Vayyar Care™

Product **Specification**

Release 40 / Rev.11

vayyar™

Vayyar Imaging Ltd. Web: https://vayyar.com

REVISION HISTORY

Revision	Date	Author	Description
1	April 2020	Noga Barpal	Preliminary issue
2	June 2020	Igal Kronshtein	More information added
3	October 2020	Noga Barpal	Japan spec added
4	November 2020	Noga Barpal	More information added
5	January 2021	Noga Barpal	More information added. Final Release
6	April 2021	Tomer Granit	Minor edits
7	May 2021	Hen Shidlansik	LED and buzzer spec, minor edits
8	August 2022	Tal Katz	Product updates
9	November 2022	Tal Katz	Minor edits
10	February 2023	Sefi Sasson	Major edits and adjustments to v38
11	Jan 2024	Sefi Sasson	Major edits and adjustments to v40

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1. INTRODUCTION

This document summarizes the product specifications of Vayyar Care, a contact-free sensing system that continuously provides real-time fall detection and presence events (activity tracking), primarily for residents of senior living facilities.

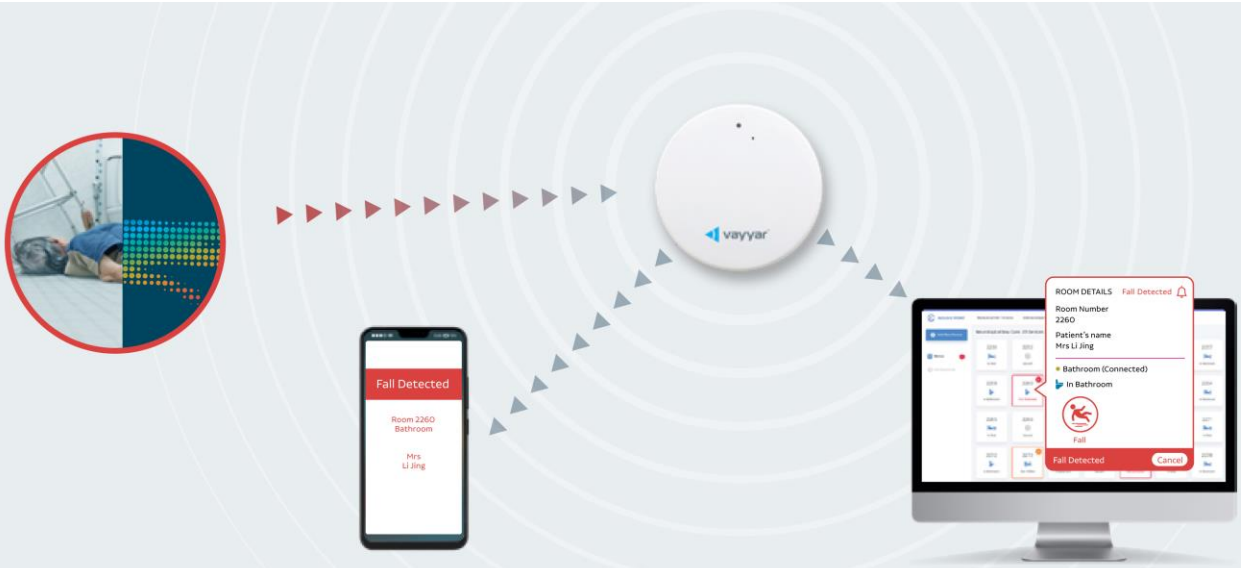
The sensor data can be utilized to relay real-time fall emergency alerts and to develop presence-based activity trend analytics, to be integrated into fall management solutions. The system is comprised of the Vayyar Care sensors that cover a single-room environment, and a cloud solution consisting of either Vayyar's cloud or a partner's cloud. The system is intended to be installed according to the Vayyar Care installation guidelines.

INTENDED AUDIENCE

- Platform providers with their own dashboard or app
- Nurse call system providers
- System integrators, distributors, and installers

SOLUTION ADVANTAGES

- Privacy – the device is RF-based (no optics), and therefore user privacy is maintained at all times.
- Contact-free – the device provides passive detection, so there is no need to wear a pendant or bracelet.
- Multiple mounting options – the device can be mounted on either a wall or a ceiling.
- Lighting – the device works in all lighting conditions.
- Humidity - the device works in conditions of steam and high humidity.
- Multiple integration options – Vayyar Care supports dry contact, Vayyar cloud-based, partner cloud-based, and an option for a customer's on-prem server developed by the partner.



