



THE THINGS
N E T W O R K

AGENDA

- **About**
- **What happened so far?**
- **Plans for the future**

About?

INTERNET OF THINGS



LORA TECHNOLOGY

long range

low bandwidth

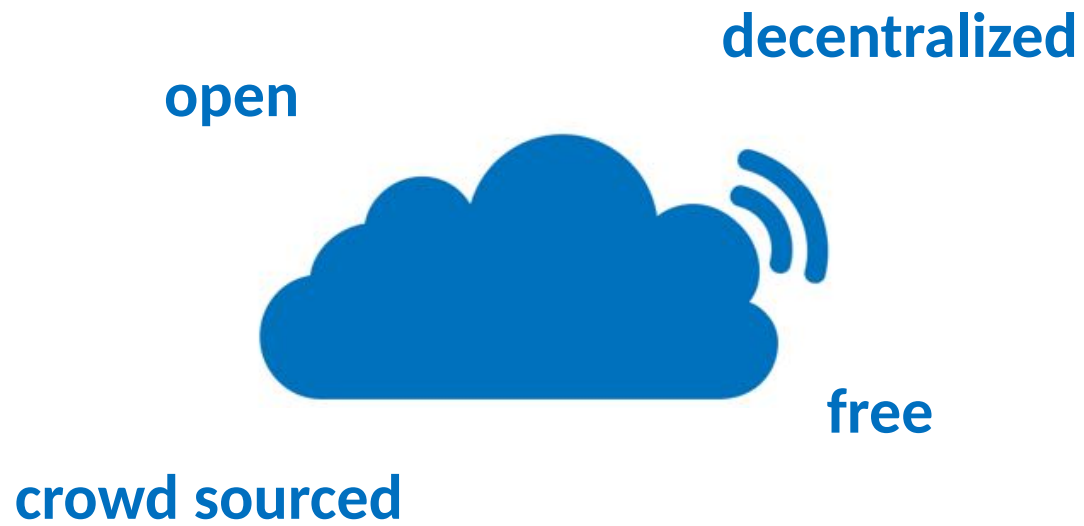
