

# Arduino i skyen

30. januar 2017

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# Arduino i skyen?

- Hvad menes med *Arduino i skyen?*
  - Mulighed for styring og overvågning på internettet
    - IoT: Internet of Things
  - Det smarte
    - Vender problemstillingen om, så du ikke selv skal sørge forbindelse fra internettet ind til din Arduino (forward gennem firewall el.lign.).  
Her er det Arduinoen, der selv forbinder til internettet.



# Arduino i skyen?

- Kræver forbindelse til internettet, f.eks.:
  - Ethernet
  - WiFi
  - ESP8266
  - Yún
- Idé
  - Efter Tommys fine introduktion til en PHP/SQLite-løsning faldt jeg over nogle løsninger, hvor man sender data ud på internettet (i ”skyen”) samt kan styre Arduinoen derfra.
  - Formentlig nemmere for nybegynderen.

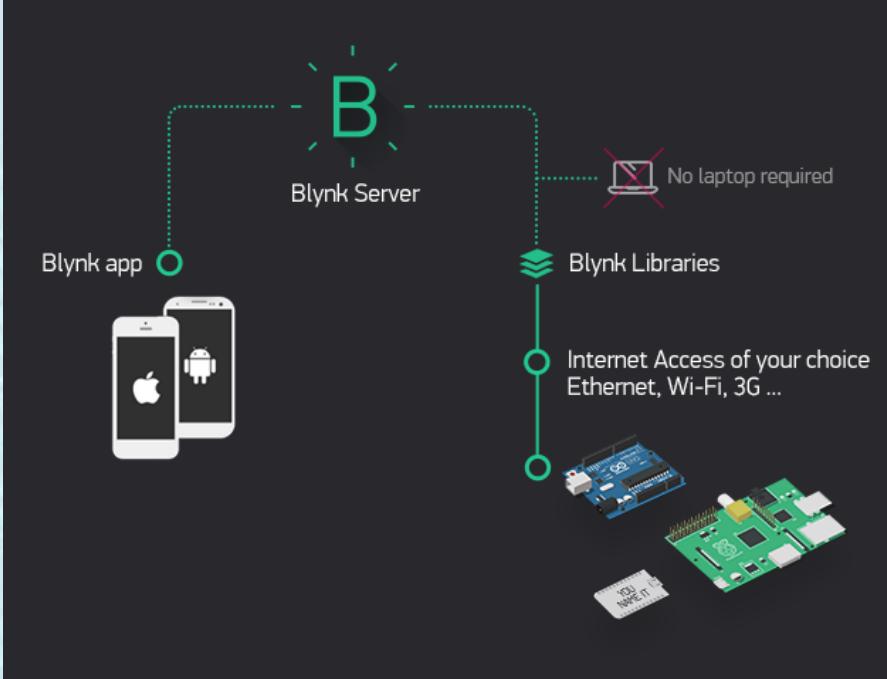
# Forskellige muligheder

- Forskellige muligheder
  - **Blynk**: Arduino + smartphone - introduceret tidligere
    - <http://www.blynk.cc>
  - **Cloud MQTT**: Introduceret af Leif Funder tidligere, også til mobil-app
    - <https://www.cloudmqtt.com/>
  - **Cayenne**: Både visning af data og styring
    - <https://cayenne.mydevices.com>
  - **ThingSpeak**: Kun visning af data
    - <https://thingspeak.com>
  - **thinger.io**: Både visning af data og styring
    - <https://thinger.io>
  - **Tonsvis af andre muligheder**
    - <https://www.thethingsnetwork.org/forum/t/visualize-and-push-your-iot-data/1788>
    - <https://www.intorobotics.com/complete-list-of-best-iot-platforms/>

