

SONY

Nimway occupancy sensors and positioning system

Two technologies that make Nimway stand out from the crowd

Nimway is a complete smart office solution for the people-centred workplace. It combines Sony's sensor technology and advanced indoor positioning systems to monitor how the office is being used and feedback that information to help employees navigate through their day. At the same time, it helps business owners optimize their use of office space.



Here, we present two of the technologies that make Nimway such a reliable and accurate tool in the modern workplace. First, the Sony Nimway sensor system, which is used to detect and report room and desk occupancy. And second, the Sony Nimway positioning system (using beacons) which locates mobile phones inside a building.



Sensors – for highly accurate, end-to-end real-time occupancy data

The Nimway sensor system consists of four major hardware components: a door sensor, room sensor, desk sensor and access point. Typically, multiple sensors talk to one access point. They are designed by Sony in Sweden and manufactured in a UK Sony factory.

All three sensors have the same physical hardware, but the shell masking varies according

to the angle at which the sensor should detect motion. They all detect movement* in their field of view and relay it, via an access point, to the Nimway cloud. This information is then used to calculate the occupancy status of rooms and desks.

**Note that the sensors are only able to detect movement and cannot identify an individual person.*

Sensor communication

Sony's sensors are based on anonymous passive infrared (PIR) detection from a Panasonic manufactured PIR sensor module, that provides information on movements.

They communicate with the gateway over the ISM band (868 MHz EU, 915 MHz US), using a Texas Instrument communication protocol that has been adapted for real-time data collection and power saving. Communication from the sensors is secured through HTTPS, TLS and certificate pinning.

The sensors are powered by a primary lithium chloride battery from SAFT with a custom connector. A generous 7+ years of battery lifetime makes our sensors and indeed, the whole Nimway solution, low maintenance.

Our sensors meet the highest environmental standards including Sony's SS-00259.

Choice of protocol

Nimway is now into its fourth generation of sensors. Previous generations used Z-wave and LoRaWAN radio protocols. However, these did not live up to Sony's high standards of accuracy, real-time data gathering, battery performance and security.

Our current generation was redesigned from the ground up with the goal of measuring and reporting real-time occupancy in a more accurate, secure and cost-effective way. When choosing the most suitable protocol, Sony's radio engineers prioritized the system's main challenges: battery life, cost, reliable & secure transmission, and real-time capability.

They evaluated 6 different radio solutions, based first on simulations and later under real world conditions: LoRa, Bluetooth 5 Long Range, Bluetooth Mesh, Z-Wave 51, NB-IoT, Ti EasyLink.

Ti EasyLink was selected since it best addressed all Nimway's customer requirements. Should other, better technologies emerge in the future, we will of course re-evaluate this decision. But for now, our customers are enjoying the great battery lifetime, low cost, reliability and real-time data offered by our Gen 4 Nimway sensors.

Nimway sensors in practice

Nimway sensors are typically installed in meeting rooms or under desks. Their location is part of an office building, which is in turn, part of a domain. Prior to the installation, this domain needs to have been configured and the maps needs to have been made. In addition, the USB access points needs to be connected and configured accordingly.

As mentioned above, the housing of each sensor type has a special designed masking that covers the internal PIR sensor in a specific pattern. Whenever a sensor detects movement in its field of view it reports the movement to the access point over a wireless connection.

The access point then relays the message to the USB connected internet enabled embedded computer. The embedded computer relays the message to the Nimway cloud service for processing. The cloud service holds an occupancy state for each room. The occupancy state is either free or occupied and is calculated by fusing all sensors in a room together.



Best-in-class installation process

Our partners report that when it comes to ease of installation, Nimway wins hands down. The Nimway App for Android contains a specific mode for installation purposes (note that this mode is not available on iOS, so the installation requires an Android phone).

The steps of the installation process are as follows:

1. Configure sensors for the region of choice.
2. Mount the sensors straight or tilted at 20 degrees. This angle is achieved by removing the back plate and twisting the back cover of the sensor 180 degrees. Typically, only the room sensor is tilted and if it already has the correct tilt, you can skip this step.
3. Using the Android mobile installation tool, which is only issued to authorized Nimway installers, the installer can select install location on the map, choose the desired sensor type and scan the QR code which contains the sensor's unique ID.
4. Sensors can be mounted using either the adhesive on the back or screwed in place.

Door sensor

Door sensors are typically mounted on the ceiling inside the room, above the entrance to the room facing downwards. This allows them to detect movements in the entrance area. If a room has several entrances, multiple door sensors should be installed.

Room sensors

When room sensors are mounted in a room, they detect movements within it. They are usually mounted at a 20-degree downward angle.

Even though sensors can detect large movements as far as 12 meters away, you should not place them with a view to detecting movement outside the room, i.e. pointing out through the door. Moreover, multiple sensors may be needed if you want the system to detect all the movements in a large room.

Desk sensors

Desk sensors is mounted under a table facing down. It detects movement from the lower part of the user's body both when sitting and standing. It should be mounted with the sensor window in the middle of the table at approximately 40 cm in from the edge.



Beacons for indoor positioning

Nimway's indoor positioning system consists of a grid of Bluetooth Low Energy Beacons, which the mobile phone can detect. A software algorithm running on the user's phone calculates its position based on three parameters: the beacon information, the movement of the phone and the layout of the map.

Bluetooth Low Energy - tried and tested

Bluetooth Low Energy (BLE) Beacons provide the positioning system with reference points in the building. They periodically submit a radio signal that is captured by the user's mobile phone.

BLE is convenient as users don't need to set up a connection to their devices. It is also power efficient i.e. it does not cause significant battery drainage on the user's phone.

The BLE solution uses frequency hopping. We have thoroughly studied the potential effect on Wi-Fi that uses the same frequency band (2.4GHz) in our radio-labs, and not seen throughput or other effects on Wi-Fi.

Beacons - almost invisible when mounted

The Nimway beacons are designed to be mounted on the ceiling of an office building. Thanks to their off-white colour and conical shape, they are very discreet and cast minimal shadows.

They are powered using coin cell batteries that last up to three years, and are fully compatible with the iBeacon standard.



Nimway puts people in the centre

Curious to learn more?
Check out our website
and get in touch!



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