

Paper Title: WiSH: WiFi-Based Real-Time Human Detection

Paper link: <https://ieeexplore.ieee.org/document/8698216>

1.Summary

1.1 Motivation

Wifi based human detection has many applications. However, deploying complex models can be challenging for various practical reasons, like: computer efficiency, deployment effort etc. The goal of this paper is to introduce a lightweight but effective real time human detection system.

1.2 Contribution

The paper introduces WiSH, a real-time human presence detection system for continuous daily use. It utilizes a lightweight method based on time and frequency correlations of CSI measurements, and includes a robust event filter to eliminate irrelevant disturbances. The authors claim that WiSH is a practical and scalable solution for long-term monitoring in real-world scenarios.

1.3 Methodology

The authors address practical constraints in motion sensing by proposing a lightweight method that combines frequency and time correlations, along with a robust event filter for human detection. The system is implemented on commodity PCs and portable devices, evaluated using metrics like True Positive rate and False Alarm. Experimental testing includes scenarios like a classroom, meeting room, and dormitory room.

1.4 Conclusion

The implementation of WiSH on resource-limited RF devices shows a detection accuracy exceeding 98%, with an average delay of 1.5s at a 20 Hz sampling rate. Identified events align with true events by 76.7%, rising to 92.5% at a 90 Hz sampling rate.

2.Limitation

2.1 First Limitation

It operates at a relatively low sampling rate due to hardware constraints, potentially limiting its suitability for scenarios requiring higher temporal resolution. Additionally, the system is dependent on specific hardware, restricting its application to other devices or environments with varying hardware configurations.

2.2 Second Limitation

The system's performance in outdoor or complex environments remains unexplored, emphasizing the importance of refining sensitivity and discussing energy efficiency in real-world deployment.

3. Synthesis

The system exclusively utilizes CSI amplitude in both time and frequency domains, achieving high accuracy. However, untapped parameters like noise-signal ratio could enhance accuracy further. Balancing accuracy and operation time in a limited computing environment is crucial. Future improvements may explore additional parameters while ensuring a short operation time to enhance the model's overall accuracy.