# I dag

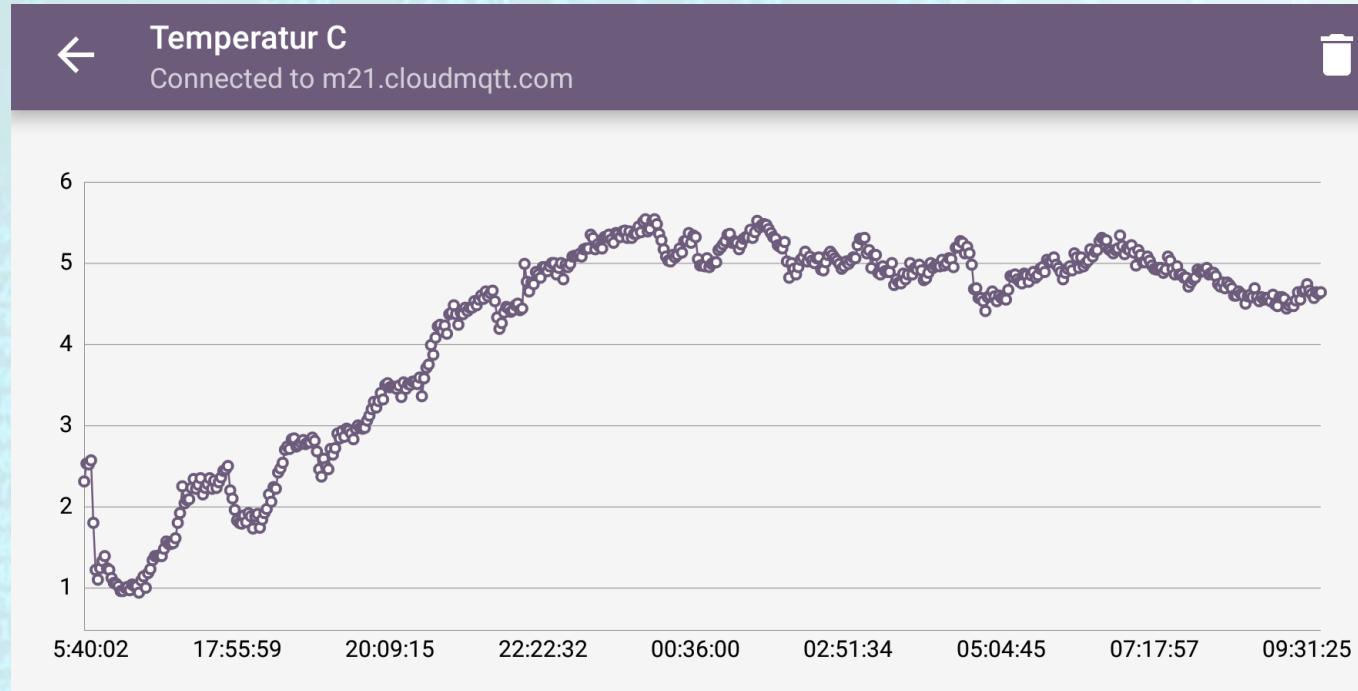
- Hurtige kom-i-gang eksempler
- Demo
- Tag det som inspiration – eksperimentér med et par af dem, hvis I finder det relevant.

# Blynk



# Cloud MQTT

- Eksempel fra Leif Funder (mobil app)



- Se mere i materialet fra Leif Funder

# Cayenne

https://cayenne.mydevices.com/cayenne/dashboard/arduino/V03-DZFB7DN-B7DN-7BA4-5

**Cayenne**

Add new... ▾

Arduino Uno

- Temp
- DS18B20
- LED
- UpTime

SimpleLED... Test +

Submit Project Community Docs User Menu

Overview Arduino Uno

Temp

Live m h d w 1mo 3mo 6mo 1y Custom

Time	Temperature
13:43:16	24
13:43:17	24
13:43:18	24
13:43:19	24

LED

UpTime

1674

DS18B20

20.25 Celsius

The screenshot shows the Cayenne web interface for an Arduino Uno. On the left sidebar, there's a 'Add new...' button and a list of device nodes: 'Temp' (represented by a thermometer icon), 'DS18B20' (represented by a purple probe icon), 'LED' (represented by a lightbulb icon), and 'UpTime' (represented by a clock icon). The main dashboard area has tabs for 'Overview' and 'Arduino Uno'. The 'Overview' tab is active, displaying four cards: 'Temp' (a line graph showing temperature over time, mostly flat around 24°C), 'LED' (a large circular button that is off), 'UpTime' (a green box showing the number 1674), and 'DS18B20' (a box showing the number 20.25 followed by 'Celsius'). The 'Arduino Uno' tab is also visible, showing a similar view for the specific Arduino device.

