



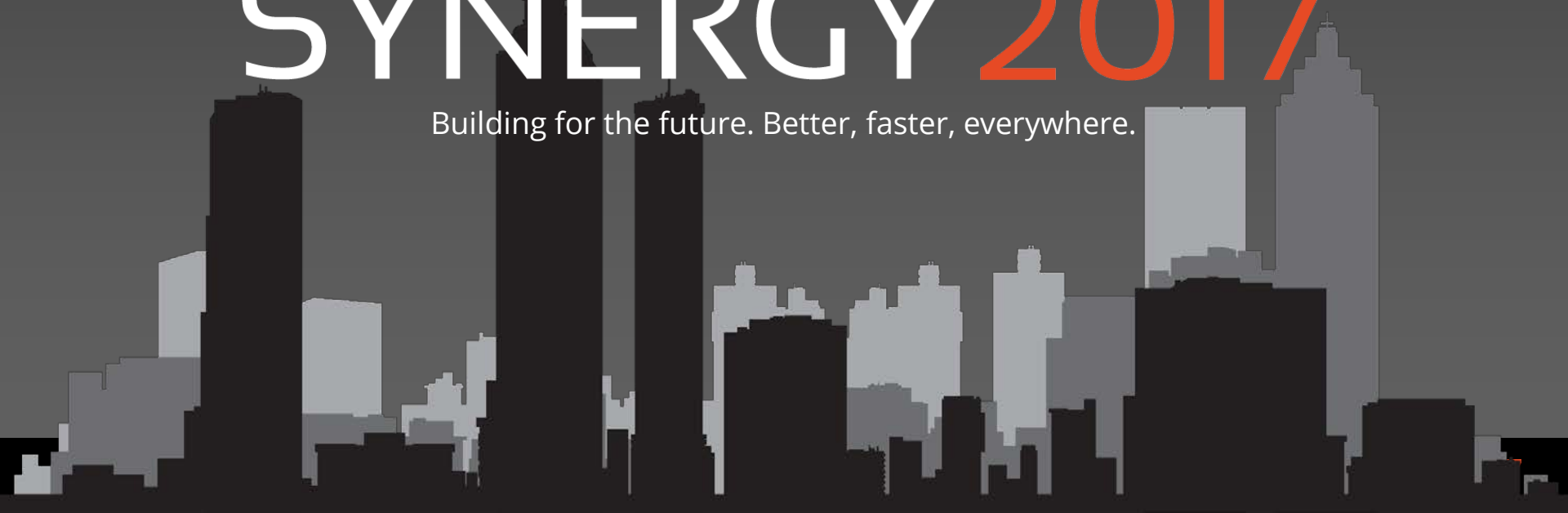
6 – 7 . APRIL



ATLANTA, GA, USA

SYNERGY2017

Building for the future. Better, faster, everywhere.



