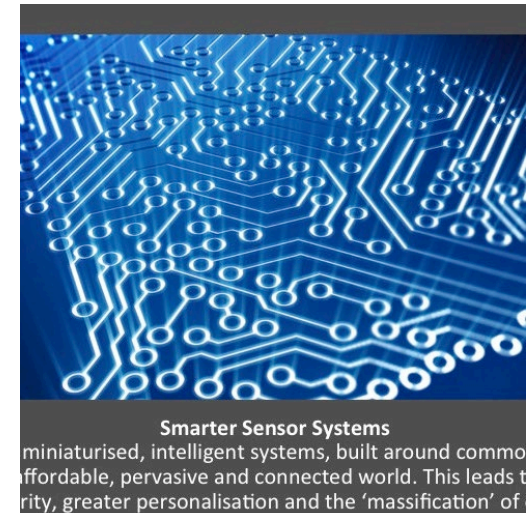
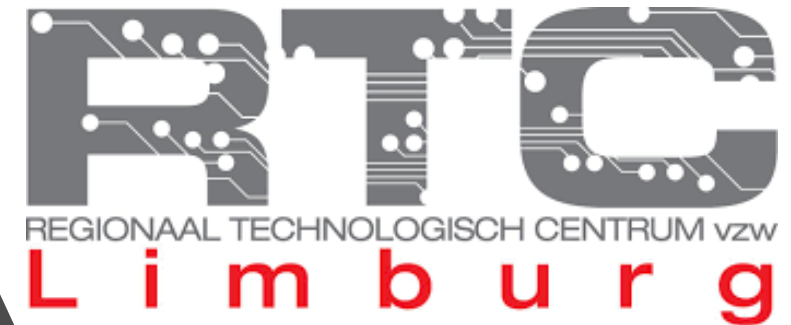


Vincent Claes

IoT Pilotproject Mobile Air Quality Measurements 2019/2020 RTC Limburg Hogeschool PXL



Deelnemers

School	Leerkracht	Aantal IIn	Klas
Spectrumcollege	Luc Meynckens	8	6IW
Mosa-RT Maaseik	Ludwig Swennen	4	6IW
TA Tungroforum Tongeren	Walter van Kets	4	6 Industriële ICT
TISM Bree	Jurgen Nijs	6	6IW