# Cayenne

- <https://cayenne.mydevices.com>
- Tilmeld med navn, e-mail og kode
- I Arduino IDE
  - Manage Libraries – tilføj Cayenne

# Cayenne - Opsætning af Arduino

Step 3: Connect your Arduino

SELECT YOUR ARDUINO BOARD CONNECTION:

Arduino Due	▼
Arduino Leonardo	▼
Arduino Mega	▼
Arduino Mini	▼
Arduino Nano	▼
Arduino Pro	▼
Arduino Pro Micro	▼
Arduino Pro Mini	▼
Arduino Uno	
<input checked="" type="checkbox"/> Ethernet Shield W5100	<a href="#">Sketch</a>
<input type="checkbox"/> Ethernet Shield W5200	<a href="#">Sketch</a>
<input type="checkbox"/> Ethernet Shield W5500	<a href="#">Sketch</a>
<input type="checkbox"/> Manual Connection	<a href="#">Sketch</a>
<input type="checkbox"/> Serial USB Connection	<a href="#">Sketch</a>
<input type="checkbox"/> WiFi Shield	<a href="#">Sketch</a>
<input type="checkbox"/> WiFi 101 Shield	<a href="#">Sketch</a>
Arduino Yun	

AUTH TOKEN FOR THIS DEVICE:

vl2givelmu

*Copy sketch file and Auth Token in Arduino IDE to upload*

 Waiting for board to connect...