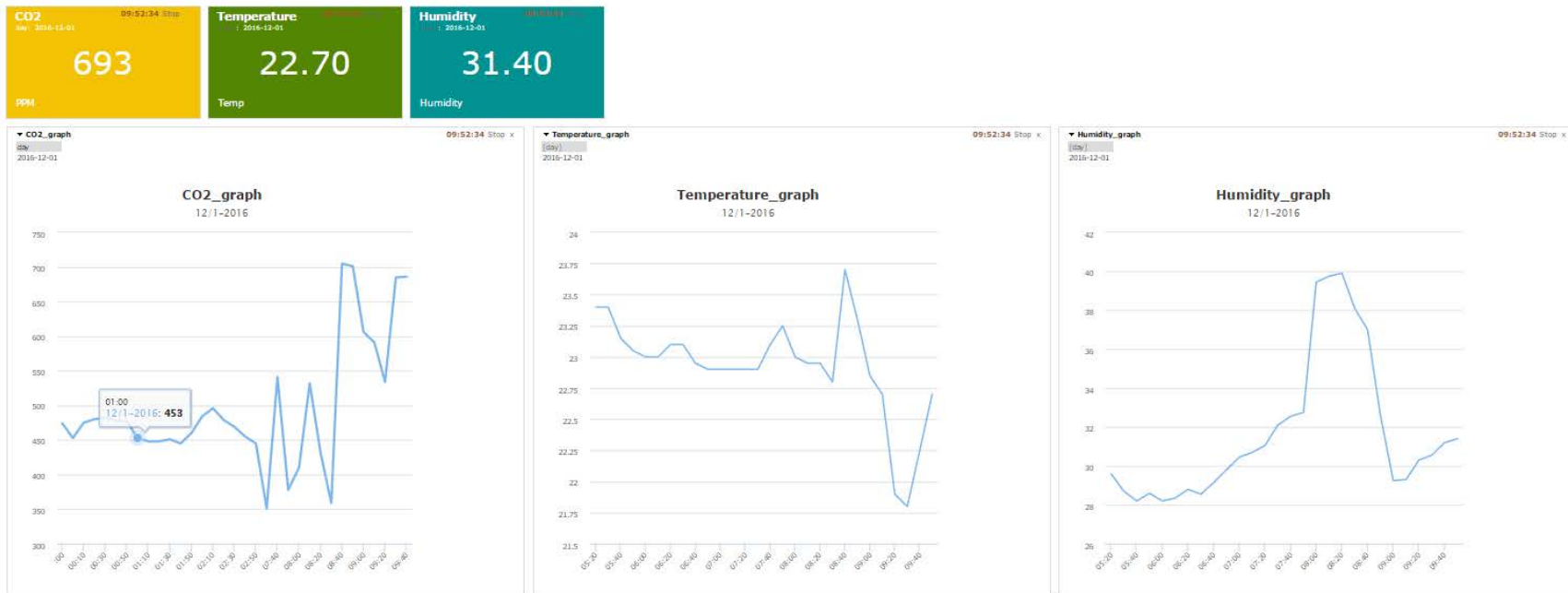
IoT - Internet of Things

Klaus Berthelsen
FrontIoT

Agenda

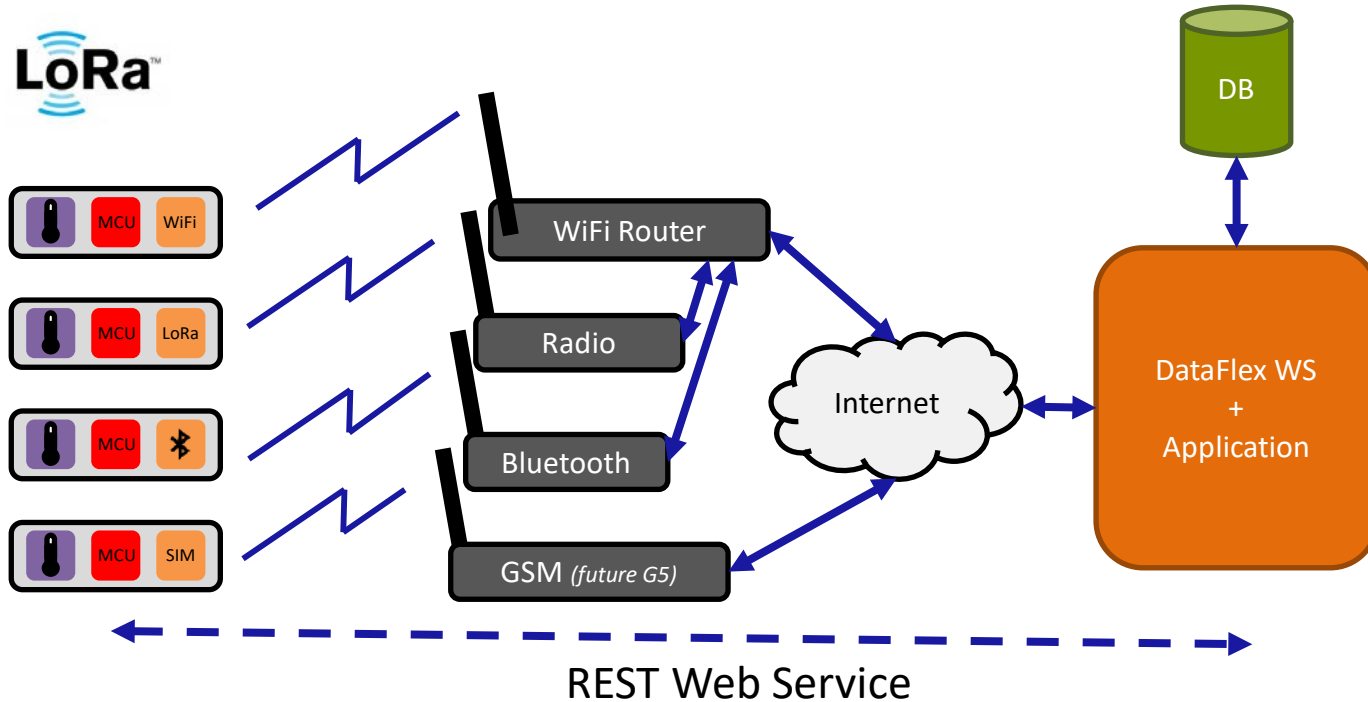
- Showcase environment monitor
- What's with DataFlex and IoT?
- How to get started
- What we do in the IoT space
- State of IoT business today