Internet Of Things



1

Connect to the network



Orange IoT connectivity

2

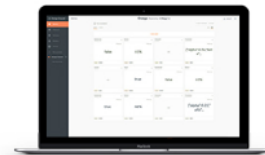
Collect your data



From your Orange NB-IoT
Rapid Development Kit

3

Visualise your data



Orange Maker
Powered by AllThingsTalk

4

Use your data



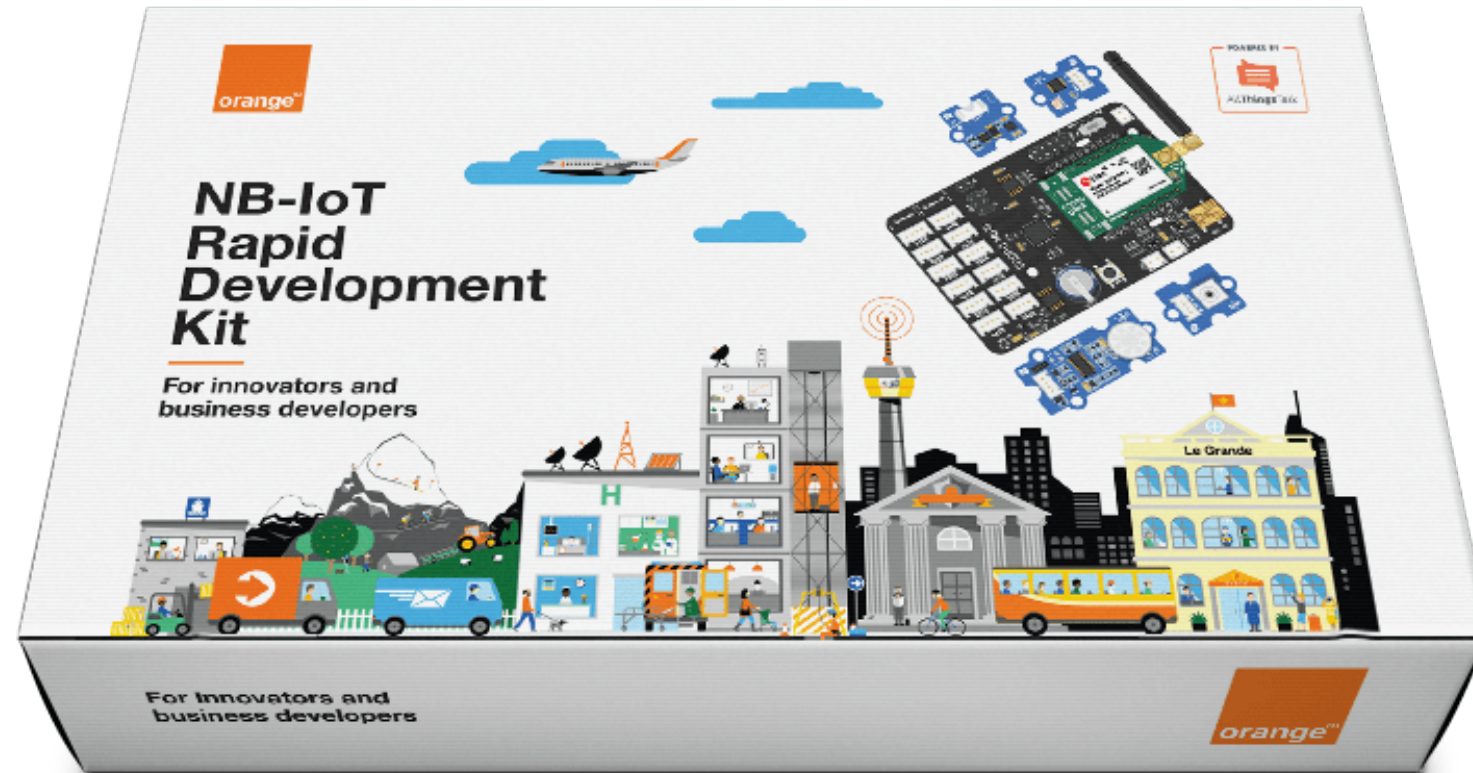