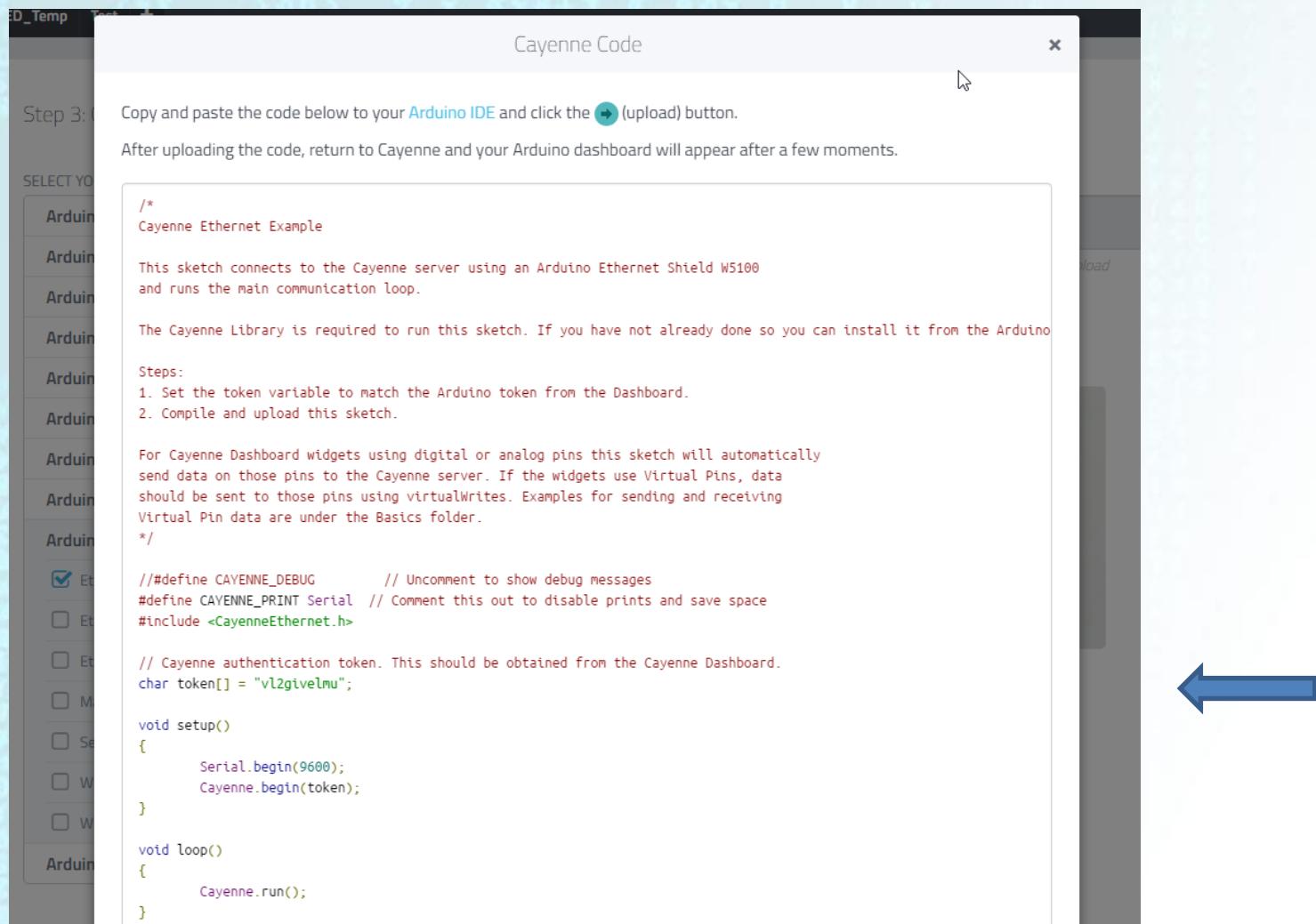


NEED HELP?

[Troubleshooting](#)  
[Download Cayenne library](#)  
[Installing Cayenne libraries](#)  
[Ask our community](#)



# Cayenne - Opsætning af Arduino – kode kopieres



# Cayenne

- Tilføj de enheder og widgets, du ønsker
- Hver gang en enhed tilføjes, laver Cayenne kode, som blot skal kopieres over i IDE'en
- Sammenbindingen sker vha. en *token*

