

## Contactless Infant Monitoring using White Noise

**This contactless infant monitoring system uses white noise to track motion and respiration during sleep. By leveraging a common smart speaker, the system emits white noise that reflects off the infant's body, allowing for accurate monitoring without physical contact. This technology ensures a safer and more comfortable sleep environment for infants, addressing a critical need for non-invasive respiratory monitoring.**

### What is the Problem?

Healthy sleep is crucial to neurological development in children and yet sleep-related conditions can cause serious harm to infants. With Sudden Infant Death Syndrome (SIDS) as the leading cause of death among children under a year old, infant monitors tracking the respiration of young children have become more and more popular. However, existing monitors have sensors or wires that must physically touch the infant for the device to function. These have at times led to rashes, burns, and in rare cases, death from strangulation. There is yet a need for a much less invasive, contact-less approach to monitoring breathing and respiration of infants during sleep.

### What is the Solution?

This innovation introduces the first contactless system that uses white noise to monitor motion and respiration in sleeping infants. With a common smart speaker such as an Amazon Alexa, the system emits white noise which reflects off the infant's body. These reflections are captured by the speaker's internal microphones and processed to monitor the child's body and chest movements. White noise is specifically chosen due to its widespread use in improving infants' sleep quality. A novel algorithm transforms the white noise into multiple frequency-modulated continuous wave radar signals, enabling accurate detection of infant motion and respiration even from distances over half a meter. This technology offers a safe, non-invasive method to ensure infants' well-being during sleep.

### What is the Competitive Advantage?

- Versatile and Reliable: Capable of detecting respiratory issues such as sleep apnea, and other body motion with high accuracy. Performance is unaffected by clothing or the orientation of the speaker, ensuring consistent monitoring.
- Cost-Effective: The use of a commodity speaker without specialized equipment makes the technology accessible for the everyday family.

### Technology ID

BDP 7878

### Category

Selection of Available  
Technologies  
Diagnostic

### Authors

Shyamnath Gollakota

### Learn more



- Two Birds, One Stone: White noise is used to both facilitate sleep and monitor respiratory activity.

- Multiple Use Cases: Beyond infant monitoring, it can be used for respiratory rate monitoring to detect infections, non-invasive monitoring of chronic respiratory diseases, older children with epilepsy or recurrent central apneas, and general wellness monitoring.

### **Patent Information:**

[WO2020214865A1](#)

[US20220196832A1](#)

### **References**

1. Anran Wang, Jacob E. Sunshine, Shyamnath Gollakota(43749) ,  
<https://dl.acm.org/doi/10.1145/3300061.3345453>,  
<https://dl.acm.org/doi/proceedings/10.1145/3300061>, 1-16