# Doshiteru Remote Monitoring Service for Unaccompanied Seniors

## Initial Foray into Smart Life Business

The coming era of the 100-year lifetime will see an increasingly diverse range of lifestyle issues as Japan's population ages, birthrates decline, and households occupied by unaccompanied seniors increase. To solve the issues associated with an aging population, seniors need to be relieved from various concerns to help them lead healthy, vibrant, and independent lives. One solution for doing so is to precisely identify the living conditions of seniors (gain insights), and use the information obtained to provide optimum services. The initial foray into such services is a remote monitoring service for unaccompanied seniors called Doshiteru that Hitachi Global Life Solutions, Inc. began providing in June 2019. It is gaining a growing number of users as one method of gathering insights. This article describes Doshiteru's features and how a monitoring service driven by consumer sensing data came to be developed.

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## 1. Introduction

About one in five seniors ages 65 or older is predicted to be living alone by 2020[1]. Concerns over sudden declines in health, injuries, and accidents are greatest for seniors living alone, while the worries of their family members living apart may be even greater. Hitachi Global Life Solutions, Inc. (Hitachi GLS) wanted to create a remote monitoring service that would let seniors continue to live happily in familiar surroundings indefinitely, and let family members living apart from them monitor them securely. As a result, it developed Doshiteru, a remote monitoring service for unaccompanied seniors driven by consumer sensing data.

This article describes the functions of Doshiteru and the work being done on improving consumer quality of life (QoL) through the use of sensing data.

## 2. Intergenerational Feelings Gap over Monitoring

During the initial development work on the Doshiteru service, Hitachi GLS interviewed a number of seniors ages 70 and older who lived alone (representing the users monitored by the service), and a number of the younger generation (in their late 40s to 50s) who had parents living alone and apart from them.

**Figure 1 — Activity Sensor**
An activity sensor mounted on the wall of a room.



The company found that many of the younger generation reported (a) being worried about their parents living alone even though they were healthy at present, (b) wanting to check on their parents right away when they got worried, and (c) calling their parents regularly but were also sometimes too busy to call. In contrast, some of the seniors living alone reported (a) not wanting to bother their children, (b) wanting to be free to live their own lives, (c) not wanting to be monitored by cameras, and (d) not feeling the need for monitoring since they are still healthy. The existence of this intergenerational 'feelings gap' over monitoring made it impossible to provide a solution.

The interviews showed that the younger generation (representing the users doing the monitoring) experienced feelings resembling regret and guilt in addition to worry. Hitachi GLS worked on devising approaches for handling these feelings and for improving the negative view of monitoring among the older generation to make it acceptable to them. This work inspired the company to try to create a service for monitoring by means of virtual, casual visits. The service would enable family members to check the senior's current condition at any time, giving them a sense of what activity the senior is doing, while still respecting the senior's privacy. The company proposed a method of remote monitoring driven by an activity sensor that measures the senior's activity level, along with an analysis system for implementing it. The method analyzes implicit movements from sensed activity levels, displaying them as an animated avatar.

The remote monitoring service respects privacy by not using images of the senior's actual body or room conditions.

## 3. Doshiteru Functions

### 3.1
### Showing Current State at All Times

An activity sensor[*1] mounted on a wall of the room occupied by the unaccompanied senior detects[*2] the presence and activity level[*3] of the senior in the room at a high frequency (once per minute), and stores the information on a server via a wireless local area network (LAN) router (see **Figure 1**). The family members living apart from the senior can check the senior's current condition at any time via a dedicated smartphone app[*4] (see **Figure 2**). The app detects high and low levels of activity. For example, if it detects movement through a room, it detects the activity level as high and displays a walking avatar. But, if

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*1 The activity sensor is installed in one room per subscriber. Use in the living room (which has the most activity during the day) is recommended.

*2 The activity sensor has a detection range of 3.5 to 5 m from the sensor, and is designed for use in rooms of up to about 16 m² in size. The sensor room's shape, state and other features will affect the detection range. The activity sensor may detect the movements of pets or the like.

*3 Indicates how much or how little human movement there is.

*4 Versions for Android 6.x/7.x/8.x and iOS 11.x/12.x are planned (as of May 22, 2019). An Internet connection is required. Android is a registered trademark of Google LLC. iOS is an operating system name licensed to Apple Inc. IOS is a trademark or registered trademark of Cisco Systems, Inc. or its affiliates in the USA and other countries, and is used under license. The features, screen design, and functions of the smartphone app are subject to change without prior notice.

