



salzburg**research**



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Umsetzung einer Beispielanwendung

LoRa, SigFox und NB-IoT



Beispielanwendung

- Temperaturmessung
- Übertragung durch Schmalband-Technologie
- Speicherung
- Visualisierung

- Vergleich der Technologien
 - LoRa
 - Sigfox
 - NB-IoT

LoRa: Überblick



| Messgerät | | Funk-Infrastruktur | | Cloud-Infrastruktur | |
|-----------|------|--------------------|-------------|---------------------|--------------|
| PyCom | | LoRa | | Eigene Datenbank | |
| Pysense | LoPy | LoRa-Gateway | LoRa-Server | InfluxDB | Grafana |
| | I2C | LoRa | UDP | MQTT | InfluxDB API |

Hardware

Software



LoRa: Details – Pysense to LoPy

| Messgerät | | Funk-Infrastruktur | | | Cloud-Infrastruktur | |
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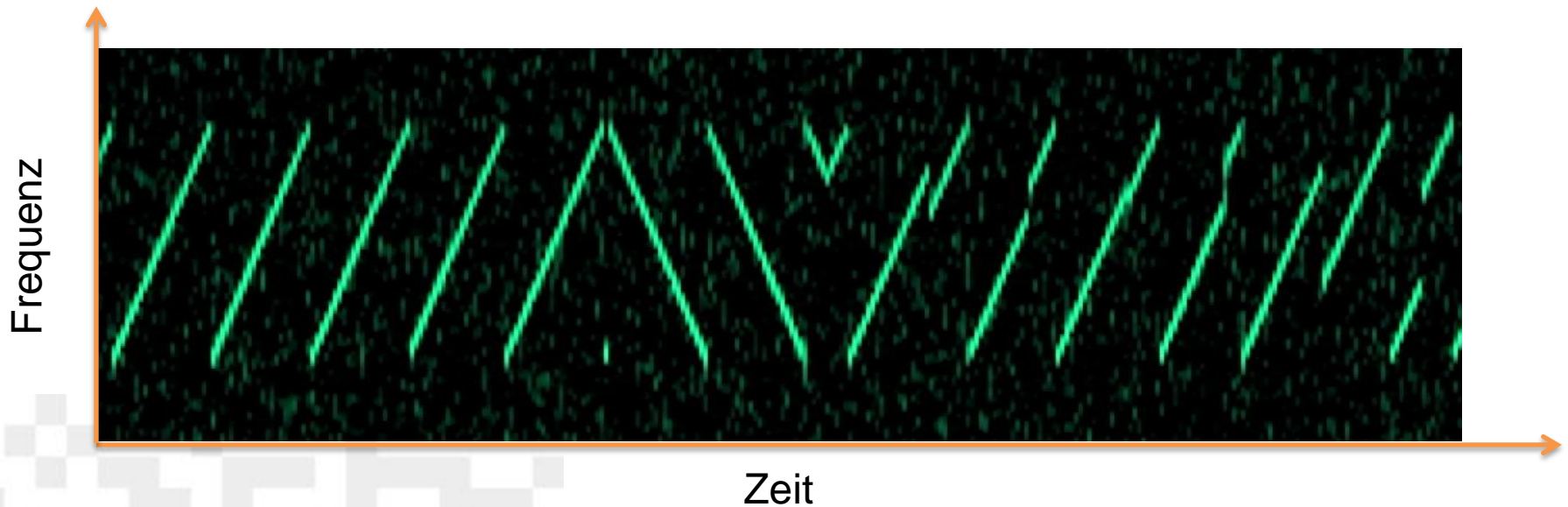
„28°C“ über I2C

[Details für heute egal]



LoRa: Details – LoPy to Gateway

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Bildquelle: Matt Knight, Decoding the LoRa PHY, 33C3, 2016