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2. PRODUCT INFO

Vayyar Care Device SKU Options	
Vayyar Care Type A	VC1BBUS02
Vayyar Care Type C (Dry Contact support)	1. Sensor - VC3BBGL03 2. Dry Contact Accessory - VHBADC01 or VHCADC01 (high resistance)
Radio Sensor	
Vayyar RFIC	VYYR7201 SOC
Technology	mmWave MIMO (46 antennas) RF Sensor
Frequency Bands	WW- 61.01 - 61.49 GHz, Japan- 60.01 - 60.49 GHz
Field of view	140° Azimuth, 70° Elevation
Connectivity	
Communications Technology	Wi-Fi 2.4 GHz, 802.11 b/g/n
Pairing Technology	BLE 2.4 GHz
Cloud Infrastructure	Vayyar Production Cloud or partner's cloud
Power supply	
Input Voltage	Vayyar Care Type A: 5V fed from AC/DC transformer (power supply provided with the device) Vayyar Care Type C: 12V/2A or 24V/1A fed from an external power supply through the accessory board (external power supply not provided by Vayyar)
Power Cable length	
Vayyar Care Type A	Strain relief USB A cable 1.5m / 5 ft
Vayyar Care Type C	Strain relief USB C cable 35 cm / 13.77 inches The cable connects to the dry contact accessory board that consists of a terminal block, for power and dry contact inputs, and supports 18-20 AWG wire types.
Device Peripherals	
LED	LED Colors: Red - 40, Blue – 20, Green - 110 Illuminance [Lux] TYP. See also the LED & Buzzer Functionality section below.
Buzzer	90 SPL [dB] TYP at 10 cm See also the LED & Buzzer functionality section below.
Button	1. Reset the device via factory reset 2. Pair the device and the Vayyar app 3. Run dry contact simulation
Device Material, Dimensions, Weight, and IP rating	
Material	ABS+PC
Diameter	9 cm / 3.54 inches

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Mounting brackets diameter	14.4 cm / 5.67 inches
Depth/Thickness	1.5 cm / 0.59 inches
Weight	110 g / 0.24 pound
IP Rating	IP54

Mounting Options

Sensor mounting options and coverage	• Wall mount: center of the wall at a height of exactly 1.5m / 5 ft • Coverage: up to 4 x 4 m / 13 x 13 ft • Sensor orientation: cable at 90 deg relative to X-Axis • Ceiling mount: center of the ceiling, at supported height of 2.3 - 3m / 7.5 - 9.8 ft • Coverage: up to 4 x 5 m / 13 x 16.4 ft • Sensor orientation*: cable at 45 deg relative to Y-Axis
Mount options tolerance**	Wall mount: up to 1 m / 3.28 ft to the left from the installer's point of view or positive direction on the X-Axis Ceiling mount: up to 0.5 m / 1.64 ft in either positive or negative direction with respect to Y-Axis

Configuration and Services

Product Features***	1. Fall detection alerts 2. Target on-the-ground alerts 3. Presence events and status
Over The Air (OTA) Firmware Updates	The device checks for OTA FW version updates once a day. If a new version is available, the device will automatically update to the latest version.
Tethered Firmware update, Provisioning, and debug using UART (Debug port)	Kit for type A devices, SKU: VEU2UT02: UART board and 2 USB cables Kit for type C devices, SKU VHRAUSB02: Vayyar Care Dry Contact Debug Board and 2 USB Cables

Reliability

Room temperature range	0°C-40°C / 32°F-104 °F
Maximum Humidity	95%

Certifications

Certifications	**USA** - FCC, **Canada** - IC, **Europe** - CE, RED 2014/53/EU, ETSI, **China** - SRRC, **Australia / New Zealand** - CISPR, **Japan** - MIC, **Korea** - KC, **Taiwan** – NCC (type A only). **Environmental certificates:** RoHS, WEEE, REACH

* Ceiling mount installation with straight sensor orientation is supported for legacy customers only and covers up to 4 x 4 m / 13 x 13 ft room area.

** The sensor should be placed in the center of the wall/ceiling. The tolerance is relative to the center.

*** General info about Vayyar Care device features:

- The person should be within the sensor's field of view and line of sight.
- Detection is optimized for a single person within the room.
- Presence events and fall detection alert accuracy is over 90% in a lab environment (empty room).
- Presence events in resting zones (e.g., in bed), require an additional Vayyar Care device to maintain accuracy.

