

TECH OFFER

Smart Sleep Monitoring: Contactless Vital Signs Sensor Based AIoT Solution



KEY INFORMATION

TECHNOLOGY CATEGORY:

Healthcare - Telehealth, Medical Software & Imaging
Infocomm - Artificial Intelligence

TECHNOLOGY READINESS LEVEL (TRL): **TRL9**

COUNTRY: **CHINA**

ID NUMBER: **TO175183**

OVERVIEW

As a breakthrough in health technology, sleep health monitoring gained significant attention due to increasing awareness of sleep's critical impact on physical and mental well-being. Demand for innovative solutions to address sleep disorders, particularly among aging populations and individuals with chronic illnesses, is rising. However, to fully unlock its potential, there are challenges to overcome, such as achieving clinical-grade accuracy, safeguarding data privacy, and ensuring seamless integration with existing healthcare systems.

To address these challenges, the technology owner has developed a non-intrusive, highly convenient solution leveraging on advanced contactless vital signs sensor and an AIoT platform. This system tracks sleep patterns, detect breathing disorders and improve overall well-being by capturing heart rates, breathing patterns, and subtle body movements using high-precision fiber optic sensors. Through sophisticated signal processing, it collects and analyses multidimensional vital sign data such as ballistocardiogram (BCG), electrocardiogram (ECG) and photoplethysmography (PPG), using big data. AI algorithms further enhance the solution by providing comprehensive sleep quality assessments and personalized sleep recommendations.

This contactless monitoring solution offered real-time, high-precision monitoring of vital signs without direct contact with the human body, ensuring medical-grade accuracy across a wide range of body weights. By eliminating the need for wearables or sensors, it enhances user comfort while providing critical insights into sleep quality - a key factor in mental, physical, and emotional health.

The technology owner is seeking collaboration with industrial partners in healthcare facilities, eldercare centers, hospitals, sleep clinics, daycare centers, and smart homes to explore various application opportunities.

TECHNOLOGY FEATURES & SPECIFICATIONS

Primary Functions:

- **Real-time vital sign monitoring:** heart rate, breathing rate, BCG, ECG, PPG, etc.
- **Body movement detection:** bed occupancy, nighttime movement frequency, subtle movement statistics, etc.
- **Multi-dimensional sleep analysis:** time to fall asleep, wake-up time, deep and light sleep durations, nighttime awakenings, out of bed frequency, nap and nighttime sleep quality, patterns of nighttime awakenings, etc.
- **Real-time alerts:** provide notifications for bed exit, respiratory issues, abnormal heart rate, sleep apnea, etc.
- **Continuous monitoring and disease prediction:** leverages long-term data analysis and comparison using AI

Key Advantages:

- **High accuracy:** over 97% for heart rate and 95% for breathing rate
- **High sensitivity:** reaction times between 10 to 30 seconds, with dynamic sensitivity adjustment
- **Adaptability:** precise monitoring for placement under spring mattresses up to 40 cm thick
- **High comfort:** effective under different sleeping positions, i.e., back or side
- **Comprehensive reporting:** generates sleep analysis reports with personalized sleep recommendations.
- **Seamless integration:** supports Wi-Fi, 4G, Bluetooth, RS485, and CAT1 connections
- **All-in-one solution:** incorporates hardware, intelligent algorithms, software interfaces, and platform services

POTENTIAL APPLICATIONS

Main Application Scenarios:

- Smart homes
- Nursing homes and elder care centres
- Hospitals and healthcare centres
- Community centralized daycare centres
- Mental health and sleep economy

Leveraging this contactless sensor and AIoT solution, the technology owner has developed an electric smart bed that integrates sleep health monitoring, electric adjustments, massage, sleep aid and wake-up functions, snoring intervention, and health alerts.

Potential marketable products include:

- Smart bed for wellness and entertainment
- Health monitoring mattresses
- Seat cushions

- Smart nursing beds
- Smart lift-assist sofas

UNIQUE VALUE PROPOSITION

- **Versatile application scenarios:** compatible with foam mattresses, spring mattresses, seat cushions, and direct placement under pillows
- **Medical-grade precision:** delivers highly accurate monitoring and reliable health data
- **Enhanced user comfort:** contactless, non-wearable design for seamless and non-intrusive detection.
- **Low maintenance:** replaceable sensor for easy upkeep and long-term usage
- **Comprehensive Health insights:** analysis diverse vital data to support valuable decision-making in healthcare sectors