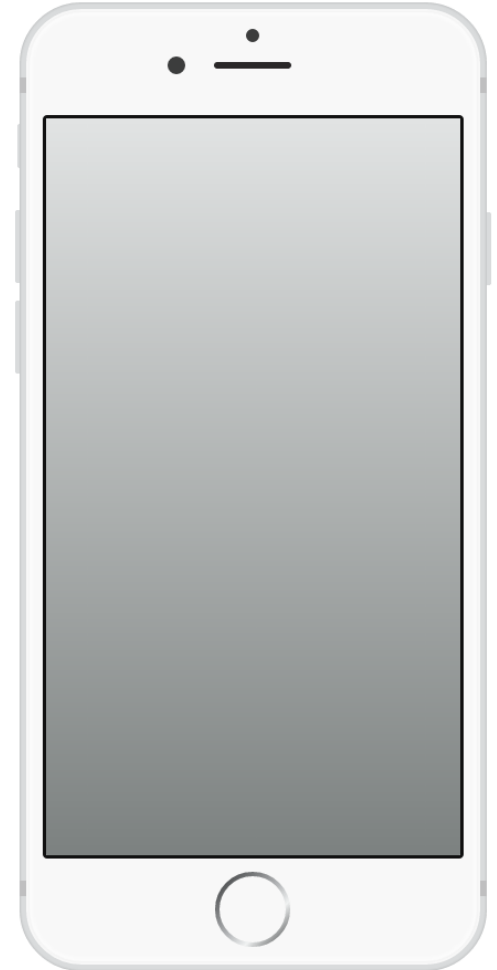
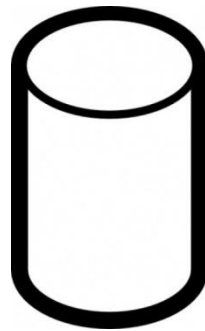
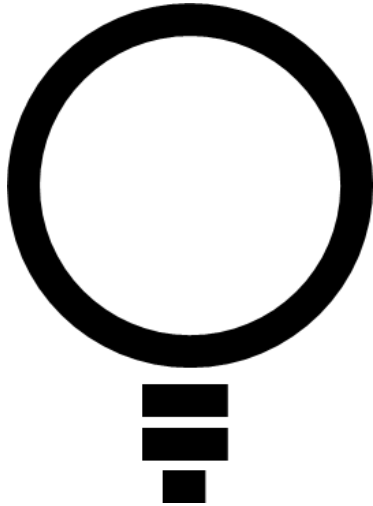
Frontend

Native

HTML5

Hybrid

Backend



Backend

Roll Your Own
Use Existing



Backend Services

Security
Authentication
Data
Users
Devices
Firmware Updates
Development Tools
APIs



Data



Frontends



Devtools



Simulator

Frontend editor

Device firmware editor

Generic Device

index.html

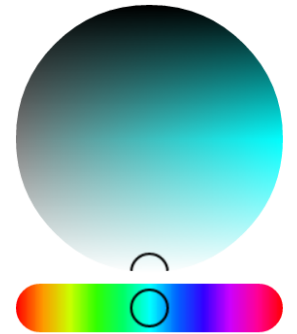
index.js

index.css

```
1 /*global $,App,thsq,data_graphic*/
2 'use strict';
3
4 var scantimer;
5
6 App.controller('home', function (page) {
7 });
8
9 App.controller('scan', function (page) {
10   thsq.scan(10000);
11   if (scantimer) {
12     clearInterval(scantimer);
13   }
14   scantimer = setInterval(function () {
15     var seen = thsq.getNearbyKeys();
16     $(page).find('#scan-nearby').html(seen.length);
17   }, 1000);
18
19   thsq.fetchDeviceList(function (list) {
20     $(page).find('#scan-registered').html(list.length);
21   });
22 });
23
24 App.controller('sign-up', function (page) {
25   $(page).on('click', '#sign-up-button', function () {
26     thsq.signup($('#sign-up-login').val(), $('#sign-up-password').val(), function (result) {
27       App.dialog({
28         title      : 'Sign up result:',
29         text       : result,
30         okButton   : 'Ok'
31       }, function (ok) {
32         if (ok) {
33           // ...
34         }
35       });
36       return true;
37     });
38   });
39 });
```



