

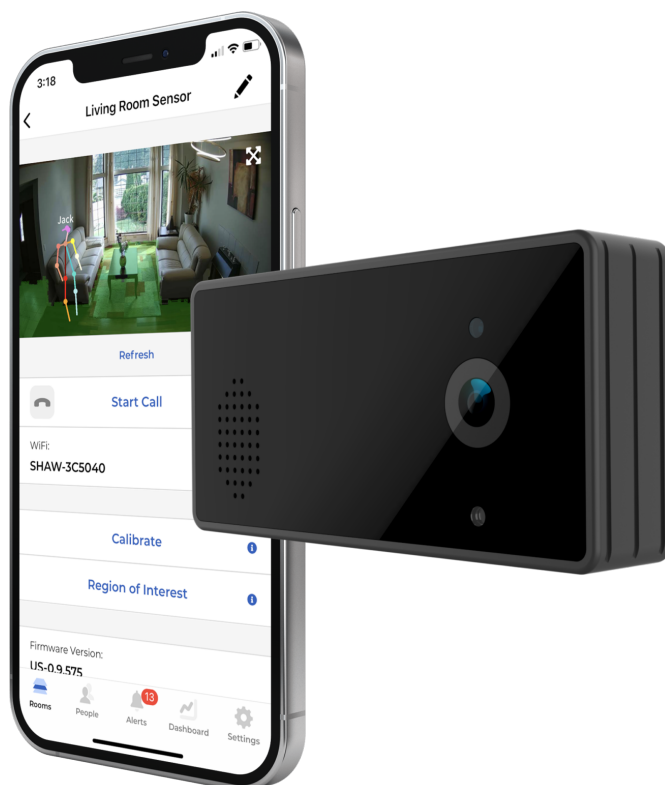
Product Test Review

FX – Functional eXperience

AltumView Sentinare 3

Video camera/sensor, single camera package.

The vendor website can be found [here](#).



Product Review Summary

The Sentinare 3 is an updated version of the Sentinare 2, in a lightweight plastic housing. The biggest product evolution has been in the hardware, which is completely rethought. The prior version looked like an Arlo camera, whereas this version is rectangular, somewhat larger than a deck of playing cards. We suspect the innards are also new, along with the chipset driving the AI/machine learning.

Functionally is the same as the Sentinare 2. See our review [here](#).

This is a camera-based activity and fall detection sensor. It's primary functionality is to detect when an individual has fallen, and to alert a caregiver via a mobile app, in near-real time. It does so by using artificial intelligence (AI) to detect that the fall has occurred.

The camera has gesture (hand waiving) recognition to enable the older adult to generate an alert without having a fall take place.

Other functionality includes observing the activity pattern of the individual. These movements are categorized into sitting, standing, lying, and bending. Categories of individuals can be custom created or the default of Senior, Staff, Visitor can be used.

The camera can be set up to detect entry and exit from rooms, or to send alerts when entry, exit or elopement occurs.

A mobile app is used to set up the camera and view alerts, activities, etc. A web app is also available to view alerts, activities, and history, though clearly more development effort has gone into the mobile version.

The subject is represented as a stick figure in the app, as a privacy feature. Multiple individuals can be distinguished if the face recognition feature is set up.

Target Market

The product targets 3 markets:

- 1) The Consumer market - intended for use by the adult child or designated caregiver to monitor the older adult for falls and activity.
- 2) The Long Term Care and Retirement Home market - operators can deploy this selectively or community-wide as a technological complement to the care they provide.
- 3) The Home Care market - operators can use this as a technological aid that complements care being provided to older adults in their homes.

Test Results

Overall, the look and feel of the Sentinare 3 is very approachable and impressive in its compact size and surprising light weight. Pricing is similar to the Sentinare 2, around CAD \$250-\$300.

Installation challenges from the previous version have been mostly addressed. The device can be mounted using screws as before, but now also comes with velcro (Gorilla) tape that can be used instead. The power cable is now a pliable, longer, USB-C cable which is much better. The camera has a tripod thread on 2 sides of the body for added options for orientation.

Fall Detection & Commercial Readiness

Based on our analysis, the product demonstrates an 80% level of accuracy in detecting falls within its main detection area, indicating a degree of commercial readiness, particularly for environments where the older adults are located within the main detection area. However, there are opportunities for improvement that we have identified, that potential buyers should be aware of:

- **Edge Detection Limitations:** The product shows reduced accuracy in detecting falls that occur at the edges of its detection range. Buyers should consider the layout and usage patterns of the environment where the sensor will be deployed to assess the potential impact of this limitation.
- **False Positives and Negatives:** The system has been observed to generate false positives, including random alerts without any correlated input, and false negatives, where some falls, especially softer or slower ones like sliding off furniture, may not be detected.

Potential Product Roadmap

Besides the already mentioned hardware performance issues that warrant improvement, there are other items that should be addressed over time.

