

# A WELFARE FACILITY RESIDENT CARE SUPPORT SYSTEM

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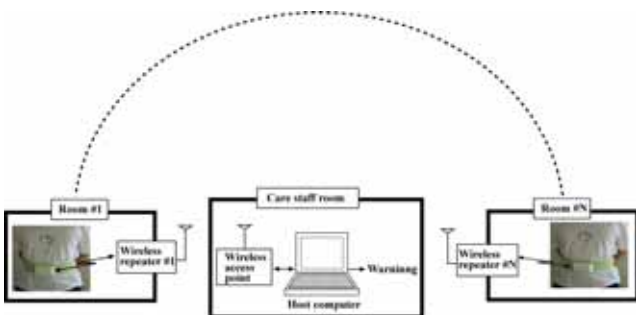
## INTRODUCTION

Japan became the longest-lived society in the world. The population of elderly needing constant care is increasing. Therefore, many welfare facilities are accepting elderly persons who need constant care.

In this study, a new care support system has been developed for monitoring the overall health of welfare facility residents who need constant care. The system can monitor up to 58 residents for 24 hours. When the resident is in an emergency situation, the system automatically alerts the situation to the care staff by an audible alarm and also by mobile phone.

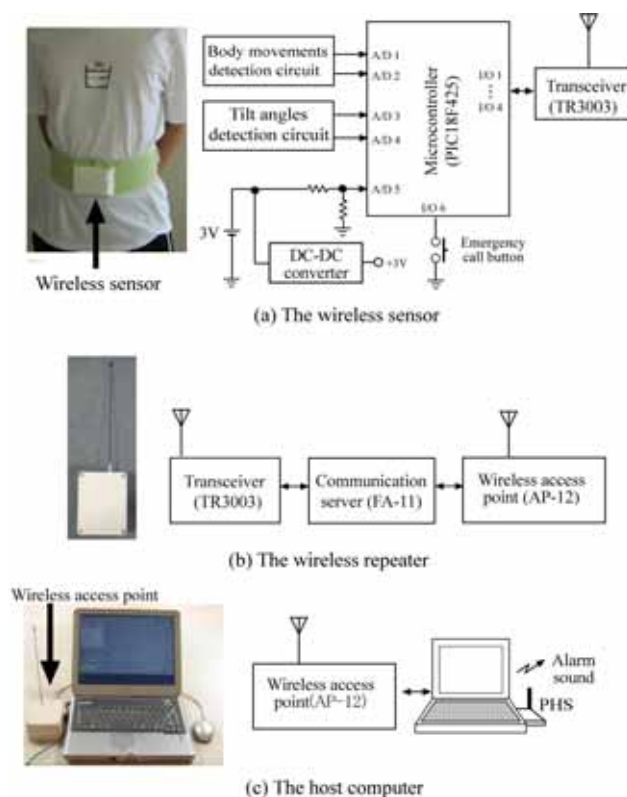
## SYSTEM DESCRIPTION

Figure 1 shows the overall welfare facility resident care support system. The facility consists of 58 wireless sensors, wireless repeaters and a host computer. The wireless sensors, attached to the resident's abdomen, record respiration, activity, posture and behavior and then send these data to the wireless repeater each minute, upon receiving a data send start command from the host computer. Wireless sensor #1 transmits the data to the wireless repeater within 1 second after receiving the start command, and then wireless sensor #n transmits its data n seconds later. The wireless repeater sends the received data to the host computer. The host computer stores the received data and displays the resident's posture and behavior on the monitor. The received ID is used to detect the resident's location in the welfare facility. When the resident is in an emergency situation, the host computer automatically alerts the situation and location to the care staff by an alarm sound and also by mobile phone (PHS).



**Figure 1** The overall welfare facility resident care support system.

Figure 2 shows the block diagram of the welfare facility resident care support system. The system is designed with wireless sensors, wireless repeaters and a host computer. The wireless sensor, which consists of a body movements detection circuit, a tilt angles detection circuit, a microcontroller and a low power 303 MHz ASH transceiver. It records respiration, activity and indicators of posture and behavior for 24 hours. These data are transmitted to the wireless repeater by the transceiver. The wireless repeaters, which are installed throughout the welfare facility, send data, including the repeater's ID, to the host computer. The ID is used to detect the resident's location in the welfare facility. The host computer stores the data, which can be used to analyze the resident's overall health condition.

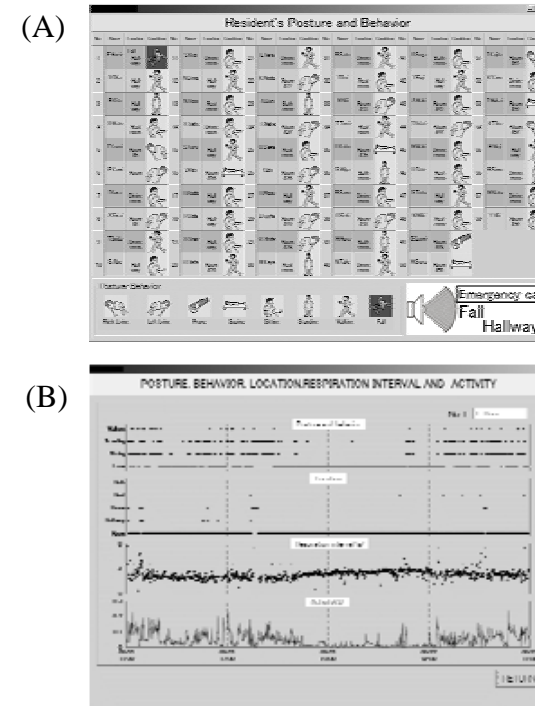


**Figure 2** Block diagram of the welfare facility resident care support system.

## RESULTS AND CONCLUSION

Experiments were performed to record the communication time required to transmit an emergency situation via PHS, which is a low-transmitting power mobile phone. The host computer was placed in the center location of welfare facility. The wireless repeater was attached to the ceiling of the hallway.

The communication time was within 1 minute. Figure 3 (a) shows the posture and behavior of 58 residents displayed on monitor. Figure 3(b) shows the posture, behavior, location, respiration interval and activity recorded over 24 hours.



**Figure 3** The posture and behavior of 58 residents (plot A) and the posture, behavior, location, respiration interval and activity for 24 hours (plot B).

The developed care support system is very applicable to welfare facility residents, should also be found useful for monitoring hospital patients.