Visualizing with Dynamic AI

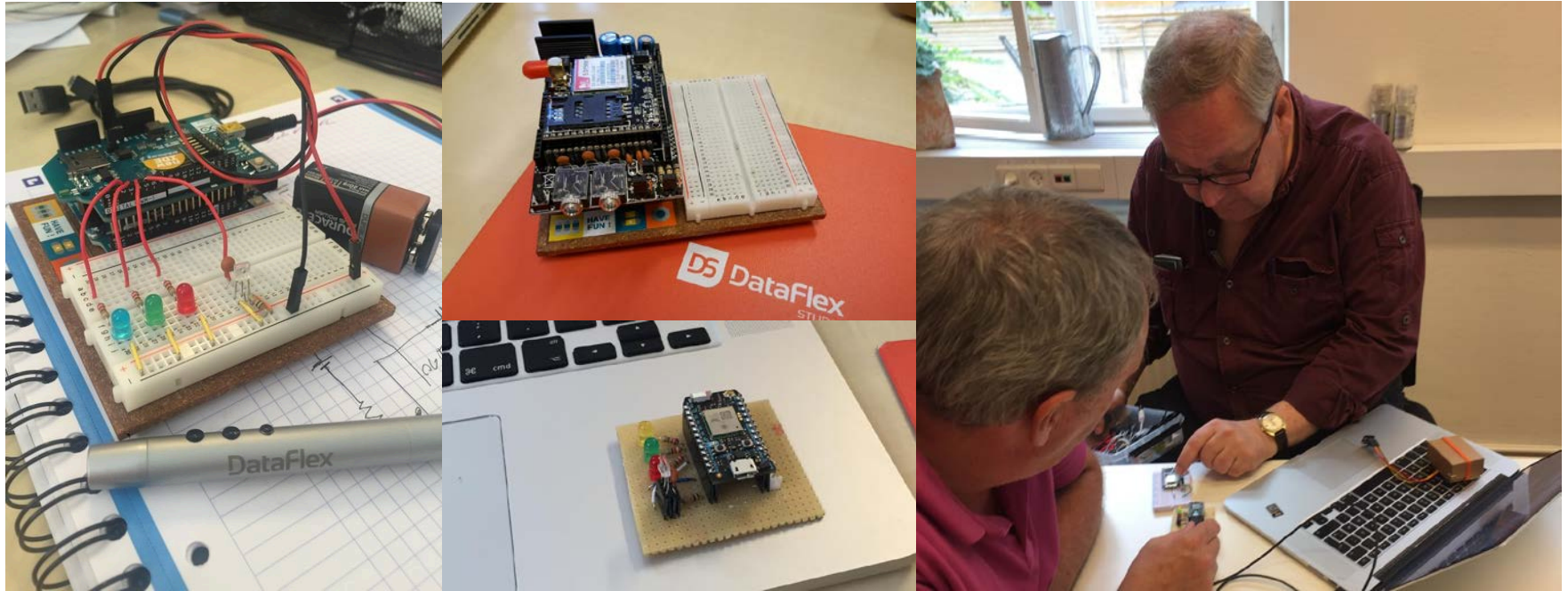


<http://2.107.26.23/ai6/default.asp>

Platforms



Spring 2016 – Exploring new territory



Why DataFlex and IoT?

To be or not to be? Which is the lesser evil?