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3. PRODUCT FEATURES

Fall Detection

- The algorithm searches for falls suffered by human targets and is optimized for a single person in the room. Fall events may still be detected when there is more than one person in the room.
- The fall detection algorithm flow consists of the following stages (end to end ⩾90 seconds):
  - Initial Fall Detection (“Fall_Detected”)
  - Fall Confirmation (“Fall_Confirmed”)
  - Fall Notification (“Calling”) - Fall Detection alert
  - Event Ended (“Finished”)
- The fall event is canceled automatically (“Fall_Exit”) at any stage if the person gets up before the “Fall Notification” stage, another person enters the room, or due to another algorithm decision.
- The partner may use the fall detection stages information to alert or report on fall events or to build customized features.
- Fall Detection requires a two-week learning period after installation, allowing the Vayyar Care device to learn the room environment in order to reduce false positives (false alarms). During Learning Mode, fall alerts are not reported to customers.
- For further information about feature implementation, refer to the API documentation.

Target on the ground

- This is a complementary algorithm to the fall detection algorithm that enables detection of a human target lying on the floor in cases where no fall was detected. The device sends “Fall_Suspected” updates every 50 seconds until it reaches the “Calling” stage - typically 5-12 minutes.
- The target on the ground process is canceled automatically (“Fall_Exit”) at any stage if the person gets up before the “Fall Notification” stage, another person enters the room or due to another algorithm decision.
- The partner may use the information to alert or report on suspected falls in near real time to ensure that high-risk residents/patients are closely monitored. Activating this feature may result in additional false positives (false alarms). For more information, please consult your CSM.
- For further information about feature implementation refer to the API documentation.

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Leveraging presence data gathered with a multi-sensor approach

- By combining and analyzing data from several Vayyar Care devices installed throughout an apartment, Vayyar partners and customers can receive a range of event notifications used to ensure resident safety, and gain detailed trending insights based on changing activity patterns that can indicate various physical and psychological conditions, guiding timely clinical interventions.

Supported Data Streams

- There are two distinct but complementary data streams, constantly reinforcing one another to deliver robust and reliable outputs:
  1. **Periodic presence data (backward compatible with v38):**
     - Data is transmitted whenever there is a change in presence status and at periodic intervals.
     - By default, the periodic interval is one minute, but this can be configured according to partner or customer requirements.
  2. **Event notifications (v40, New):**
     - **Empty bed** – triggered by negative bed presence data combined with sub-region threshold crossing.
     - **Empty/occupied room** – triggered by a door crossing, the feature indicates the direction of the crossing.

Periodic presence prerequisites

- For trending insights applications, Vayyar recommends a minimum latency of 120 seconds.
- For event notification applications, Vayyar recommends a minimum latency of 10-15 seconds.
- Additionally, gathering data on presence in resting zones (e.g., in bed), requires the following:
  - The resting zone's minimum size should be 1 x 1 m / 3.28 x 3.28 ft.
  - The minimum separation distance (borders between zones) should be 0.5 m / 1.64 ft.
  - The feature supports up to 4 subregions (zones).

Event notification prerequisites

1. **Empty Bed:**
   - The feature is supported with **ceiling installation** only.
   - The sensor must be at least 1.m / 4.9 ft away from the bed (horizontally).
   - The bed must be defined as subregion/resting area #1.
   - The subregion's minimum size should be 1.8 x 1 m / 5.9ft x 3.28 ft.
   - The minimum separation distance (borders between zones) should be 0.5 m / 1.64 ft.
2. **Empty/occupied room:**
   - The feature is supported with **ceiling installation** only.
   - The feature is optimized for a single person.
   - To be able to detect a directional door crossing, there needs to be a virtual fence (radius around the door) of at least 1m. Therefore the feature may not be supported for small rooms.
   - The door must be defined as a subregion.
   - Each sensor supports directional door-crossing notifications for up to two doors.

Example use cases

Periodic data-based behavioral analytics

1. **A change in average bathroom visits**
   - A sudden and/or significant change in bathroom usage may be indicative of a medical condition such as a UTI.
   - The Vayyar Care "Empty Room" event for the bedroom (assuming the bedroom door is the bathroom's point of entry) along with Periodic presence status from the bathroom can be used to create a notification for caregivers, allowing them to investigate the issue and refer it to a medical practitioner for diagnosis and treatment.
   - Once an increase in bathroom visits and/or dwell time in bathroom is recorded, send a notification saying: "Resident of apartment 101 has experienced a XX% monthly increase in bathroom visits; please act according to facility protocol."
2. **A change in apartment dwell time**
   - A sudden and/or significant change in time spent in apartment may be indicative of a change in social engagement which can reflect on physical and mental wellbeing.
   - The Vayyar Care "Empty Apartment" event along with negative periodic presence status from the apartment can be used to create a notification for caregivers, allowing them to investigate the issue and refer it to a counsellor or psychologist for diagnosis.
   - Once an increase apartment dwell time is recorded, send a notification saying: "Resident of apartment 101 has experienced an XX% monthly increase in time spent in the apartment; please act according to facility protocol."

