

Mi-SPARK

Smart Platform for Wireless Mesh Sensor Network

Mi-SPARK is a mesh-capable wireless communication platform for connecting things such as sensors and transducers to the Internet i.e. Internet of Things (IoT). It is specially designed for various low bandwidth, low data rate, and low power applications.



Overview

Mi-SPARK is a wireless communication platform that comprises of three components, namely node, gateway and backend server. The node is wired to the device to be sensed or controlled, while the gateway connects a network of nodes to the backend server over the Internet. Users can interface with each Mi-SPARK node via a web-based dashboard.

Wireless communication between Mi-SPARK node and gateway complies with 802.15.4 specifications on sub-GHz ISM radio band (919-923MHz). Its networking layer uses 6LoWPAN, enabling data exchange with remote hosts and supporting mesh capability. MQTT protocol is used for data transfer between node and backend server, and CoAP protocol is used for over-the-air (OTA) firmware updates.

Features

Mi-SPARK comprises the following features:

- **Multiple Onboard Sensors**
Onboard sensors include temperature/humidity, accelerometer/gyroscope, light level, and pressure to cater for various use cases.
- **Extendable Headers**
Node functionality can be extended to support additional sensors and transducers using daughterboard via extension headers.
- **Bluetooth Low Energy (BLE) Integration**
Onboard BLE transceiver for ease of integration with external device, such as smartphones and BLE beacons.
- **Multiple Power Options**
Powered using 5VDC micro USB adapter or using batteries (AA or LiPo). Mains power is also supported via suitable AC/DC step down converter.

- **Ethernet and 3G Gateway**

Choice of Ethernet or 3G-based gateway.

- **IP67-Rated**

Gateway enclosure is rated IP67 for outdoor deployment.

Technology Benefits

The benefits of Mi-SPARK are:

- **Long Range Communication**
Mi-SPARK operates at sub-GHz frequency where signal absorption by the environment is less. This enables long range communication over difficult terrain and non-line of sight (LoS) condition.
- **Reduced RF Interference**
Compared to the 2.4GHz ISM band, the sub-GHz band is less crowded and relatively interference-free.
- **IP-Based Low Power Wireless Mesh Network**
Mi-SPARK is a low power embedded device that can form an ad hoc wireless mesh network and is able to communicate over the Internet via the gateway. This enables communication between remote hosts and eases OTA firmware updates.

Applications

Smart Homes/Buildings/Factories, Smart Cities, Smart Agriculture/Farming, Environment Monitoring, Structural Monitoring