Experiments



Pilootproject

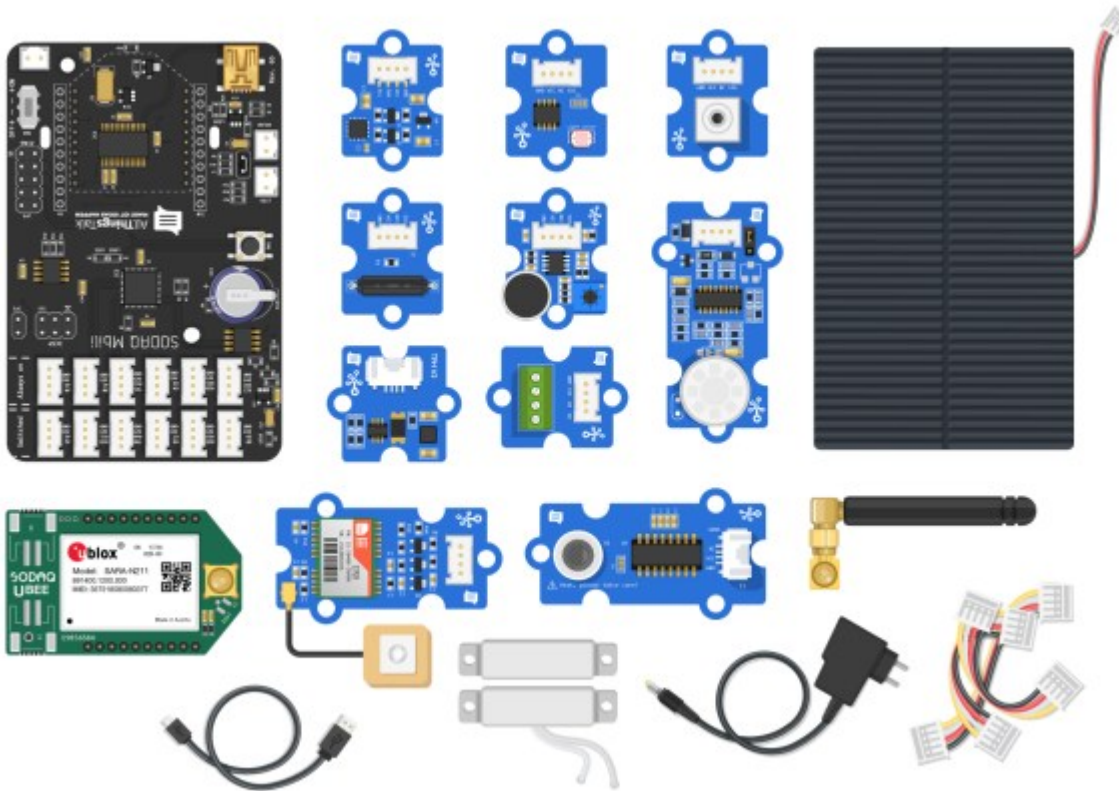
- De deelnemers komen in aanraking met de belangrijkste topics van **Internet-of-Things** systemen zoals:
 - *Sensoren*
 - *Sensor Netwerken (Low Power)*
 - *[Sensor] Gegevens [Data] visualiseren*
 - *Programmeren*