The associated mobile and web apps could be (re)built in a modular fashion to enable toggling of features associated with specific market segments, or tiered paid functionality. In this way the vendor would have to maintain only one software stack while supporting the development of various hardware versions. Optimizing the UI/UX is a required exercise in continuous improvement. We would expect that the AI functionality would evolve to make fall detection and activity categorization increasingly accurate, on a stable hardware platform

Fleet management in an enterprise operator environment would need to be robust and easy to use, which is not the case today for multi-location installations. We would also recommend pre-built integrations with the most common target platforms (e.g. nurse call systems like Notify, Sara, etc) for easy connectivity and data flow. This can all come with time as the product matures.

Review Details

Packaging

The packaging was basic, efficient, intuitive, protective, and professional.

Installation

The lens is clearly visible so that the front of the camera is obvious.

The instructions recommended a mounting height above floor level of 1.5–2.5 m, or high enough so that the camera has a clear view of the room and floor area. It is very important that it can clearly see the entirety of the floor space for proper operation and fall detection. This will require the camera to be tilted downward.

Mounting the camera can be done using the included velcro Gorilla tape, or with screws. This is a welcome improvement in the installation process.

The mounting base provides good rotation on 3-axes, making it easy to adjust the camera angle once the location has been selected and the camera placed. The user manual has good instructions and photos for clarity.

The camera needs to be aligned vertically (landscape orientation), but can be mounted right-side up or upside-down, which is convenient as the tripod screw is located on bottom and back of the body. It is important to take note of the orientation as it will be required when configuring the camera.

The mounting height of 1.5–2.5 m is easily achieved using the included USB-C power cable.

Configuration

Once the camera is powered on, a mobile app is used to configure it. Adding a room was easy. Adding a camera (sensor) requires Bluetooth to be enabled to connect to the camera. This was straight forward to do. The workflow in the app guides the user to proper installation, and orientation, such as vertically aligned versus tilted sideways.

Connecting the camera to WiFi was straight forward and made sense within the configuration workflow. Note that the WiFi network cannot be hidden, and authentication must be enabled (WPA2).

Once the camera is added, it goes through a calibration during which it essentially detects what it sees in the room, specifically it needs to identify the floor area correctly (the accuracy of this will affect fall detection accuracy). In order for this step to work well, it is best to ensure the room is empty of occupants, as the image

of the room will form the display in the app. If people are present in the room, they will appear in the app rendering of the room during regular use, which is distracting.

The floor area is shown in green on a small portion of the smartphone screen. We found the accuracy of auto-determining floor area was quite good. User may have to make some manual adjustments.

Making these adjustments to the floor area in the app requires some degree of user familiarity with how these systems work. We expect this would be achievable by most user as this type of dexterity is becoming increasingly commonplace.

A region of interest, such as a doorway, can also be identified, similar to how the floor area is modified, though in this case the user would “paint” using their finger, adding the green area (rather than erasing it).

Overall Functionality

Privacy

Each person moving through the space is redacted to a stick figure representation to accommodate privacy concerns. The rendering of this on the screen is good.

There is also an option to set a privacy mode for the room rendering which can be used.

The camera captures a video of each fall that is detected, rendering the person to a stick figure, which can be reviewed by caregivers.

Alerts were received within 20 seconds or less.

We did not test with animals or small children to assess how the system interprets them, though we do not foresee this being an issue.

Fall Detection

In our testing (firmware version: CA-1.1.254), we found the sensor to be accurate 80% of the time within the central field of view of the camera, within a 4m range.

However, performance dropped off significantly to less than 40% accuracy at the edge of its field of view. The full field of view or detection area is 90-100 degrees.

The volume of false alerts, meaning an alert is generated when there was no actual fall, was relatively low compared to the overall true positives. The examination of false positives reveals that certain movements, such as bending over at the system's edge, can mistakenly trigger alerts.

The occurrence of random false alerts, noted in a handful of instances, should be an area for focus. However, these numbers, while important to consider, represent a

small fraction of the system's total testing volume, suggesting that the system maintains a reasonable balance between sensitivity and specificity.

A false negative occurs when the system fails to recognize and alert on an actual fall event. An example of this is an older adult gently sliding off a sofa or chair to the floor, and not being able to get up, which the system did not pick up on. This type of fall might not trigger the conventional detection mechanisms due to its lower impact or slower motion compared to more abrupt falls.

Addressing false negatives is crucial for a fall detection system, as it directly impacts the safety and well-being of the users, potentially leading to delayed assistance and adverse outcomes.

Recommendations:

- 1) **Enhance Edge Detection Capabilities:** Refine the algorithms responsible for detecting falls at the edges of the detection area.
- 2) **Reduce False Positives:** Focus on minimizing random false alerts through advanced filtering techniques and algorithmic adjustments.
- 3) **Increase Specificity in Complex Scenarios:** Train the system to better distinguish between falls and non-fall movements like bending or squatting, especially in challenging environments.
- 4) **Enhance Sensitivity to Low-Impact Falls:** Refine the detection algorithms to better identify falls that occur with less force or over a longer duration.

