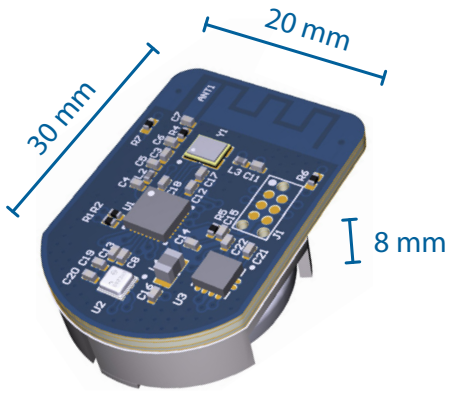
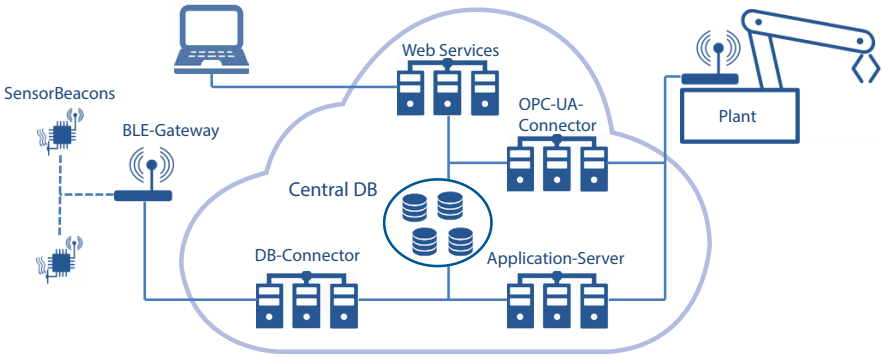
SensorBeacons & SensorCloud

New IoT Powered Concepts for Smart Manufacturing, Condition Monitoring and Predictive Maintenance





SensorBeacon

Measurement of i.e. temperature, air pressure, humidity and acceleration in three axes

Characteristics

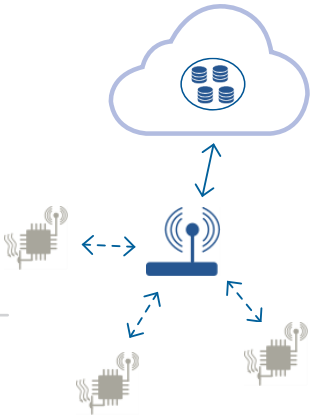
- Wireless (battery operated, radio transmission)
- Ultra low power technology with BLE
- Indoor range approx. 10...20m / up to 10Hz
- Many beacons possible at the same time
- Easy to install and connect via gateway to IoT platform
- Battery lifetime up to five years

Power consumption example:

Communication Interval	Battery Life (230mAh Capacity)
1 sec.	> 8 months
30 sec	> 4 years

SensorCloud

Connection of SensorBeacons via BLE-Gateways



Small cell coverage by gateways:

- Minimization of radio interference and thus increase of possible throughput
- Flexible coverage of an area of any size
- Radio signals remain in the production hall
- Seamless roaming between gateways

Architecture – Central Data Base

- MongoDB
- NoSQL
- Supports sharding (horizontal scalability)
- Supports replication (Increased availability due to mirror server)

Web Interface (Client)

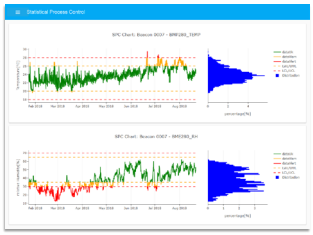
- Web application, runs in browser, therefore cross-platform (tablet, PC etc.)
- Safe communication via https
- Data can be quickly visualized (chart templates)
- Web applications allow complex evaluations
- Multi-client / multi-user capable

Use Cases

- Monitoring for transport & storage
- Smart Manufacturing & process monitoring
- Retrofitting of sensors to existing systems without cabling effort
- Monitoring of high-quality products during production and lifetime

Customized versions available.

- Tracking of products or mobile equipment in production
- Implementation of predictive maintenance concepts by measuring loads/abnormalities
- Simple execution of control or test measurements, even simultaneously at many different locations ...