Rapid Prototyping Hardware



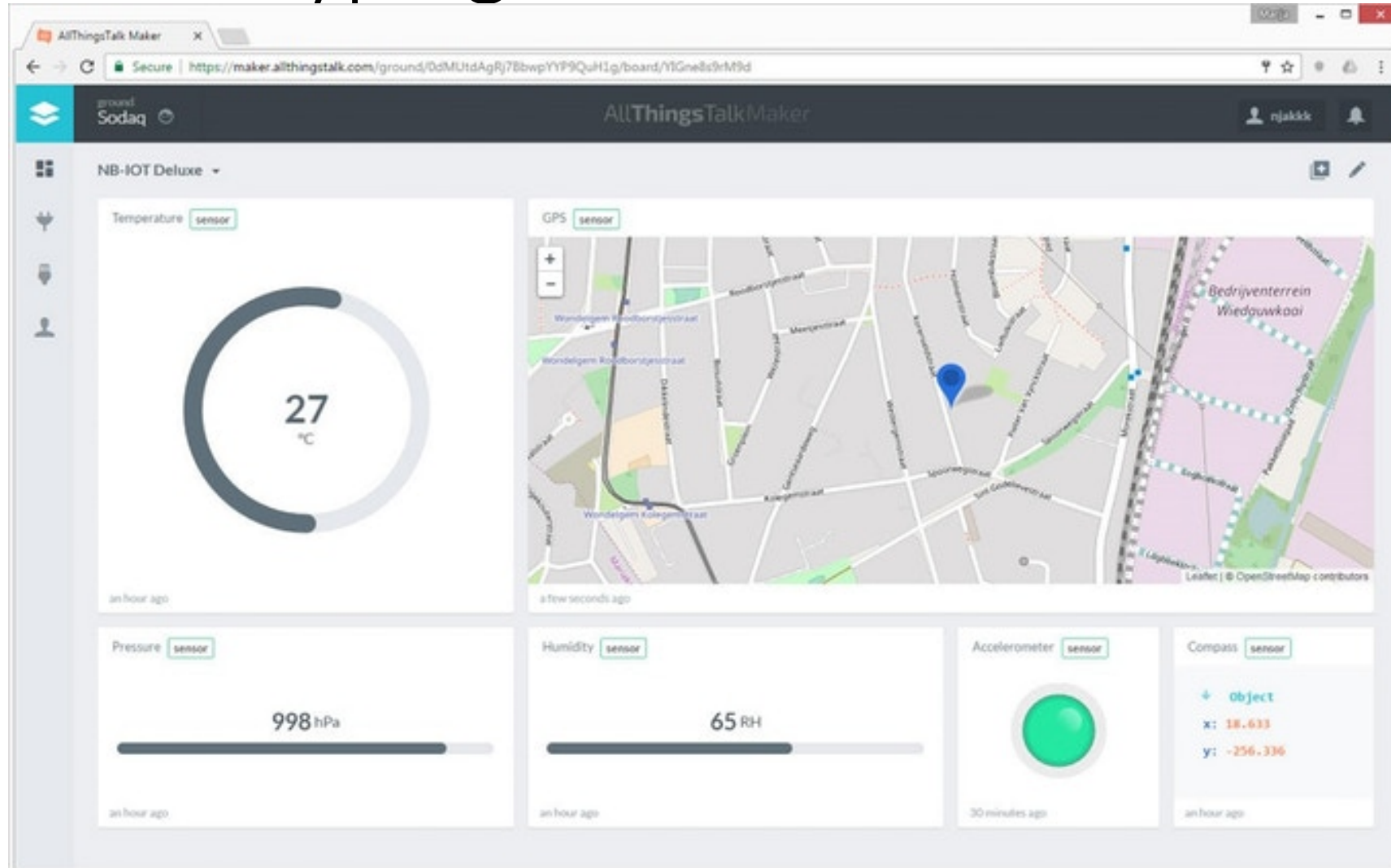
Sensoren

NB-IoT Starter kit



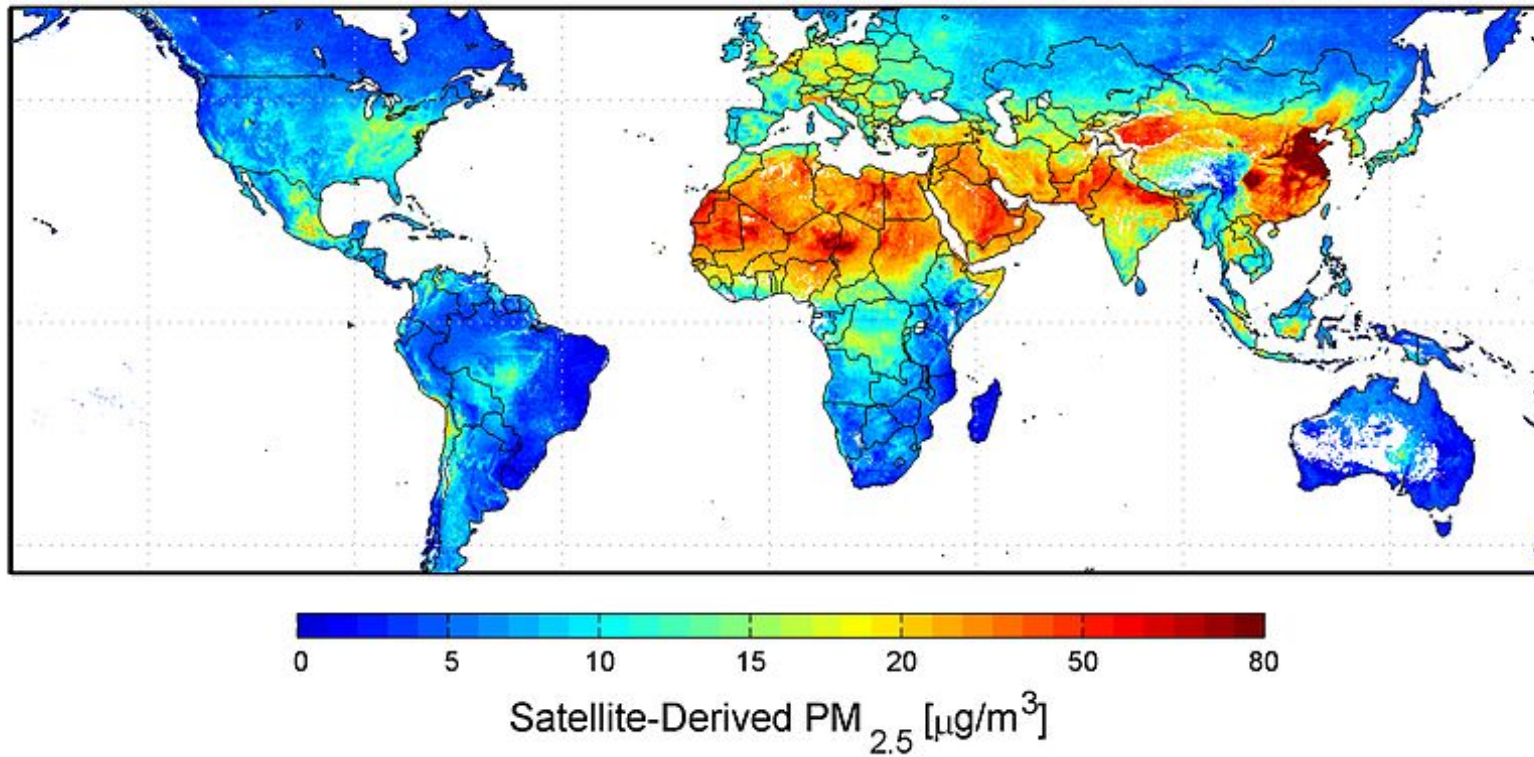
- **uBlox SaraN211 module**
- **Antenna**
- **1.5W Solar panel**
- **Lithium Polymer Battery 1200mAh**
- Grove – Button
- Grove – **Light sensor**
- Grove – PIR motion sensor
- Grove – **Temperature – pressure – humidity sensor**
- Grove – 3-Axis Digital Accelerometer
- Grove – Sound/Loudness Sensor
- Grove – **GPS module**
- Grove – Air quality sensor (Indoor)
- Grove – Tilt switch
- Grove – Magnetic door switch & screw connector