low battery



low cost

a lot of devices

THE THINGS NETWORK - MANIFESTO



AMSTERDAM



KICKSTARTER

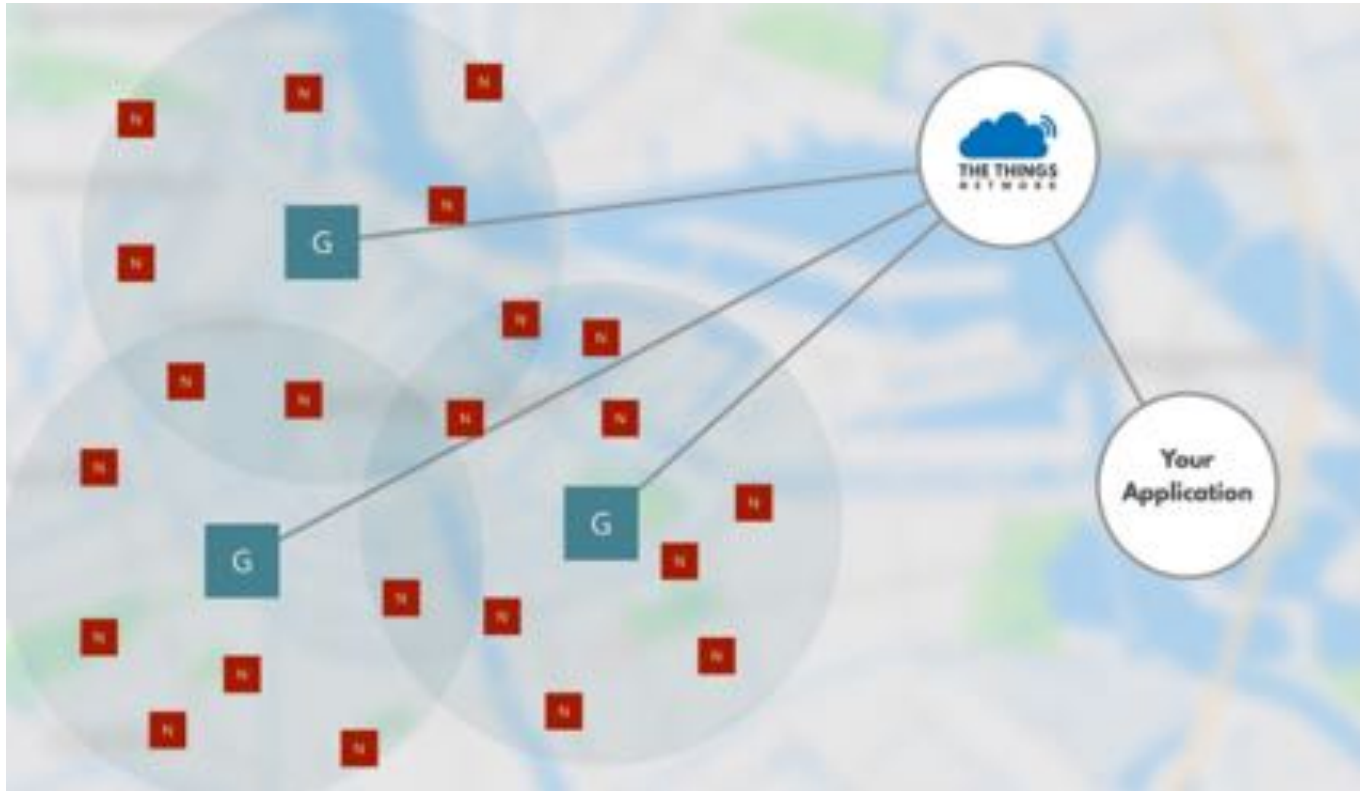
goal € 150,000
after only 8 days
finally 934 backers
€ 295,331