LoRa: Details – Server to Influx

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```
[udp sum ok] RADIUS, length: 231
Access-Request (1), id: 0x84,
Authenticator: 00800000a00001d37b227278706b223a
Tunnel-Server-Auth-ID Attribute (91), length: 123, Value: "tmst":3991468499,
"time":"2018-01-09T15:27:40.537289Z","chan":0,"rfch":0,"freq":868.100000,
"stat":1,"modu":"LORA","datr": Login-LAT-Service Attribute (34), length: 83,
Value: F7BW125","codr":"4/5","lsnr":7.0,"rssi":-73,"size":14,
"data":"QCzqUAYA0gACy3GyciA"
```



LoRa: Details – Server to Influx

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```
application/1/node/70b3d54995b7af71/rx {  
  "applicationID":"1","applicationName":"SRFG-Demo-App",  
  "nodeName":"DemoNode1","devEUI":"70b3d54995b7af71",  
  "rxInfo":[{"mac":"00800000a00001d3","time":"2018-01-09T16:05:40.589629Z",  
    "rssi":-85,"loRaSNR":9.2,"name":"","latitude":0,"longitude":0,"altitude":0}],  
  "txInfo":{"frequency":868300000,"dataRate":{"modulation":"LORA",  
    "bandwidth":125,"spreadFactor":7},"adr":false,"codeRate":"4/5"},  
  "fCnt":248,"fPort":2,"data":"HA=="}
```

Info: Base64Decode("HA==") = 28

LoRa: Details – InfluxDB



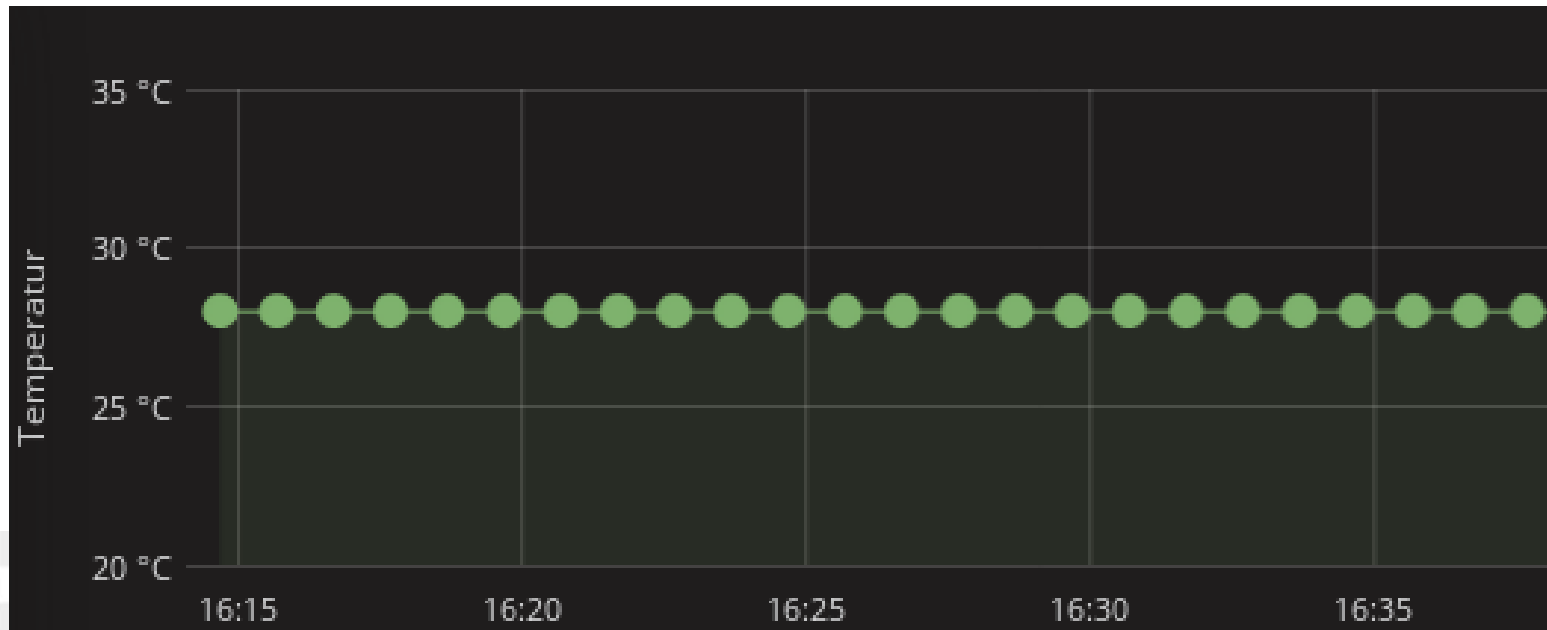
| Messgerät | | Funk-Infrastruktur | | | Cloud-Infrastruktur | |
|-----------|------|--------------------|-------------|----------|---------------------|--|
| PyCom | | LoRa | | | Eigene Datenbank | |
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| Timestamp | App-Name | LoRa-SNR | Node-Name | RSSI | Temperatur |
|---------------------|---------------|----------|-----------|------|------------|
| ... | | | | | |
| 1515514600587769088 | SRFG-Demo-App | 7.5 | DemoNode1 | -75 | 28 |
| 1515514660592169984 | SRFG-Demo-App | 8.8 | DemoNode1 | -75 | 28 |
| 1515514720584403968 | SRFG-Demo-App | 7.5 | DemoNode1 | -75 | 28 |
| 1515514780586051840 | SRFG-Demo-App | 8.5 | DemoNode1 | -78 | 28 |
| 1515514840597026048 | SRFG-Demo-App | 8.5 | DemoNode1 | -78 | 28 |
| ... | | | | | |