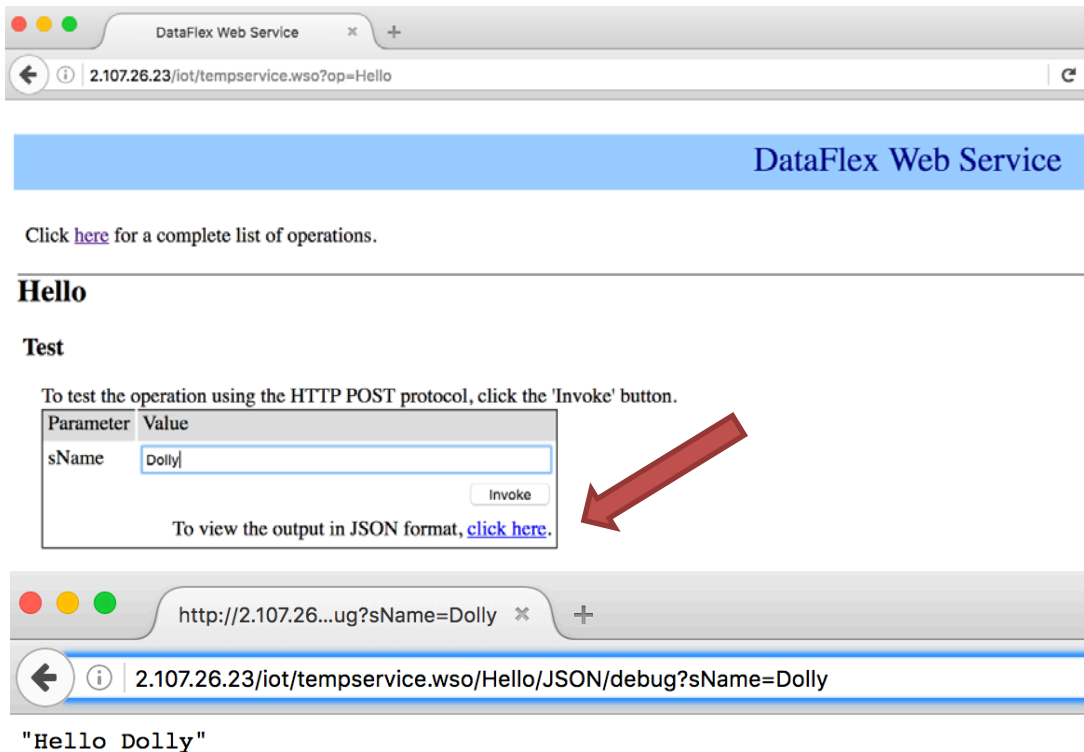


To program a SOAP client in c

Or to program a REST-service in DataFlex?

As it turns out DataFlex already does REST.

REST service in DF



The screenshot shows a web browser window titled "DataFlex Web Service" with the URL `2.107.26.23/iot/tempervice.wso?op=Hello`. The page has a blue header with the text "DataFlex Web Service". Below the header, it says "Click [here](#) for a complete list of operations." The main content area is titled "Hello" and "Test". It contains a form with a table for parameters:

Parameter	Value
sName	<input type="text" value="Dolly"/>

Below the table is an "Invoke" button. A red arrow points to this button. Below the button, it says "To view the output in JSON format, [click here](#)." Below this is another browser window showing the URL `http://2.107.26...ug?sName=Dolly` and the response `2.107.26.23/iot/tempervice.wso/Hello/JSON/debug?sName=Dolly` with the output `"Hello Dolly"`.

DataFlex Web Service

Sensor (C/C++)

```
client.println("GET /Arduino/tempService.wso/Hello/JSON/debug?sName=Dolly HTTP/1.1");  
client.println("Host: 192.168.1.63");  
client.println();
```

Server (DataFlex)

Object oHello is a cWebService

```
{ Published=True }  
{ Description="" }
```

```
Procedure Hello String sName Returns String  
    Function_Return ("Hello " + sName)  
End_Procedure
```

End_Object

Micro Controllers; What are they?

- A Micro Controller or MCU is a small programmable device with a lot of analogous and digital connectors.
- It can do a set of simple repetitive tasks – Fast
- In recent years MCU's and WiFi chips are build together.

