ZERØKEY

SPATIAL INTELLIGENCE

ZKISMB10 Unit User Guide
v1.1.0

ZKISMB10-UG
Edition V1.1
February 2021

Safety Notice

WARNING!

The ISMB10 is designed to be operated in hazardous areas where flammable vapours and gases may be present.

- **Read the user manual before use.**
- **ONLY charge in a non-hazardous area**
- **ONLY use the specified charging adapter and cable.**
- **Do NOT charge unit at temperatures below 0 c (32 F)**
- **Do NOT expose the device to temperatures above 60 c (140 F)**
- **Do NOT disassemble, modify, or attempt to repair this device.**
- **Do NOT open this device under any circumstances.**
- **Do NOT immerse in liquid(s).**
- **No serviceable parts inside.**
- **Clean only with a damp cloth to prevent static build up.**

Certification and Compliance

The ISMB10 is certified through SGS Group for use in hazardous locations

Rated as Class 1 Division 1, IP68

The radio used in this device has been certified for use according to Federal Communications Commission (FCC), Industry Canada (IC) and Conformitè Europëenne (CE) rules and regulations.

FCC Part 15 Regulatory Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

RSS Regulatory Statement

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) L'appareil ne doit pas produire de brouillage;

(2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

RF Exposure Statement

This device has been evaluated to, and shown to be compliant with, the FCC, IC, CE Radio Frequency (RF) exposure limits.

Contents

1 OVERVIEW

1.1 SMART SPACE

ZeroKey Smart Space is an indoor positioning system that is capable of real-time positional tracking in three-dimensional space. The system is composed of multiple clip-on mobile units and fixed anchor units. The mobile units are designed to be worn or attached to people or equipment that can move about within the defined workspace. The anchor units are fixed in place and are used to assist in the determination of the mobile unit's position.

The mobile and anchor units exchange various signals, radio frequency and ultrasonic pulses, and then use the collected information to determine the mobile unit's position in 3D.

1.2 SAFE SPACE

ZeroKey Safe Space is an adaptation of the Smart Space system and is used to detect the proximity of two or more users to one another. The system is composed of a multiple clip-on mobile units and specialized software to coordinate the proximity detection operation.

The mobile units are designed to be worn or attached to people that can move about within the defined workspace. Each user's device detects and alerts the wearer to the proximity of another user and records each instance of close contact infractions. The mobile units exchange various signals, radio frequency and ultrasonic pulses, and then use the gathered information to determine the mobile unit's distance to one another.

2 ISMB10 MOBILE UNIT

The target of the tracking system. This node functions as the tracked object and is tracked in real-time by the Smart Space system.

2.1 PHYSICAL DEVICE

2.1.1 SIZE

Without clip: 2.85 inches tall, 2 inches wide and 1.1 inches deep

With clip: 3.9 inches tall, 2 inches wide and 1.85 inches deep

2.1.2 WEIGHT

105 grams (3.7 ounces)

2.1.3 IP RATING

IP 65, rated for water jets and splashing

2.1.4 POWER

The mobile device is battery powered with an integral rechargeable internal battery. This device and its battery have been tested and certified to be intrinsically safe. ONLY use the supplied charger and cable to recharge the unit. Use of another charger could cause damage or impair the device.

2.1.5 CONNECTOR(S)

A USB type C connector is used to connect to an external Ac adapter for charging the battery. There are no user functions associated with the USB connection. Do NOT attempt to use the device as a USB peripheral. It cannot be accessed as a USB Flash drive or data device.

2.1.6 FEATURES

- Tough, light weight, engineered plastic case
- Sealed against water, dust, and chemicals
- Long lasting rechargeable battery
- Convenient power connection for charging
- Alert, vibration, sound, and light
- Battery status and charge indicators

2.2 ALERTS, WARNINGS, AND INDICATORS

2.2.1 VIBRATION ALERT

The mobile device incorporates a vibration element used to alert the user to special situations such as a proximity alert or a low voltage warning.