Event notifications

1. **Wander management**
   - People with dementia who leave their beds and/or apartments at night may harm themselves or others.
   - The Vayyar Care "Empty Room" event and periodic presence status from the other rooms in the apartment can be used to create a notification for caregivers, allowing them to respond in time and return the individual back to their apartment and beds.
   - Once the Empty Room event is acknowledged, the partner can quickly check the presence status in the other rooms (if the bedroom door is the apartment's point of exit) and send a notification saying: "Resident of apartment 101 left the apartment at 22:49; please apply night-time rapid response protocol."
2. **Too long in the bathroom**
   - If an individual is spending significantly longer than usual in the bathroom, it may indicate a digestive issue, an inability to stand, disorientation, or distress.
   - The Vayyar Care "Empty Room" event for the bedroom (assuming the bedroom door is the bathroom's point of entry) and bathroom periodic presence status can be used to create a notification for caregivers, allowing them to respond in a timely fashion and assist the individual if required.
   - Once the "Too Long in the Bathroom" event is acknowledged, the partner can quickly check the presence status in the other rooms and send a notification saying:
   - "Resident of apartment 101 entered the bathroom at 22:49; please apply night-time checking protocol."

4. SUPPORTED INTERFACES

Supported types of integration

- Webhooks API – Enables sending alerts and status from the Vayyar cloud to the partner's cloud/server and Vayyar cloud for Vayyar Care device management.
- MQTTHooks API – Enables sending alerts and status from a Vayyar Care device to the partner's MQTT Broker and Vayyar cloud for Vayyar Care device management.

Fall Detection alert

Webhooks	MQTT	Module Support	Dry Contact	Vayyar App*	Vayyar Dashboard*	SMS*
V	V	V	V	V	V	V

Target on the Ground detection alert

Webhooks	MQTT	Module Support	Dry Contact	Vayyar App*	Vayyar Dashboard*	SMS*
V	V	V	V	X	X	X

Presence

Webhooks	MQTT	Module Support	Dry Contact	Vayyar App*	Vayyar Dashboard*	SMS*
V	V	V	X	V	V	X

*Available only during system evaluation or pilot

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5. LED AND BUZZER FUNCTIONALITY

Status	LED color	LED Mode	Buzzer	Notes
Device startup	White	Blinking	N/A	Appears when the device is first connected to the power or rebooted.
Pairing mode	Blue	Blinking	N/A	Stable blue turns to blinking as the button is pressed for 5 seconds and released to enable pairing mode. If factory version is 38, the device enters this mode immediately after startup.
Fall detected	Yellow	Blinking	OFF	Initial suspicion of a fall Duration = 50 seconds
Fall confirmed	Yellow	Fast Blinking	ON	Confirmation of fall Duration = 40 seconds
Fall alert ("Calling")	Yellow	Fast Blinking	ON	A fall alert is sent Duration = 30 seconds
Wi-Fi/Internet disconnection	Red	Blinking	N/A	Red LED appears when the device is plugged into the power but disconnected from Wi-Fi or in version 38 when disconnected from the internet.
Factory Reset	Blue + White	Blinking	N/A	To reset provisioning details (Wi-Fi and pairing) 1. Press and hold the button for 20 seconds while the blue light flashes. 2. Release the button when the blue light changes to solid white. 3. Wait about 30 seconds until light flashes white 4 times, indicating that the process is complete.

Notes:

1. Some of these behaviors are configurable and are subject to change.
2. For commercial deployment Vayyar recommends turning off the LED and the buzzer (configurable) to avoid end user/resident disturbance.
   When the LED is turned off, only Wi-Fi / Internet disconnection error (red color) will be displayed in the event of an error.

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6. VAYYAR CARE DEVICE TYPES

- Vayyar Care Type A

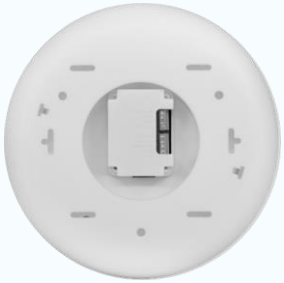
- USB TYPE A

- Vayyar Care Pro Type C

- USB TYPE C

- Dry Contact Board

- Mounting accessory for Vayyar Care



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Thanks!

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