COMMUNITIES



NETWORK LAYOUT



GATEWAYS



NODES ('THINGS')



What happened so far?

RECENT DEVELOPMENTS

- **5/2016: Start**
- **6/2016: Gateway Maaspoort live**
- **6/2016: TTN Community established**
- **7/2016: Brabants Dagblad, Gemeente, Provincie, JADS**
- **7/2016: Informal kick off meeting Den Bosch TTN
community**

AFTER WE STARTED..

- **Node hardware standardized**

AFTER WE STARTED..

- **Node hardware standardized**
- **Added software for a some of the shelf sensors**
- **Increased battery life**
- **Basic dashboards**

Plans for the future

CURRENT COVERAGE



ROLL OUT PLAN

- **9/2016 Paleiskwartier**
- **11/2016 Vught**
- **11/2016 Centrum**
- **2017: ??**
- **2018: 95% coverage citywide**

THE 'POP UP' GATEWAY



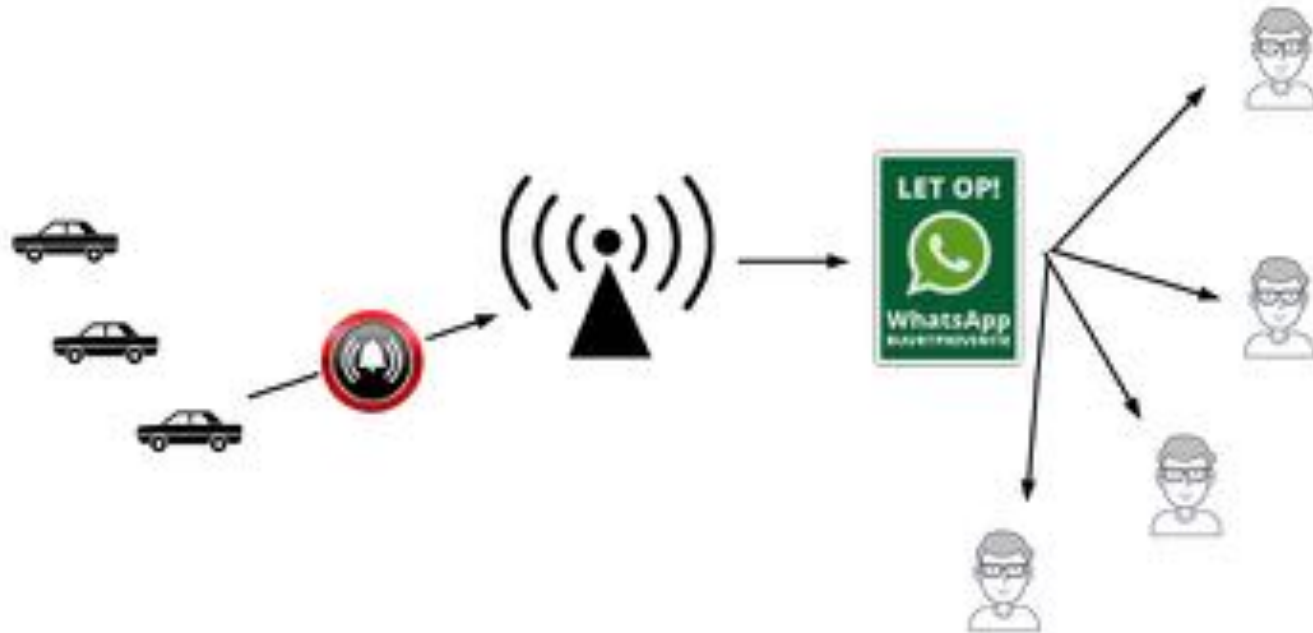
USE CASES

- **?/2016: Proof of Concept, Waste bin**
- **10/2017: Air quality Maaspoort**
- **10/2017: Car alarm -> 'Buurt App'**
- **11/2016: Paleiskwartier, ??**

USE CASES – AIR QUALITY

- “Smart citizens”
- Sensor selection
- “Talk to your neighbour”

USE CASES - Car alarm / Buurt app





THE THINGS
NETWORK
Den Bosch

Thank you

SENSORS - HTU21D

- Temperature + Humidity



SENSORS - DS18B20

- Temperature



SENSORS – SR501 PIR

- Movement



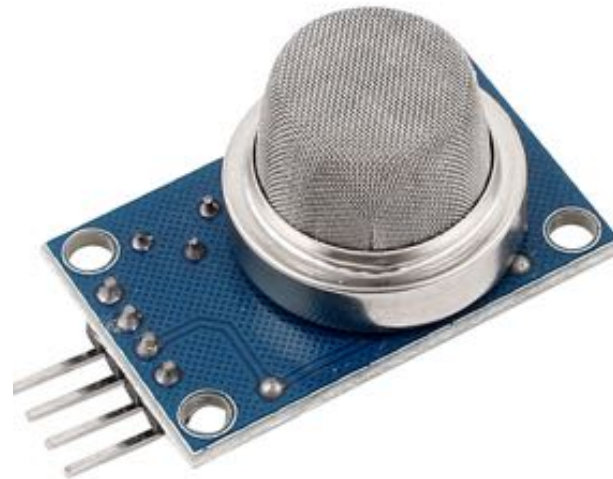
SENSORS - GP2Y1010AU0F

- Dust/smoke



SENSORS – MQ Series

- Several substance sensors



SENSORS – MQ Series

- MQ-2: Methane, Butane, LPG, smoke.
- MQ-3: Alcohol, Ethanol, smoke
- MQ-5: Natural gas, LPG
- MQ-6: LPG, butane gas
- others.. Carbon Monoxide, Hydrogen Gas, Ozone,
Benzene, Alcohol, smoke, Hydrogen Sulfide gas,
Ammonia, Benzene, Toluene, Alcohol, Acetone, etc