2.2.2 SOUND ALERT

The mobile device incorporates a beeper used to alert the user to special situations such as a proximity alert or a low voltage warning or other situations.

2.2.3 LIGHT ALERT

A high intensity white LED is used to signal that an operational exception has occurred, and the user should alter their behavior such as when a proximity alert occurs.

Colour & Pattern	Meaning
Blinking white	Alert – you are too close to another user
Blinking blue	DFU mode
Blinking green	On, with normal battery level
Blinking red	On, with low battery level
Solid white	Unit is restarting
Solid red	Unit is plugged in and charging
Solid green	Unit is plugged in and charged

2.3 ATTACHING AND WEARING THE ISMB10

The mobile device has been designed to be either clipped on or worn with a lanyard. Do not obstruct the front face of the device and always have it facing outwards to achieve optimal performance.

2.3.1 LANYARD LOOP

To use the lanyard attachment method:

- Flip the clips outer ring up
- insert the lanyard through the loop
- pull the lanyard through itself so that it forms a knot at the clips ring.

2.3.2 CLIP-ON

To use the clip,

- release the back retaining clip
- insert clothing into jaws of clip
- engage the retaining clip
- To remove, reverse these steps.

3 OPERATION

3.1 SAFE SPACE CONFIGURATION

In *Safe Space*, the Mobile unit performs proximity detection for contact tracing purposes and to encourage social distancing. It does not perform full 3D positioning in this mode. The Mobile unit can be connected to a power source via a USB-C cable. This charges the unit but also acts as the method of powering the unit on. When disconnected from the USB-C connection the unit will remain powered on as long as there is sufficient charge. There is no user-facing method to power off the unit, as it is intended to be always-on.

In regular operation the user clips the Mobile unit to their clothing or equipment in an outward-facing manner. The user then goes about their standard day to day activities. Whenever the Mobile unit is within Radio range of another Mobile, it will record this interaction as a low-accuracy event. Whenever the Mobile unit is within ultrasonic range of another Mobile (default set to 4m), it will record this interaction with the specific range as a high-accuracy event. Whenever the Mobile unit is within alerting range of another Mobile (default set to 2m), it will not only record the interaction but also trigger the physical alerts.

The physical alerts consist of a motor providing vibratory feedback (in a short-short-long pattern), a beeper producing an audible beep, and a white alert indicator LED on the top of the Mobile unit. When the user remains within alerting range of any other Mobiles, the alerts will repeatedly trigger to warn the user of their proximity to another user until they move apart.

When alerts occur on one Mobile, it is aware of which other Mobile triggered them. For extra redundancy and to ensure that the Mobiles both remain in sync, the first Mobile will inform the other Mobile wirelessly to trigger their own alerts.

When a user carrying a Mobile is within Radio range of an (optional) Gateway device, the Mobile will proceed to dump all interaction data stored onboard wirelessly to the Gateway. This allows a server to take the data and display it in any fashion. As stated above, all recorded interactions at all distances will be recorded, not just those triggering alerts. This provides much more opportunity for data analysis, and to expand search distances when performing contact tracing.

The Mobile has an RGB LED for status indication which each color operating independently. It blinks green every 5 seconds to indicate it is alive and active. It blinks red every 5 seconds to indicate a low battery state has occurred or that it is currently charging. The red LED will stop blinking once it has reached sufficient charge. When put into firmware update mode the blue LED turns on, and it blinks blue while performing the firmware update.

Lastly, the Mobile goes enters a deep sleep if it picks up no other ZeroKey radio activity for 2 consecutive minutes. This only occurs when the Mobile is taken off-site or away from all other ZeroKey hardware. Once in this mode the Mobile will wake up every 30 seconds to determine whether to resume normal activity. During the 30 second sleep time the status RGB LEDs will be disabled but will operate once each time the Mobile wakes up.