Multiple People

Within the app, people that might move through the space can be grouped into older adults, staff, visitors, and custom groups. This grouping is used in conjunction with setting the region of interest and combining it with groups for alerts and actions.

One of the features that is highly valued and unique is the ability to accurately identify different people moving through the space. It does require taking 4 photos of each individual at different facial angles to enable face recognition, but it was easy to do in the app. Once this is done, each person is identified by a name label above their stick figure representation as they move through the space. Enabling this functionality provides activity and entry/exit analytics for each individual.

Hand Waving Detection

This feature worked well at the “high” sensitivity setting, though intermittently on other settings. It generated only a few false positives during our test cycle. Alerts were received within a few seconds, and the arm waving duration required was about 5 seconds. This is a useful feature to enable an alert to be triggered without a fall.

Two-way Communication

This worked and the audio from the camera is acceptable.

Region of Interest Detection

This was not tested.

Activity Tracking

The system appeared to track activities correctly for each individual, and categorize them appropriately, though more extensive testing would be required over a longer period of time with a larger sample population to assess this feature properly. We would like to see the product go further and make recommendations based on the activity tracking.

Fall Risk Assessment

The documentation in the user manual explains how the fall risk score is derived using two well known methods: the Morse Fall Scale, and the Timed Up and Go gait analysis. It is a thoughtful inclusion of functionality, adding an extra clinically oriented element that uses a questionnaire for the MFS, supplemented by the camera detecting and scoring the TUG portion.

The in-app guide is very useful and provided a scored result, with a level of severity indicated, though we are unable to confirm accuracy, which would need to be tested over time.

Integration with Alexa

This was not tested as it is only available in the US currently.

Documentation & Videos

The user manual (found [here](#)) is comprehensive and includes helpful photos. It also sets expectations around good performance of the system (section 1.1.2), which generally suggests the individual be within 4.5 m from the camera.

The vendor has some helpful videos available on their YouTube channel, [here](#).

Mobile App & Web App

Generally the mobile app (for iOS) worked well, has a good user interface, and provides a good user experience. Click depth could be optimized, as well as the click journey.

The web app is intended for a higher level (i.e. enterprise) view though with the ability to look at individual details. The UX is basic and parallels the layout of the mobile app. More work is required on the web app to make it more valuable. For now it seems sparsely utilitarian in its implementation. It does not support multi-site deployments.

Extensibility

Well documented integrations such as OAuth 2.0, APIs, and web hooks are available through the web app/portal, making it fairly straight forward to integrate data from this system into a nurse call system or other higher order resident management or care app. This documentation also helps to make the system developer friendly, whereby new functionality, such as proximity detection between individuals, could be developed by a 3rd party.

Purchase Options

The vendor has their own website where the product or bundles can be purchased in \$USD. The vendor's order page can be found [here](#).

The vendor also has a [store](#) on the Amazon.ca marketplace where the product or bundles can be purchased in \$CAD. The Amazon marketplace site can be found [here](#). At the time of writing, one camera was CAD \$250-\$300.

Potential enterprise customers would need to contact the vendor directly. We have found the vendor to be very responsive.

If you would like to learn more about the Sentinare camera sensor, we would be happy to address any questions you may have. Feel free to contact us at info@agetechlabs.ca.

If you are ready to purchase a Sentinare camera sensor, we can point you in the right direction. Feel free to reach out to us at info@agetechlabs.ca.

Document History

We periodically update the information in this review. This is a quick view of what's been updated and when.

Original release	February 8, 2024	Full FX review.
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Some Things to Keep in Mind

We hope you find our reviews helpful and instructive, and we do our very best to ensure they continue to provide value for both operators and vendors.

Here are some key points to keep in mind:

- **We aim to be suitably comprehensive in our testing.** Our testing aims to get a representative view of the product's function and performance, and to test the vendor's specific claims, in the real-world. The testing is not exhaustive, meaning that we do not test an infinite number of times, and we do not test every use case permutation. We aim to test the majority of use cases or permutations we believe would be of highest value to operators, so it is possible we did not test for your use case. If you cannot find something you are looking for, please reach out to us at info@agetechlabs.ca.
- **We aim to be impartial in our testing and reviews.** We follow an adapted scientific method (reference [here](#)) so that our testing is structured and has grounding in science and applied engineering. However, we are human, and that means we bring our biases, likes, and dislikes to this process. Following the scientific method is meant to limit the impact of those on our testing and reviews, but sometimes our enthusiasm (or the opposite), may come through in our reviews.
- **We aim to provide a representative view of product function and performance.** Our testing and reviews do not guarantee performance or function of the product. Our goal is to provide a representative view of the how the product works, its areas of strength, and its limitations, as we see them. However, this does not guarantee how the product might work for you or your use case.
- **We are product agnostic.** We aim to to provide an operator-centric, "how it works in the real-world" view of product functionality and performance, so in alignment with our impartiality, we are not product promoters. *Our testing and review of a product is not an endorsement in any way.* We do this work so operators can make more informed decisions of their own, and so vendors can receive some candid feedback to evolve their product.