How to start

ARDUINO UNO



WeMos D1 mini



ESP8266 12E



Why Arduino

- It is a de-facto standard.
- Easy to work with.
- Are referenced to by all producers of MCU's and sensors.
- IDE (Big word for small program) works for most other MCU's

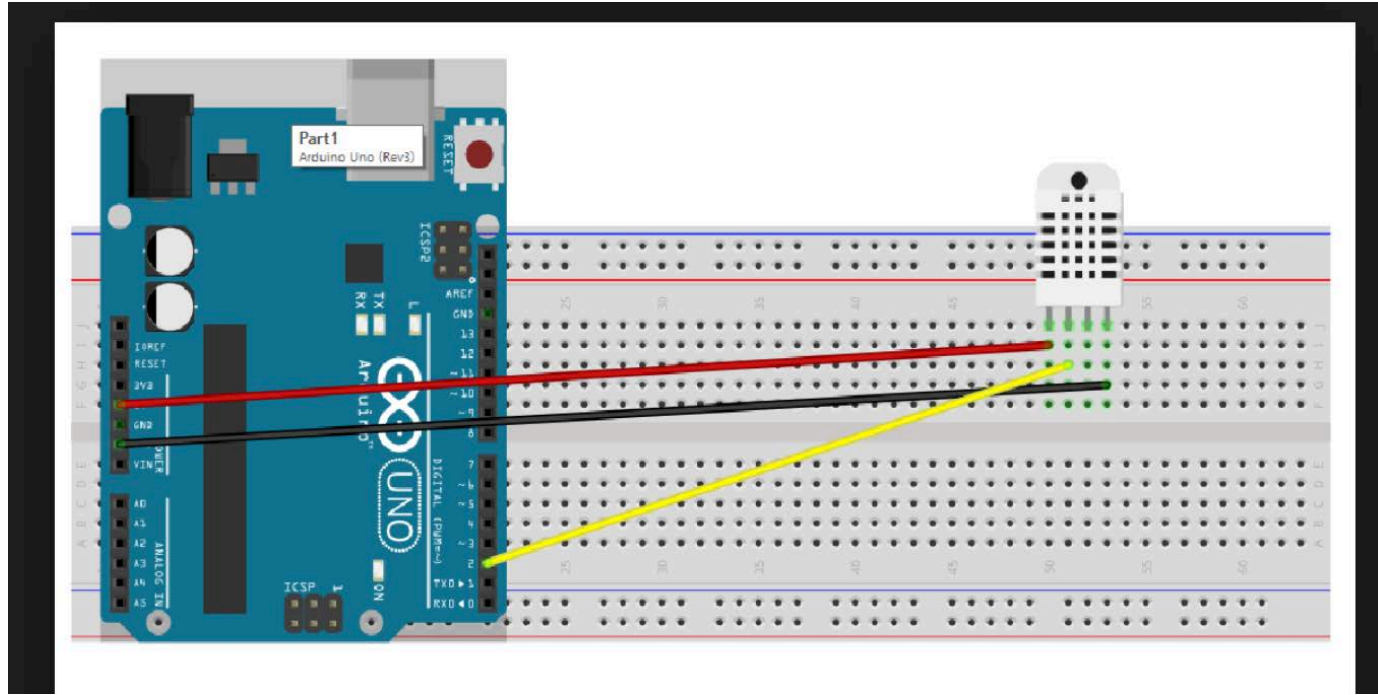
The Arduino IDE



The screenshot shows the Arduino IDE interface with a window titled "restclient | Arduino 1.6.8". The code editor displays a C++ program for a REST client. The code includes headers for SPI, WiFi, and a custom RestClient.h. It defines SSID and password, sets the status to WL_IDLE_STATUS, and defines a server IP. The setup function initializes the serial port, WiFi, and prints the local IP. The loop function attempts to connect to the server and send a GET request. If the connection fails, it restarts the ESP module.

```
restclient $
1 #include <SPI.h>
2 #include <WiFi.h>
3 #include "RestClient.h"
4
5 char ssid[] = "xxx";
6 char pass[] = "xxx";
7 int status = WL_IDLE_STATUS;
8
9 IPAddress server(2,107,26,23);
10
11 WiFiClient client;
12
13 void setup() {
14   Serial.begin(9600);
15   WiFi.begin(ssid, pass);
16   IPAddress ip = WiFi.localIP();
17   Serial.println(ip);
18   Serial.println("connecting...");
19
20   if (client.connect(server, 80)) {
21     Serial.println("connected");
22     client.println("GET /Arduino/tempService.wso/Hello/JSON/debug?sName=Dolly HTTP/1.1");
23     client.println("Host: 2.107.26.23");
24     client.println();
25   } else {
26     // No connection
27     Serial.println("connection failed.");
28     ESP.restart();
29   }
30 }
31
32 void loop() {
33 }
```

How to connect a sensor?



How to get information?

If the vendor does not have the information you need: Google it!