3.2 SMART SPACE CONFIGURATION

In *Smart Space*, the Mobile unit performs full 3D positioning utilizing the installed infrastructure of ZeroKey Anchors, Gateways, and Repeaters. The Mobile unit can be connected to a power source via a USB-C cable. This charges the unit but also acts as the method of powering the unit on. When disconnected from the USB-C connection the unit will remain powered on as long as there is sufficient charge. There is no user-facing method to power off the unit, as it is intended to be always-on.

In regular operation the user clips the Mobile unit to their clothing or equipment in an outward-facing manner. The user then goes about their standard day to day activities. As the user moves around, the Mobile will be interacting with nearby Anchor units to resolve its position in 3D space. The resulting positions will be broadcast wirelessly via the Gateway and Repeater hardware, so that they can reported to a central server. The server can use these positions in real-time to drive a dashboard, record position history, trigger proximity or zone-based alerts, and perform other data analysis.

Alert Zones can be defined on the dashboard and server to indicate areas that users should not enter. When a user enters one of these zones an alert packet will be transmitted through the system out to the relevant Mobile. When the Mobile receives this alert packet, it will trigger the physical alerts on board to warn the user. The physical alerts consist of a motor providing vibratory feedback (in a short-short-long pattern), a beeper producing an audible beep, and a white alert indicator LED on the top of the Mobile unit. Until the user leaves the Alert Zone, the alerts will repeatedly trigger.

The Mobile has an RGB LED for status indication which each color operating independently. It blinks green every 5 seconds to indicate it is alive and active. It blinks red every 5 seconds to indicate a low battery state has occurred or that it is currently charging. The red LED will stop blinking once it has reached sufficient charge. When put into firmware update mode the blue LED turns on, and it blinks blue while performing the firmware update.

4 CHARGING

This device contains a rechargeable lithium polymer battery and can be successfully recharged over 600 times. DO NOT CHARGE THE UNIT AT TEMPERATURES BELOW 0 c (32 F).

4.1 AC ADAPTER

A standard charger is included with the device. ONLY use this charger with the device. This adapter has been carefully chosen to comply with Intrinsically safe charge methods. The use of fast chargers or any other USB charger could compromise the continued safety of the device causing damage to the device, or possible harm to persons using the device.

4.2 CHARGE CABLE

The charge cable supplied with the device is charge only. Do NOT use a data enabled cable with the charger. There are no user accessible data structures in the device.

5 PRODUCT CARE

5.1 GENERAL CARE

While the device has been rigorously tested and certified for use in hazardous environments, this is still an electronic device and as such, needs to be handled in a reasonable manner to ensure reliable continued use.

5.2 CLEANING

The device can be cleaned using a moistened soft cloth and nonabrasive hand/dish soap. DO NOT IMMERSE. Wipe dry to prevent any moisture build up.

5.3 OPERATING TEMPERATURE

This device is designed to operate from -20 c to +60 c ambient, while worn on the user. Do not place unit in direct sun for extended periods without proper ventilation as the unit may exceed the +60 c temperature.

6 REPAIRS AND DISPOSAL

6.1 FIRMWARE UPDATES

The ISMB10 can be updated with new firmware through our over-the-air reprogramming application to correct, improve, or add new features to enhance the unit's performance. Details on how to perform these updates is included with each update installation package.

6.2 OPERATION LOGS

The ISMB10 updates and maintains information concerning its operation and activities as it is being used around the site. This information is used to monitor the health of the unit and improve the device performance. The information collected does not contain any personal information from the user.

6.3 REPAIRING DAMAGED DEVICE

Units that have been damaged or have failed to operate in the field can be returned for repair or replacement with a few exceptions. If the battery has been physically compromised or has been found to be defective, the unit can NOT be legally shipped by any carrier. If the unit is intact but has ceased to operate, it can be returned via an RMA request to our repair center. Please contact your plan administrator for more information and an RMA form.

6.4 DISPOSAL OF DEVICE

The ISMB10 contains a lithium polymer battery and must be sent to a electronics recycling depot to reclaim the battery and electronics. Please contact your nearest electronics recycling company for details on their collection requirements.