Rapid Prototyping Software



- <https://maker.allthingstalk.com>

Case Study: Luchtkwaliteit



Case Study: Luchtkwaliteit

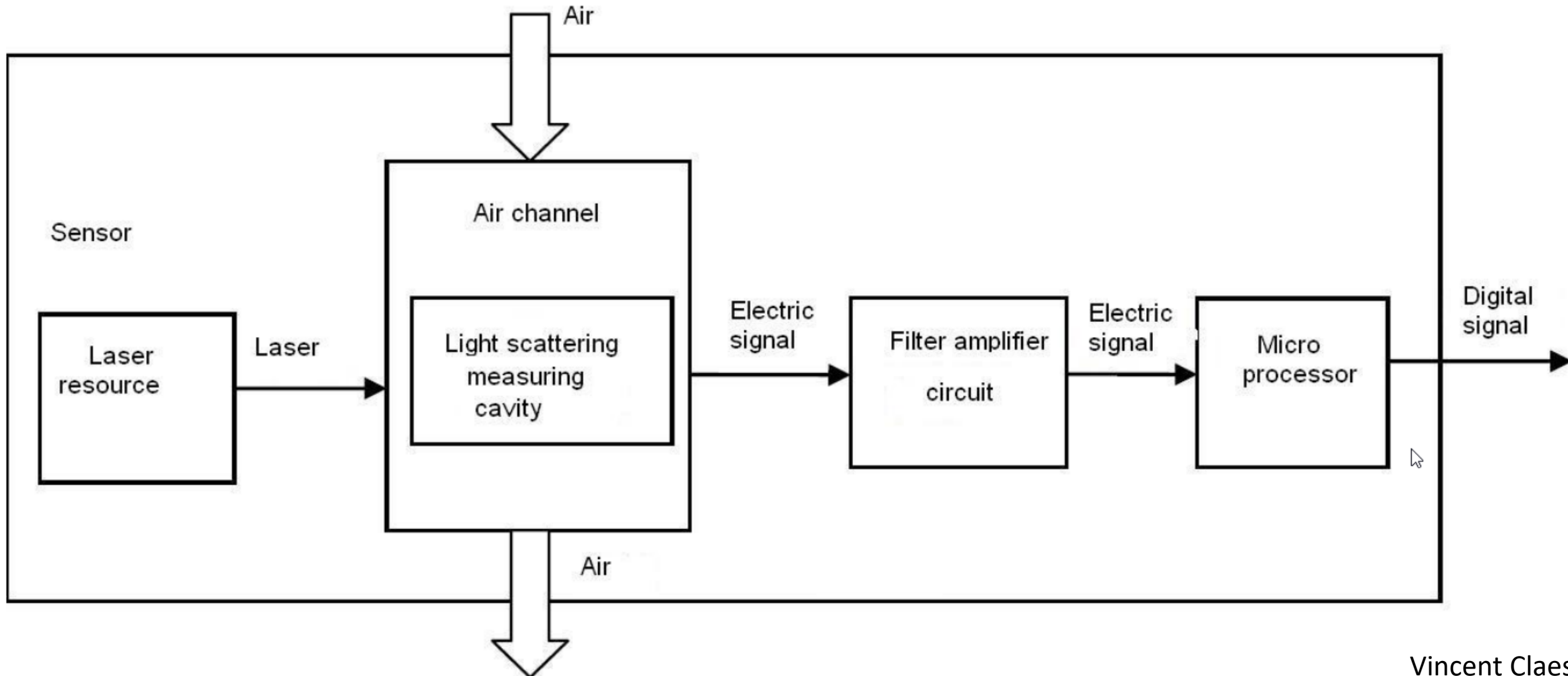
- PM3015 laser particle sensor module
- Deeltjes van $0,3\mu\text{m}$ ~ $10\mu\text{m}$
- Output van sensor: PM1.0, PM2.5 en PM10 in $\mu\text{g}/\text{m}^3$
- Industrial Grade