**Figure 2 — Example Screens Showing Different Activity Levels**
The animated display of the avatar changes in response to the activity level.
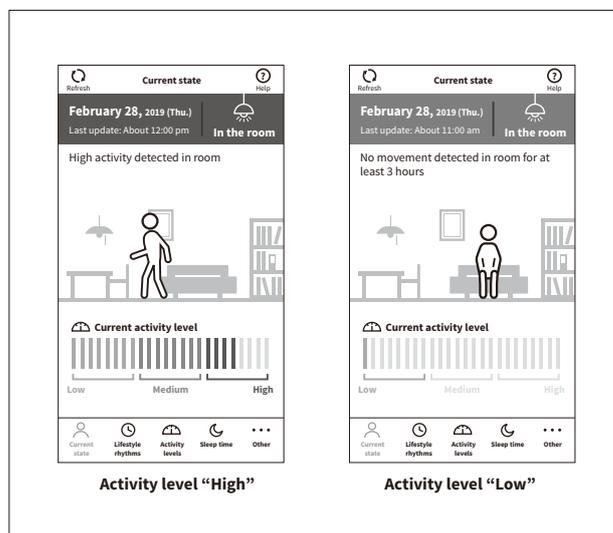
**Figure 3 — Example Screens Showing Lifestyle Rhythms and Abnormal Change Notification**

The lifestyle rhythms screen shows sleep, absence, and activity level when in the room. Conditions such as an absence or lack of movement for the preset amount of time trigger abnormal change notifications sent to the family members.



**Lifestyle rhythms**　　　　**Abnormal change notification**
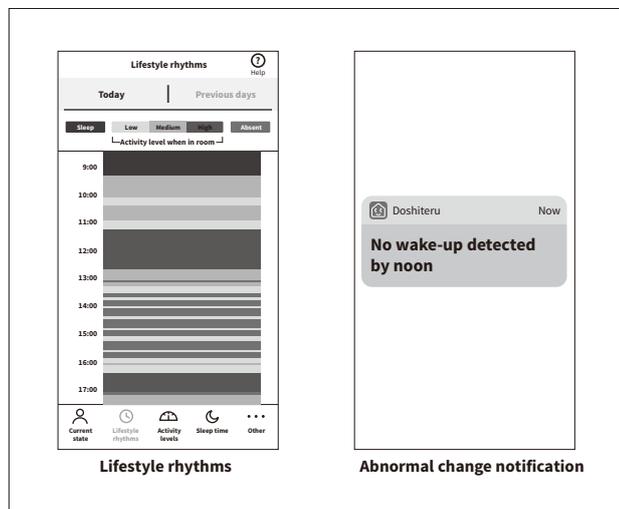
the senior is sitting on a sofa watching TV, the app detects the activity level as low and displays a sitting avatar to indicate that the senior is motionless. These displays are one benefit of the service. Privacy can be respected since no actual images are used, and security is rigorously managed since the server that stores the detected information is protected against unauthorized external access.

## 3. 2

### Identifying Lifestyle Rhythms

Information about the unaccompanied senior that has been detected by the activity sensor is stored on a server, enabling lifestyle rhythm, activity level, and sleep time[*5] histories to be checked easily from a dedicated smartphone app by the family members living apart (see **Figure 3**, left). These histories can make family members aware of changes in activity states. This enables them to check on the senior by phone or in person when a change is noticed, promoting more contact with the unaccompanied senior.

## 3. 3

### Unusual Change Notification, Pricing Approach

The app is also equipped with a function for notifying the family members of unusual changes such as when

the unaccompanied senior is continuously absent or still for a preset amount of time. A notification is sent to the smartphone if the senior never enters the living room (room where the activity sensor is mounted) from the evening through the following morning (see **Figure 3**, right). Up to five family members can register to receive notifications for a single monitored senior, enabling monitoring by all the spouses, siblings, and other family members concerned. The wireless LAN router is provided as rental equipment with the communication charge included in the fee (as of June 2019). This pricing approach reduces the cost of installing the system for seniors who often have no existing Internet connection. It also keeps service quality consistent in terms of areas such as communication environment problems and security.

## 3. 4

### User Feedback

Since February 2019, a pilot service has been offered to limited areas and recipients. It has enabled feedback from more than ten users, for use in checking the service functions.

Some of the feedback concerned seniors' negative views of monitoring services. The company found that concerns in this area had been eliminated for users who reported that their parents were initially anxious about the idea of monitoring, but were reassured about privacy upon seeing the avatar display. The family members doing the monitoring commented on the immediacy of being able to casually check on the senior whenever a concern arose, such as while commuting. They also reported feeling reassured by finding out what activity the senior was doing from their lifestyle rhythms.

Since the service indicates when the senior is home, users also praised its ability to let them know appropriate times to make phone calls. Some users used the service to monitor a senior who was unaccompanied only during the day while their partner was at work. The service helped eliminate similar concerns for these users also.

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*5  Sleep time is a guideline value inferred from factors such as room presence detected by the activity sensor mounted in the living room or other room.

**Figure 4 — Overview of Hitachi Smart Life Service Platform**

The illustration shows how lifestyle data acquired by consumer home sensing can be stored on the smart life service platform for use in developing new products or services, and for collaborative business creation and growth.