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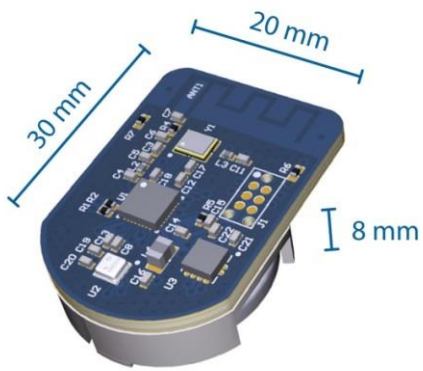


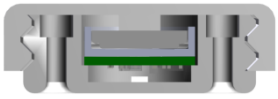
SensorBeacon

Measurement of temperature, air pressure, humidity and acceleration in three axes

Characteristics

- Wireless (battery operated, radio transmission)
- Ultra low power technology with BLE
- Indoor range approx. 10-20 m
- Many beacons possible at the same time
- Easy to install and connect via gateway to Iot platform
- Operating temperatur range -20 °C – 40 °C
- Battery lifetime up to ten years

Housings with screw mounting or magnetic fastening available



Firmware

Environmental – <Env_SBG_V2.3>

- SensorBeacon provides environmental data
  Temperature: -40 °C – 85 °C (±1.0 °C)
  Pressure: 300 hPa – 1100 hPa (±1.0 hPa)
  Rel. humidity: 0 % – 100 % (±3 %)
- Battery lifetime: 1 s datarate ⇨ 4 month
  60 s datarate ⇨ 4 years
- ⓘ Datarate can be adapted to user requirements

Acceleration – <Acc_Env_SBG_V2.7>

- SensorBeacon provides acceleration in three axis
  Full scale range: ±8 g (±5 %)
  Resolution: 1 mg
  Datarate: 10 Hz
- Beacon provides environmental data every minute
- Auto-Sleep: SensorBeacon shuts down acceleration measurement while not moved
- Battery lifetime: active mode ⇨ 1 month
  sleep mode ⇨ 14 months

Spectrum – <Acc_Env_SBG_V2.8>

- SensorBeacon provides acceleration in three axis
  Resolution: 4 mg
  Datarate: 50 Hz
- Beacon provides environmental data every minute
- Auto-Sleep: SensorBeacon shuts down acceleration measurement while not moved
- Battery lifetime: active mode ⇨ 2 weeks
  sleep mode ⇨ 14 months

Shock – <Acc_SBG_V2.5>

- SensorBeacon internally measures acceleration in three axis with 200 Hz and provides highest value every 100 ms
- Battery lifetime: ⇨ 60 hours
- ⓘ SensorBeacon never sleeps

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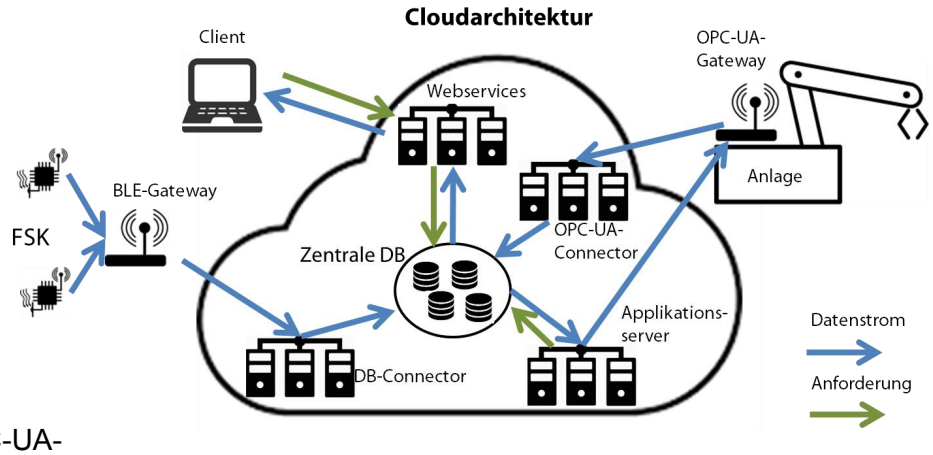
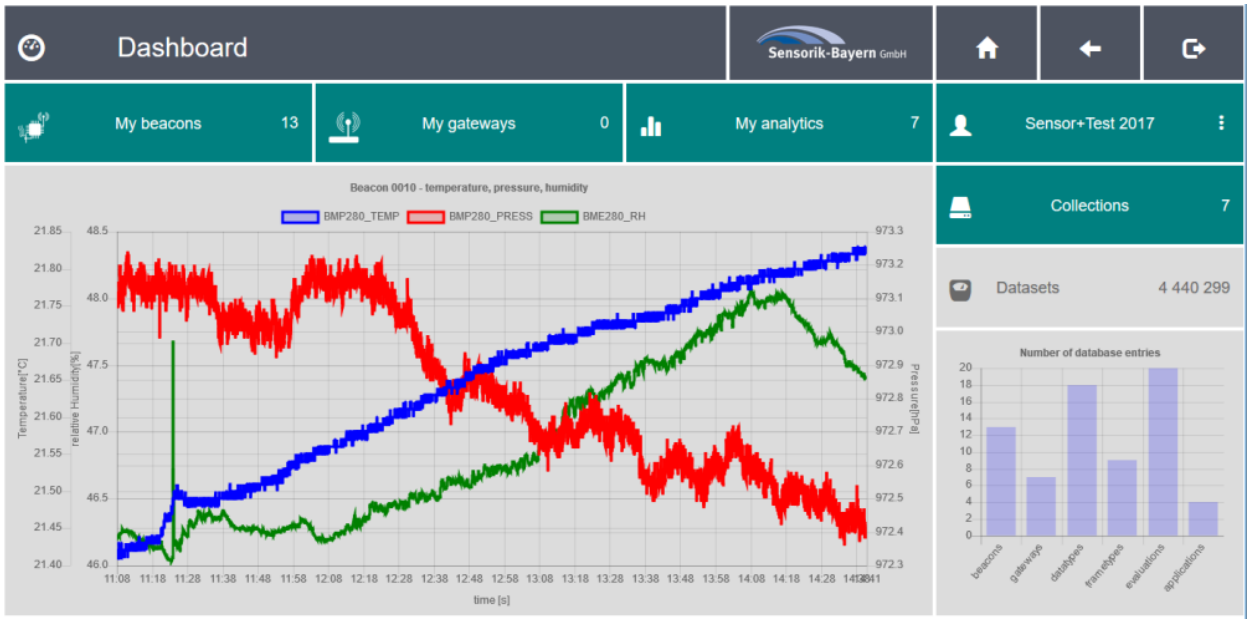
- Energieeffiziente Firmware für die Funksensorknoten
  Ruhestrom bei ca. 1,5 µs, Laufzeiten von mehreren Jahren mit Knopfzelle