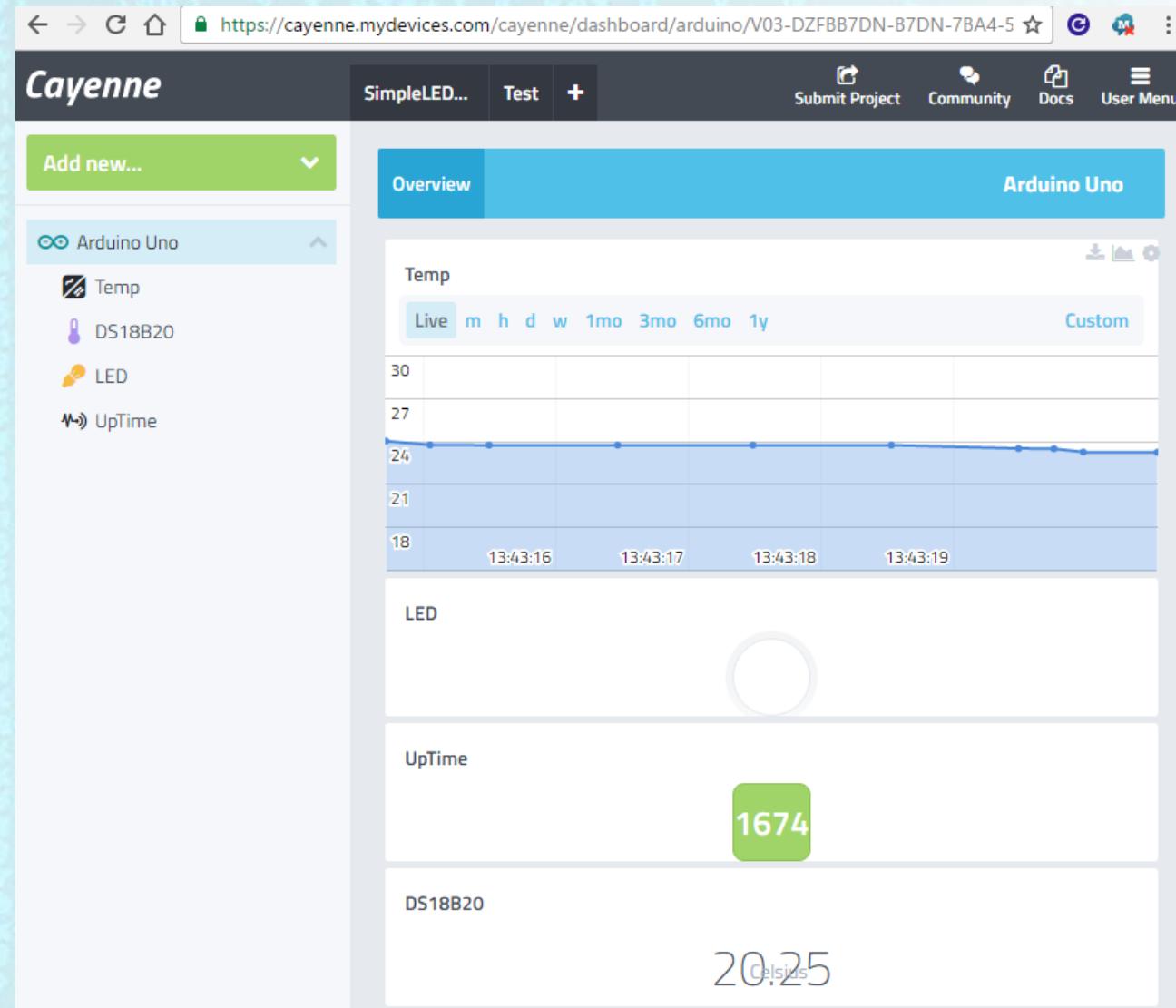
```
// Cayenne authentication token. This should be obtained from the Cayenne Dashboard.  
char token[] = "v12guvelmu";
```

# Cayenne

- Kommentar!
  - Library inkluderer Blynk, hvilket tilsyneladende ødelægger Blynk. Skyldes at Arduino IDE finder Blynk-filerne først under Cayenne (gl. udgave).
  - Betydning: Hvis du ikke kan forbinde til Blynk længere, skal Cayenne afinstalleres.

# Cayenne

- Demo!
- Data og styring



# ThingSpeak

https://thingspeak.com/channels/177653/private\_show

## ThingSpeak™

### WeatherStation

Channel ID: 177653  
Author: Gedebuk  
Access: Public

Private View    Public View    Channel Settings    API Keys    Data Import / Export

Add Visualizations    Data Export    MATLAB Analysis    MATLAB Visualization

#### Channel Stats

Created: about a month ago  
Updated: less than a minute ago  
Last entry: less than a minute ago  
Entries: 9240

#### Field 1 Chart

WeatherStation

Date	Temp
14. Nov	22.5
14. Nov	21.5
14. Nov	20.5
14. Nov	18.5
28. Nov	22.0
12. Dec	21.0
26. Dec	20.5

ThingSpeak.com

# ThingSpeak

- <https://thingspeak.com>
- Tilmeld med brugernavn, e-mail og kode
- Opret kanal og felter
- Vigtigt:
  - *Channel ID*
  - *Write API Key*



Arduino

Channel ID: 207053  
Author: Gedebuk  
Access: Private

Private View Public View Channel Settings API Keys Data Import / Export

Write API Key

Key SP4MJL1H519R346L

Generate New Write API Key

Help

API keys enable you to write data to a channel or read data from a private channel. API keys are auto-generated when you create a new channel.