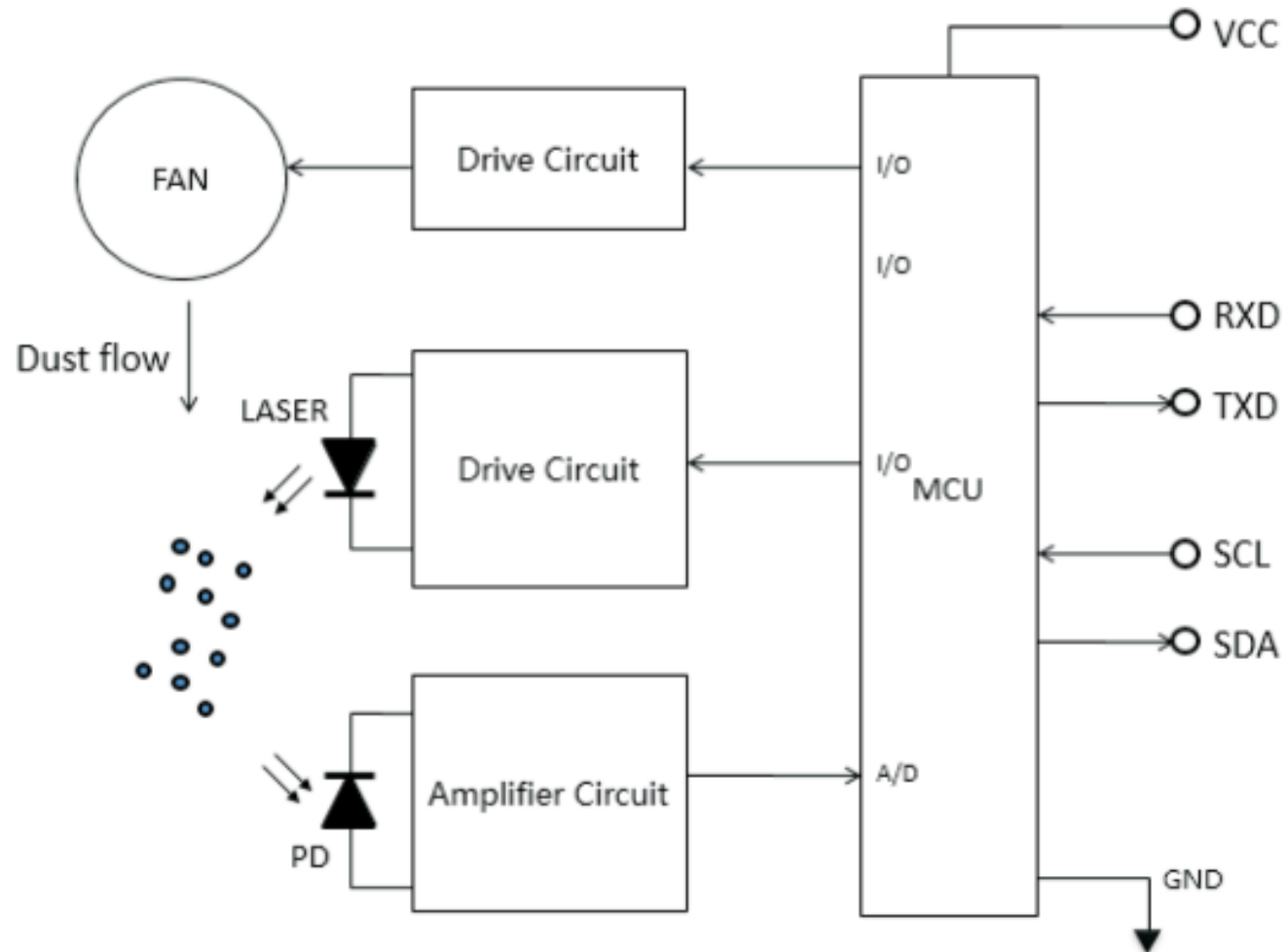
Applications

- Outdoor air quality monitoring
- Environmental monitoring

Case Study: Luchtkwaliteit



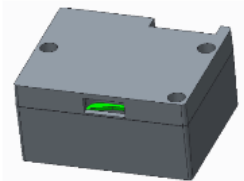
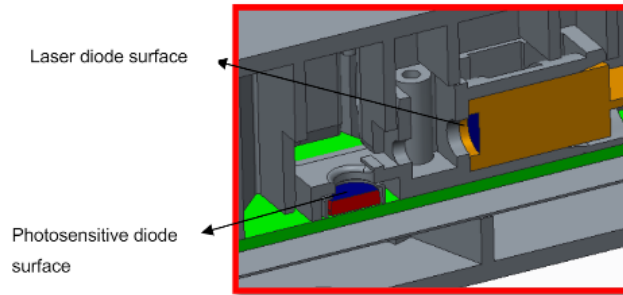
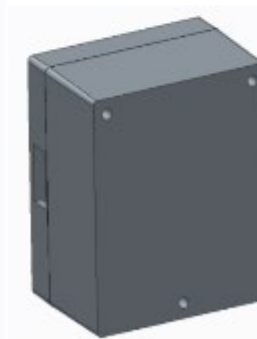
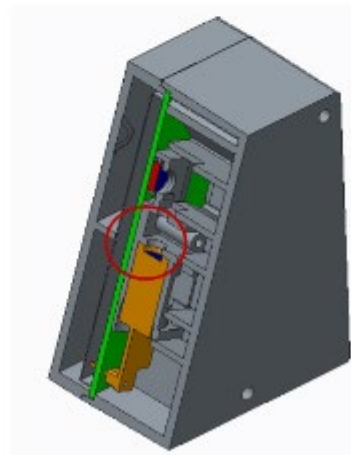
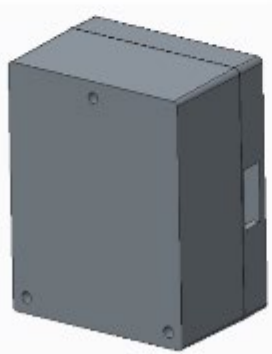
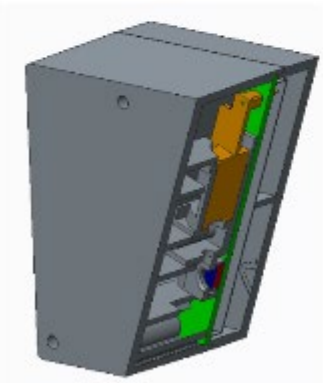
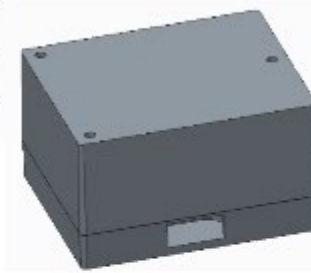
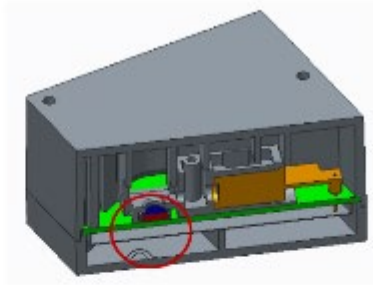
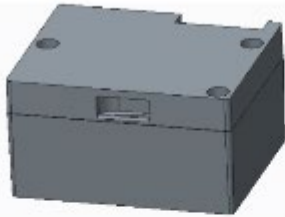
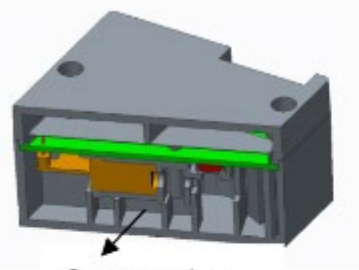
Case Study: Luchtkwaliteit



Case Study: Luchtkwaliteit

Recommended Installation

Non Recommended Installation



Case Study: Luchtkwaliteit

- Connectie Sensor (Hardware en Software)
 - UART interface
 - 3,3V ⇔ 5V
- Air inlet / outlet
- Behuizing (onze hardware moet herbruikbaar zijn voor volgend jaar, waterdicht, monteerbaar op fiets, ...)
- Data Visualisatie

Gebruikt Materiaal

- **Stap 1: Hardware van Orange Maker Kit [SODAQ]**
 - Arduino IDE
 - Gebruik van 3-Axis Digital Accelerometer en GPS module