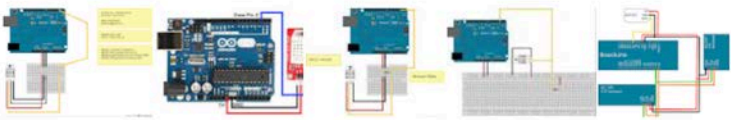
AM2302 arduino

Alle Bilder Shopping Videoer Maps Mere ▼ Søgевærktøjer

Ca. 178.000 resultater (0,50 sekunder)

Arduino DHT22 (AM2302) Tutorial + Library + Wiring
www.electroschematics.com/.../arduino-dht22-am2302-tutorial-lib... ▼ Oversæt denne side
You can use the DHT22 (or AM2302) humidity/temperature sensor and the Arduino UNO board to read data and print it out to the serial monitor or to display i.

Billeder af AM2302 arduino Rapportér billeder



Flere billeder af AM2302 arduino

AM2302 (wired DHT22) temperature-humidity sensor ID: 393 - \$15.00 ...
<https://www.adafruit.com/product/393> ▼ Oversæt denne side
15,00 \$
Adafruit Industries, Unique & fun DIY electronics and kits AM2302 (wired DHT22) temperature-humidity
... We have written an Arduino library with example code

Sensors

Gas



Color



IR



Hall



Vibrations



Light



Moisture



Twist



Sound



Temp/Humidity



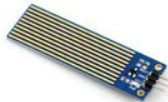
Tilt



Laser



Water level



and many more...

A business case - Light

My only job is to check if the light is turned on or off and report that to a DataFlex webservice.

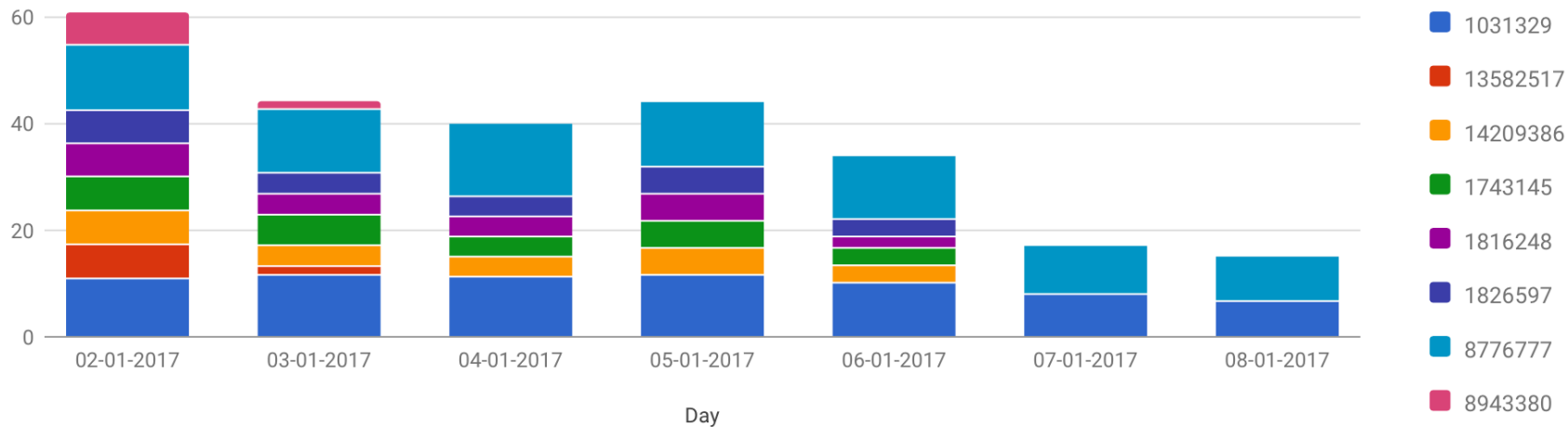
This tells you how much energy you have saved by switching to LED.



Presenting data

From 02-01-2017 To 08-01-2017 Show

Lights on per day (hours)



State of IoT business today

MCU's and Sensors



State of IoT business today

MCU's and Sensors



IoT Infrastructure



State of IoT business today

MCU's and Sensors



Solutions ??

That's us

(Void)

IoT Infrastructure



Usefull links

- <https://www.arduino.cc>
- <http://www.esp8266.com>
- <https://www.adafruit.com>
- <https://www.sparkfun.com>