API Keys Settings

- **Write API Key:** Use this key to write data to a channel. If you feel your key has been compromised, click **Generate New Write API Key**.
- **Read API Keys:** Use this key to allow other people to view your private channel feeds and charts. Click **Generate New Read API Key** to generate an additional read key for the channel.
- **Note:** Use this field to enter information about channel read keys. For example, add notes to keep track of users with access to your channel.

Read API Keys

Key E1BZ9LIDX33HRI9

Note

Save Note Delete API Key

Generate New Read API Key

Create a Channel

```
POST https://api.thingspeak.com/channels.js
api_key=LSOPDA8DHT2PQE2K
name=My New Channel
```

Update a Channel

```
PUT https://api.thingspeak.com/channels/207053.js
api_key=LSOPDA8DHT2PQE2K
name=My New Channel
```

# ThingSpeak

- I Arduino IDE
  - Manage Libraries – tilføj ThingSpeak
  - Examples -> ThingSpeak -> F.eks. WriteVoltage
  - Fjern udkommentering af den type, du bruger:

```
//#define USE_WIFI101_SHIELD  
#define USE_ETHERNET_SHIELD
```
  - Skriv kanalnr. og API-key ind i Arduino-koden og upload.

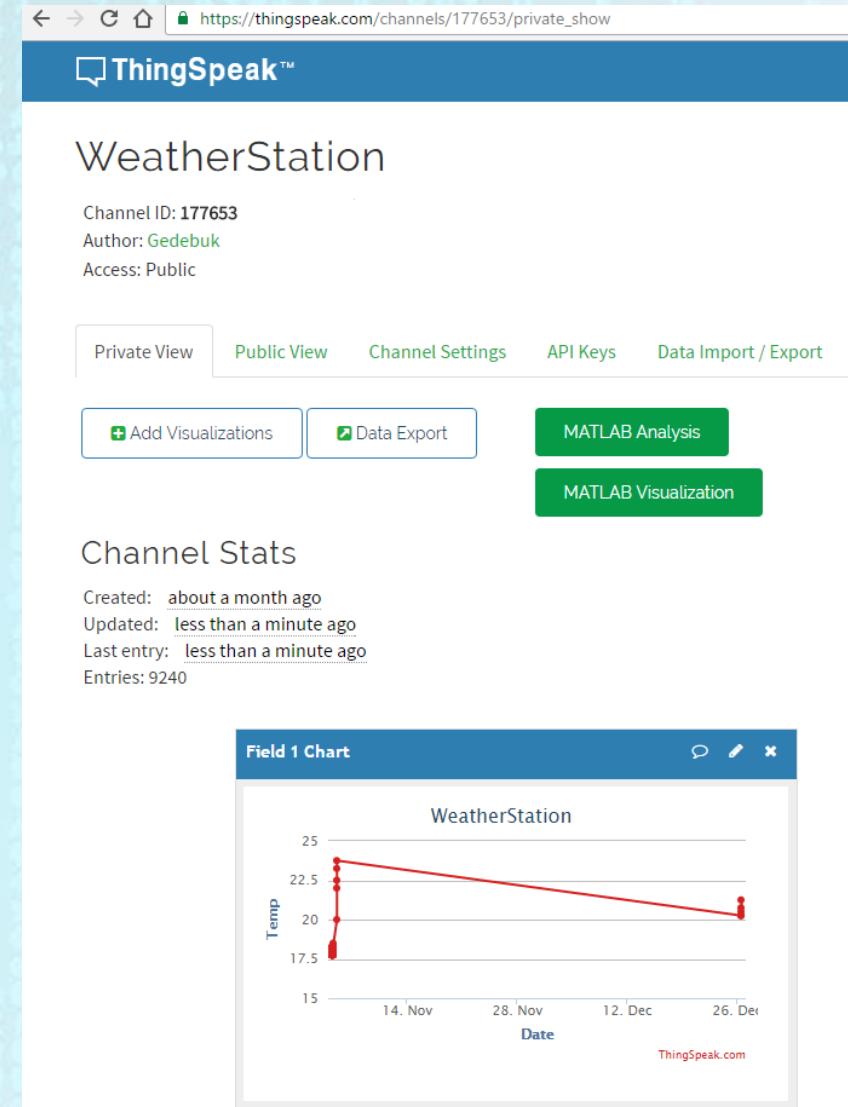
```
unsigned long myChannelNumber = 207053;  
const char * myWriteAPIKey = "SP4MJL1H519R346L";
```