 - Gebruik van Magnetic door switch en Push button
 - Gebruik van Light, Temperature, Pressure, Humidity, sound level en air quality (indoor) sensoren
 - Experimenteren
- **Stap 2: Software van AllThingstalk (Gegevens visualisatie)**
 - Grafische Webomgeving Allthingstalk gebruiken
 - Data Visualisatie
 - Experimenteren
- **Stap 3: Case Study**
 - Nieuwe Sensor implementeren (aansluiten, gebruik)
 - Behuizing bouwen voor sensorsysteem
 - Data Visualisatie voor Case Study
- **Stap 4: Presentatie en demo van gerealiseerd project**

Voorkennis?

- Arduino IDE
- Andere programmeertalen
- Webprogrammatie
- Elektronica / Analooq / Digitaal
- Mechanisch Ontwerpen (CAD, ...)

Planning

- Stap 0: Kick-off moment met Leerkrachten
 - **18 / 11 /2019**
- Stap 1 + 2: Hardware workshop, Kick-off moment met studenten, Gegevens Visualisatie
 - **Eerste of tweede lesweek van januari (na 17/01/2020)**
- Stap 3: Case Study setup workshop
 - [TBD]
- Stap 4: Slotmoment
 - [TBD]

Contact gegevens

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- Rinaldo.Menichetti@rtclimburg.be