Adam's Lighting



Nearby

0



Remote



Adam's Lighting



Devices



Account



Connected Lighting



Thingsquare

Product: Adam's Lighting ▼

Login: adam@dunkels.com ▼



Data



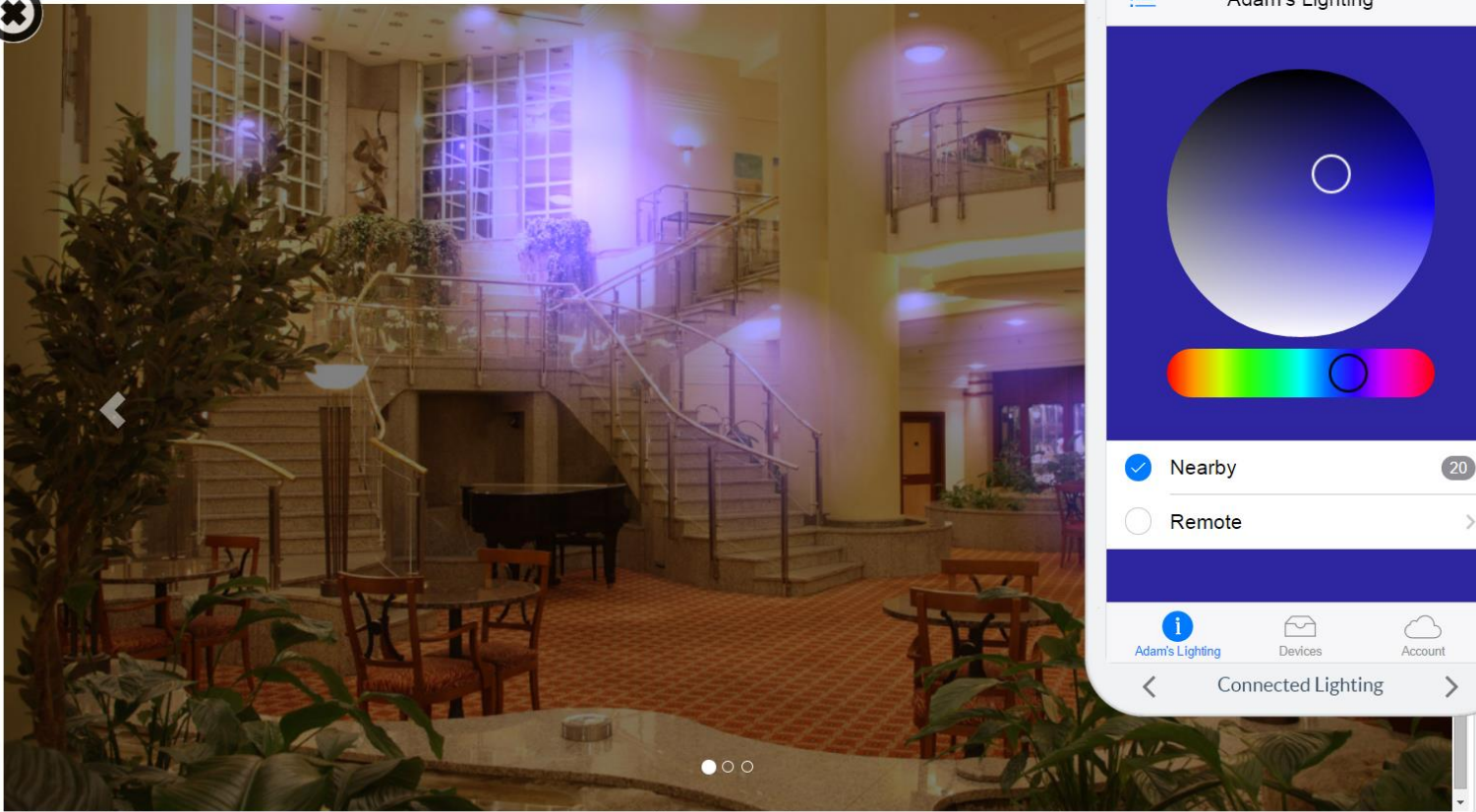
Frontends



Devtools



Simulator



Risks

Technology
Market

$$I \rightarrow P$$

Idea to Prototype

Idea to Pitch

Idea to Product

Prototype, Prototype,
Prototype, Product

Involve Your Users



`www.thingsquare.com`
`@thingsqr`