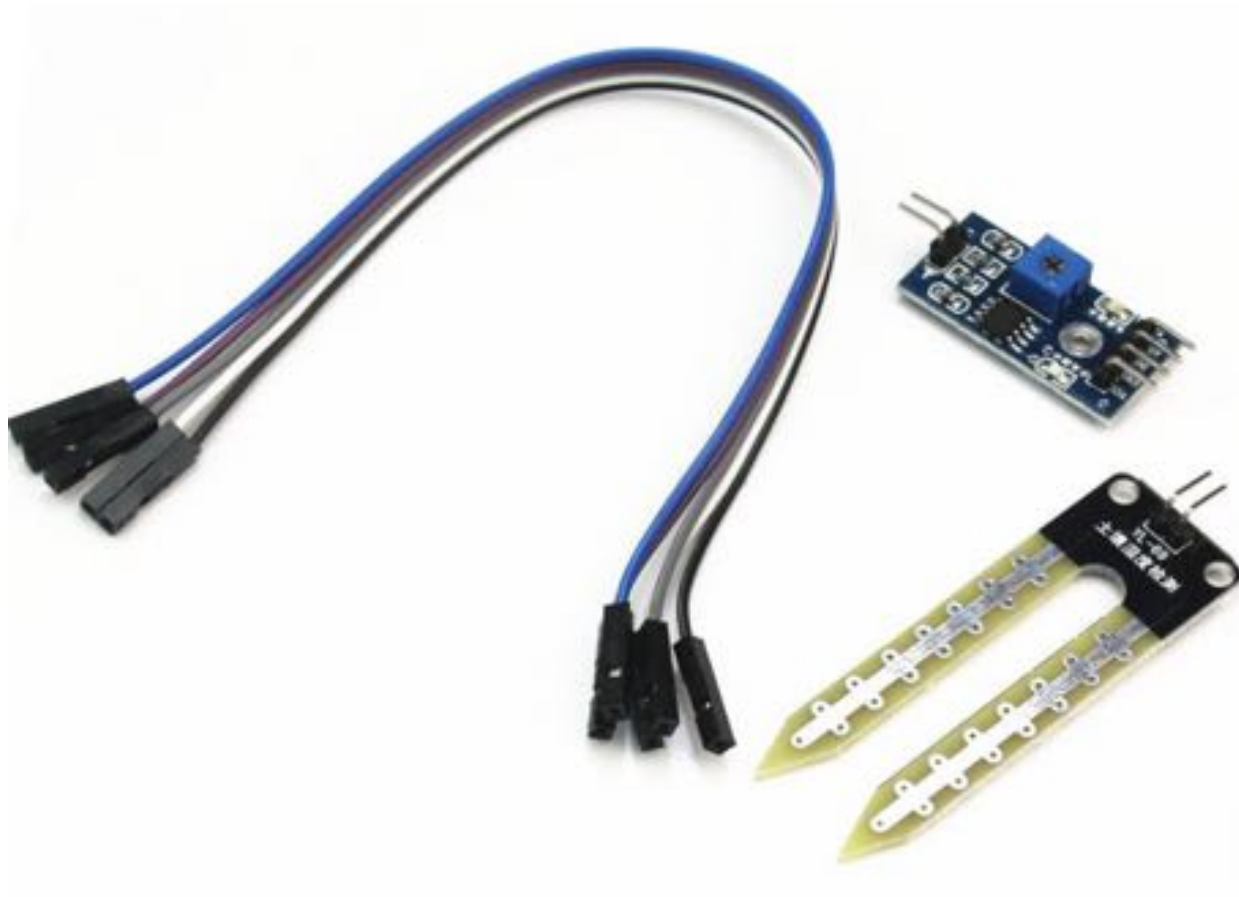
SENSORS - HC-SR04

- Distance



SENSORS - No Name

- Soil moisture



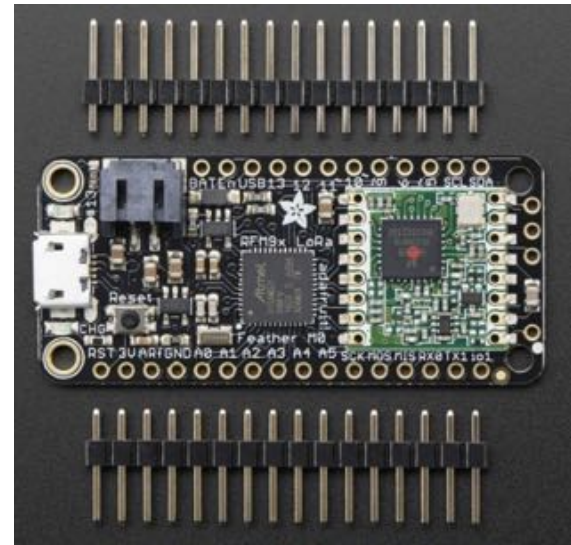
NODES

- Controller,
transceiver &
sensor(s)



NODES - off the shelf

- Prices vary; somewhere between quite expensive and extremely expensive
- Still pretty high DIY level



NODES - DIY



TRANSCEIVERS – RFM95W

- ‘Cheap’ & stupid



TRANSCEIVERS – RN2483

- Expensive & Smart(er)