- IoT-Gateway zur Cloudanbindung der Funksensorknoten
  basierend auf Rhaspberry Pi mit eigener Software

- Eigene Cloudarchitektur
  - Server basierend auf NodeJS (effizient, hochskalierbar)
  - Zentrale Sensordatenbank als IoT-Hub (skalierbare verteilte noSQL-Datenbank)
  - Anbindung der FSK durch BLE-Gateways an die DB
  - Anbindung von Anlagen via OPC-UA-Gateways (an die DB und an den Applikationsserver)
  - Nutzung der Daten via Webservices im Browser (Visualisierungen, Webapps, plattformunabhängig)





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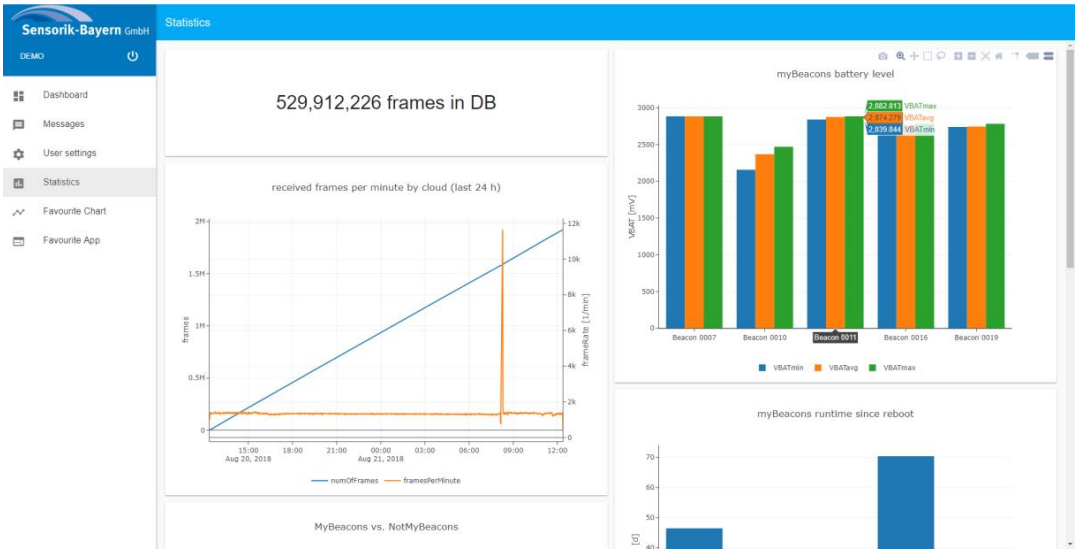
- Webinterface (Client):
  - Webapplikation, läuft im Browser; plattformübergreifend (Tablet, PC, usw.)
  - Kommunikation über https (TLS mit RSA 204)
  - Daten sind mittels Chart-Templates schnell zu visualisieren
  - Webapplikationen erlauben komplexe Auswertungen
  - Administration der Plattform



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