TECH OFFER

AI Powered ToF Sensors for Smart Fall Detection

KEY INFORMATION

TECHNOLOGY CATEGORY:

Infocomm - Healthcare ICT

Infocomm - Video/Image Analysis & Computer Vision

Infocomm - Wireless Technology

TECHNOLOGY READINESS LEVEL (TRL): **TRL6**

COUNTRY: **JAPAN**

ID NUMBER: **TO175114**

OVERVIEW

The demand for improved healthcare, coupled with increasing life expectancy and a growing elderly population, alongside resource constraints, necessitates the implementation of a 24/7 remote monitoring system equipped with an accurate risk prediction process. This process should forecast potential risks for individuals, enabling early detection and remote alerts to promptly alert healthcare providers and individual caregivers, thereby enhancing the well-being of those under care.

A Japanese technology owner has developed a Time-of-Flight (ToF) sensor technology, characterised by executing a risk prediction process to predict risks for the monitored individuals based on presence range and posture. Unlike conventional camera-based systems, the proposed technology emphasises the privacy of the monitored individual by abstaining from capturing actual photos or images. Through the implementation of a proprietary artificial intelligence (AI) algorithm, it can discern whether the individual under observation is absent from the bed, lying flat on it, sitting at its edge, or lying on the floor next to the bed. A web-based user interface had been developed to provide healthcare professionals various degrees of warning, e.g.,

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patient at safe zone, gray zone, caution zone or bed edge zone.

The technology owner is looking to work with healthcare providers, agencies or developers providing housing for the elderly, or technology companies for test bedding trials, as well as research and development collaborations to customise the technology for specific use cases.

TECHNOLOGY FEATURES & SPECIFICATIONS

- The technology leverages time-of-flight (ToF) sensors, which gauge distances between the sensor and the subject for each point in the image based on the round-trip time of an artificial light signal emitted by a laser.
- The process commences with the capture of an image of the individual, subsequently transmitted wirelessly via Wi-Fi to central management software.
- Equipped with algorithms, this software discerns any movement beyond predefined boundaries, such as within a hospital bed setting.
- Positioned above the bed, ToF sensors ascertain the person's position, whether lying down, seated on the bed's edge, or standing beside it. The resultant data is transmitted to a dedicated server situated at a nurse or helper station, where professionals like nurses or caregivers operate.
- The ToF sensor is positioned at a height of 2.5m, effectively covering a 2m x 2m area.
- The sensor detects height variations by displaying different colours and shapes on the software's graphical squares.
- Additionally, the system conducts an analysis of the individual's spatial orientation and vertical displacement, aiding in the evaluation of their overall condition.
- Visual representations typically depict lighter hues denoting proximity to the sensor, while darker shades indicate areas further away, such as the floor.

POTENTIAL APPLICATIONS

Patient/ Elderly Fall Management:

- Healthcare Monitoring: Monitoring patients in hospitals or nursing homes to track their movements, position changes, and overall well-being without compromising their privacy.
- Elderly Care: Assisting caregivers in monitoring elderly individuals living independently at home to ensure their safety and well-being, particularly for those at risk of falls or other health issues.

The technology can be adapted to be used for object tracking, human presence detection, etc.

UNIQUE VALUE PROPOSITION

The technology is low-cost and low-power consumption, lightweight, and easy to install. The UVP includes:

- **Privacy Emphasis:** Prioritizing privacy by avoiding actual image capture while still providing effective monitoring.
- **Unlock greater data potential:** System firmware/software maximizes TOF sensor data, extracting unparalleled value.
- **Visualization and Analysis:** Utilizes graphical representations and AI/ ML algorithms to visualize and analyze data, aiding professionals in evaluating an individual's condition and making informed decisions.
- **Real-time Alerts:** Provides real-time alerts to professionals, such as nurses or caregivers, enabling prompt responses to any detected abnormalities or movements outside predefined boundaries.

- **System Extension:** ToF sensors can be easily added into the existing hardware and software system, minimizing implementation costs and disruption.