LoRa: Details – Grafana

| Messgerät | | Funk-Infrastruktur | | | Cloud-Infrastruktur | |
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Vergleich: LoRa, Sigfox, NB-IoT (1)

| Messgerät | | Funk-Infrastruktur | | Cloud-Infrastruktur | |
|-----------|-------------|---------------------|--------------------|---------------------|---------|
| PyCom | | LoRa | | Eigene Umsetzung | |
| Pysense | LoPy | LoRa-Gateway | LoRa-Server | InfluxDB | Grafana |

| | | | | | |
|---------|-------------|-----------------------|--|------------------|---------|
| PyCom | | Sigfox | | Eigene Umsetzung | |
| Pysense | SiPy | Sigfox Backend | | InfluxDB | Grafana |

| | | | | | |
|---------|-------------|---------------------------|--|------------------|---------|
| PyCom | | NB-IoT | | Eigene Umsetzung | |
| Pysense | FiPy | Netz des Providers | | InfluxDB | Grafana |

Vergleich: LoRa, Sigfox, NB-IoT (2)



| | | Frequenzband | |
|---------------|------------------|--------------|--------------|
| | | Lizenziert | Unlizenziert |
| Infrastruktur | Von Anbieter | NB-IoT | Sigfox |
| | Selbst betrieben | - | LoRa |



Alternative: Nutzung durch Cloud Provider

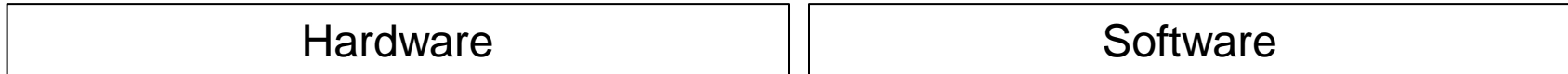
| Messgerät | | Funk-Infrastruktur | Cloud-Infrastruktur | |
|-----------|------|--------------------|---------------------|---------|
| PyCom | | NB-IoT | Eigene Umsetzung | |
| Pysense | FiPy | Netz des Providers | InfluxDB | Grafana |

| PyCom | | NB-IoT | Lösung des Providers | |
|---------|------|--------------------|----------------------|----------------|
| Pysense | FiPy | Netz des Providers | Datenbank | Visualisierung |

Zusammenfassung



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- Alternativen
 - Funk
 - Cloud



Vielen Dank für Ihre Aufmerksamkeit!

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Forscher

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