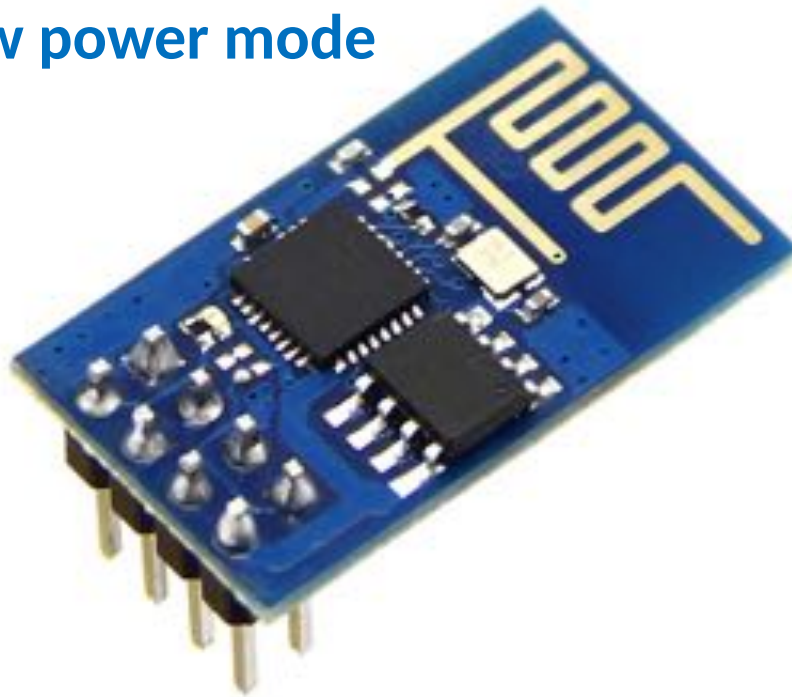
CONTROLLERS – Arduino Pro Mini

- Atmel AT328P
- 43 μ A in low power mode



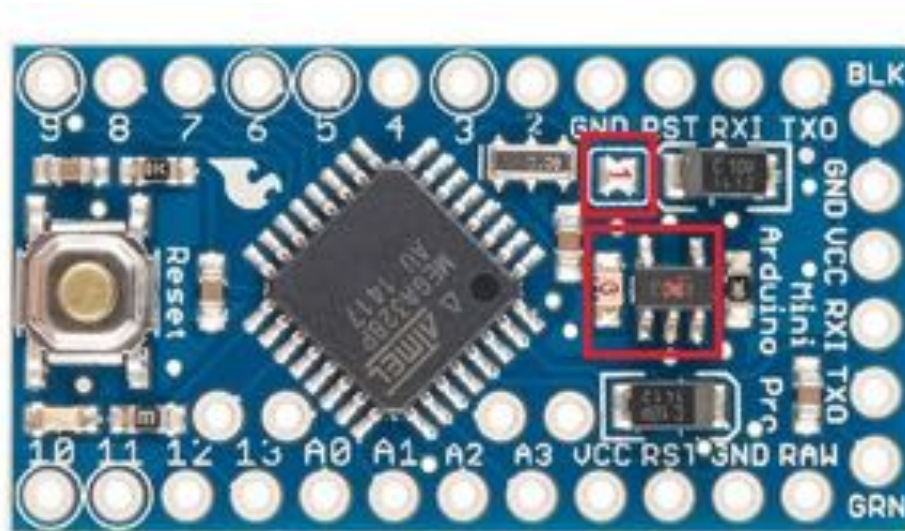
CONTROLLERS - ESP8266

- 32-bit RISC CPU: Tensilica Xtensa LX106
- Onboard WiFi
- 77 μ A in low power mode



CONTROLLERS – Activating the low power

- Software: enable sleep mode(s)
- Hardware: see below >:)



GATEWAYS – Kick starter

- Pre order: november.
- Normal sale: januari
- Ca. 300 euro



GATEWAYS – Kerlink

- Operator grade
- Ca 1500 euro
- Additional features, like
on board 3G
- Same range (legal
limitations)



GATEWAYS – Lorank8

- **Semi-professional**
- **Ca 700 euro**



GATEWAYS - DIY

- Roughly comparable with Lorank8
- Ca 300 euro
- Raspberry Pi + add on board



EXTERNAL ANTENNA

- Vastly better than small indoor antenna
- Ca 100 euro



USE CASES - SmartBeeHives



USE CASES - HoosjeBootje



USE CASES – Wie kalt ist der Kanal



Dortmund-Ems Kanal @DortmundEms · Jul 11
Heute: Erfrischende 22°C. #idek

Dortmund-Ems Kanal @DortmundEms · Jul 6
15 Uhr. 20.5°C. Warm geht anders.

Dortmund-Ems Kanal @DortmundEms · Jul 2
Samstag. 15 Uhr.
Der Kanal meldet 20.8 °C.
Die Frisur sitzt.

#freifunk #münster

Dortmund-Ems Kanal @DortmundEms · Jun 30
Guten Morgen #Münster!
Dortmund-Ems Kanal meldet 21°C

INTERESTED? -> how to join?

- Provide and arrange use cases
- Install a gateway
- Node development
 - Improve looks and usability
 - Less power consumption
 - Code review
 - Add more sensors (in particular software)