QoL: quality of life
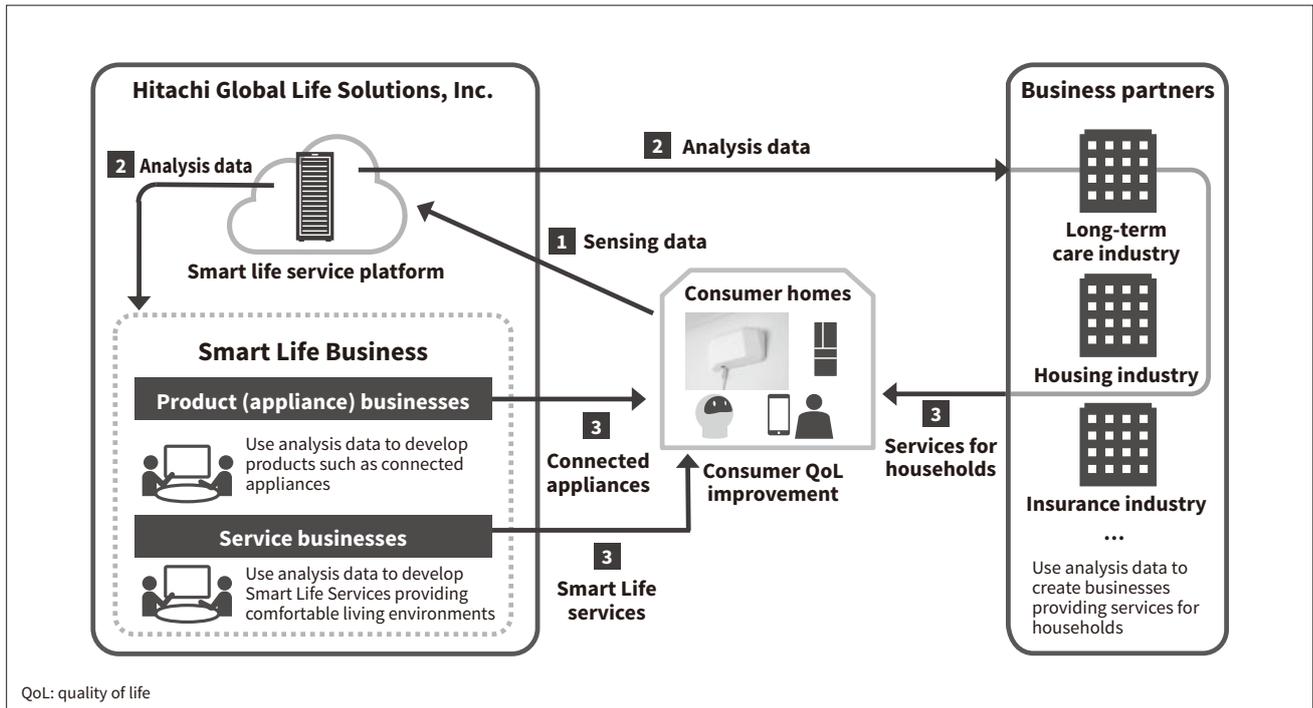
## 4. Improving Consumer QoL through Data Usage

Doshiteru's sensing data is so-called lifestyle data generated based on direct actions done in the home. It is 'line data' rather than 'point data'. Doshiteru's functions provide clear depictions of weekly, monthly, and yearly lifestyle rhythms that show whether the monitored senior tends to keep to themselves, go out a lot, get up early, or stay up late. When long-term care later becomes needed, use of these functions may be helpful in preventing dementia or selecting the best long-term care service for the senior. Lifestyle data will also be used to supplement competitor monitoring services and to help solve issues of public concern such as unattended deaths and local comprehensive care services.

Lifestyle data acquired by sensing can also be stored on the smart life service platform (see **Figure 4**) to enable product businesses to use the stored analysis data in the development of new products such as connected home appliances[*6]. Home appliances are

consumer contact points that will create suggestions for new types of added value generated by helping with the housework chores or dietary habits that are integral parts of daily life.

Hitachi GLS's service business will apply data usage to the development of new Smart Life Services that solve user lifestyle issues.

The company is considering working with business partners to help grow its range of business areas. Acquired analysis data could expand into collaborative business creation by developing new services for households while using the data interactively with providers of solutions to consumer issues such as the long-term care, housing, and insurance industries, and housekeeping and home food delivery services.

## 5. Conclusions

The casual monitoring concept of Hitachi GLS has resulted in a service that lets family members make virtual visits to unaccompanied seniors at any time. While seniors living alone are happy to receive email messages or brief phone calls, busy family members can sometimes be aware of these needs but unable to

*6 Home appliance products with functions for exchanging data with the Internet or smartphones.

meet them. The service name Doshiteru is a corruption of the Japanese '*dō shite iru?*', or 'how are [they] doing?'. It is intended to evoke the concern for unaccompanied seniors living apart that family members might have as they go about their daily lives. The company is looking forward to Doshiteru becoming a catalyst for communication between seniors and their family members.

Hitachi GLS wants to continue providing and improving high added-value services by continually listening closely to users directly to expand on the positive features provided.

The experience gained from the Doshiteru service will be used to better understand the feelings of a wide range of users as Hitachi GLS constructs a business platform for its Smart Life Business that will provide solutions to lifestyle issues.

**Reference**

1)  National Institute of Population and Social Security Research, "Population Projection for Japan" and "Household Projection for Japan" (National Estimates), http://www.ipss.go.jp/syoushika/tohkei/Mainmenu.asp, in Japanese.

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