bPart: Bluetooth Low Energy Sensor Particle

General Description

The bPart is a highly integrated Bluetooth Low Energy sensor node. It includes several sensors, battery, processing unit and wireless transceiver in a volume of less than 1 cm$^3$. In addition a push button and a multicolor RGB-led is included for user interaction, as well an infrared led for camera assisted tracking.

The use of Bluetooth LE, onboard power-conversion and low-power sleep modes enables runtimes of several years. In contrast to other established low-power wireless communication standards, it is supported on nearly all modern desktop and mobile operating systems, facilitating the connection to existing software.

The small size and energy consumption make the bPart suitable for long-term monitoring applications, where existing equipment needs to be retrofitted with unobtrusive sensors. Sensor modalities include acceleration in all three axes, ambient light level and ambient air temperature and humidity. This is supported by configurable sampling and transmission intervals.

Characteristics

General:
- Bluetooth Low Energy Smart Device
- Transmission range ~10m indoors
- Small size 21.4mm x 21.4mm x 7.2mm
- Push button, infrared and RGB leds

Operation:
- Standard CR2023 lithium coin cell
- Runtime up to several years
- Configurable sampling interval
- Maximum supported rate 100Hz

3-axes accelerometer:
- $\pm 2g/\pm 4g/\pm 8g/\pm 16g$ selectabe fullscale
- Low power motion detection

Ambient light sensor:
- Wide range from 0.045 to 188,000 Lux
- Near human eye response

Temperature and relative humidity sensor:
- Samples ambient air parameters
- Sensitivity of 0.1°C and 0.1%rH

Magnetic switch
- Hall effect non-contact input

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