- I loop () laves arbejdet og sendes til ThingSpeak vha. kanalnummer, feltnr. og API-key

```
ThingSpeak.writeField(myChannelNumber, 1, tempC, myWriteAPIKey);
```

# ThingSpeak

- Demo!
- Kun data



# thinger.io

The screenshot shows the thinger.io dashboard interface for an Arduino project. The left sidebar contains navigation links for 'Your Cloud' (Statistics, Dashboards, Devices, Data Buckets, Endpoints), 'Your Account' (Profile, Settings), 'Resources' (Documentation, Community, GitHub Libraries), and 'Contact' (Twitter). The main area is titled 'Arduino' and includes a green toggle switch. Below it are three data cards: 'Uptime' showing the value 689, 'LED' with a green toggle switch, and 'Temp' which displays a line graph of temperature data from 12:56:30 to 13:01:00. The 'Temp' card also shows a value of 20.25.

https://console.thinger.io/#/console/dashboard/Arduino

thinger.io

Your Cloud

- Statistics
- Dashboards
- Devices
- Data Buckets
- Endpoints

Your Account

- Profile
- Settings

Resources

- Documentation
- Community
- GitHub Libraries

Contact

- Twitter

Arduino

Uptime

689

LED

Temp

20.25

12:56:30 12:57:00 12:57:30 12:58:00 12:58:30 12:59:00 12:59:30 13:00:00 13:00:30 13:01:00

# thinger.io

- <https://thinger.io>
- Tilmeld med brugernavn, e-mail og kode
- Tilføj Device (ID og kodeord er vigtigt=sammenkoblingen)
- I Arduino IDE
  - Manage Libraries – tilføj thinger.io
  - Examples -> thinger.io -> F.eks. Ethernet
  - Standardeksemplet har styring af LED samt visning af uptime
  - Binder sammen vha. navne, f.eks. `thing["led"]` og `thing["millis"]`

```
thing["led"] << digitalPin(8);
thing["millis"] >> outputValue(millis() / 1000);
```
  - Skriv brugernavn, Device ID og Device kode ind i Arduino-koden og upload
- På thinger.io kan forbindelsen overvåges
- Tilføj Dashboard
  - Widgets: Text/Value og On/Off state

# thinger.io

- Demo!
- Data  
og  
styring

The screenshot shows the thinger.io dashboard interface for an Arduino device. The left sidebar contains navigation links for 'Your Cloud' (Statistics, Dashboards, Devices, Data Buckets, Endpoints), 'Your Account' (Profile, Settings), 'Resources' (Documentation, Community, GitHub Libraries), and 'Contact' (Twitter). The main area is titled 'Arduino' and features a green 'Add Widget' button. It displays four data visualizations: 1) 'Uptime' showing the value 689; 2) 'LED' showing a green toggle switch; 3) 'Temp' showing a line graph with a sharp spike from 20°C to over 23°C around 13:00:30; 4) 'Temp' showing the value 20.25.

# Afrunding

- Flere forskellige måder at hente data fra sin Arduino på og også måder at styre Arduino på.
- Fælles for dem er, at man i Arduino-koden forbinder vha. en eller anden form for kode/token.
- Kræver relativt lidt kode for at virke.  
Nogle af dem intet ud over standard-eksemplet.
- Råd: Prøv at eksperimentér med de forskellige og se, om du kan bruge noget af det.

# Spørgsmål?

- Ellers bare spørg i klubben!

