

Robust heart rate monitoring during motion

Physiological monitoring during movement is challenging, as motion introduces noise and artefacts that degrade signal quality. Reliable heart rate tracking requires robust signal processing capable of separating true physiological signals from motion-related interference.

OPM applies advanced signal processing to maintain accurate heart rate measurement during movement. The following section outlines performance during walking and running, validated against ECG reference data.

Motion-robust heart rate tracking

This test evaluates heart rate tracking during motion using the OPM device worn on the wrist. Data was collected from a subject with dark skin tone (MST9) while walking and running on a treadmill at multiple speeds (1.5, 3.1 and 6.7 km/h).

The figure shows heart rate changes as treadmill speed increases, with heart rate rising as movement intensity increases. Advanced signal processing filters out noise and motion artefacts, enabling the OPM device to maintain reliable readings during both walking and running.

To assess accuracy during motion, heart rate measurements from the OPM device were compared against an ECG chest strap (Garmin HRM-Run), worn simultaneously by the subject during the test. Accuracy was assessed using ARMS.

The OPM device achieved an ARMS value of 2.3%, exceeding the performance requirement for reflectance-based devices (target ARMS \leq 3.5%). These results demonstrate accurate heart rate measurement during motion, including for a subject with dark skin tone.

Heart rate measured using a wrist-worn OPM device compared against ECG reference data for a subject with dark skin tone (MST9).

