in contact with the sensors. PTT, heart rate, low frequency of heart rate variability, pulse wave morphology, and anthropometric data were obtained. These variables were incorporated into a machine-learning algorithm to estimate BP. Standard BP was measured using an arm cuff and a finger cuff for continuous monitoring. BP perturbation maneuvers were performed to induce BP changes.

Results: A total of 30 subjects were enrolled, providing 140 BP data points for comparison with stationary BP readings. The results showed a high correlation (r = 0.9 for systolic BP [SBP] and r = 0.93 for diastolic BP [DBP]). The mean absolute error (MAE) ± standard deviation of absolute error (SDAE) was 3.1 ± 3.2 mmHg for SBP and 2.2 ± 2.6 mmHg for DBP. For continuous BP monitoring, 8 subjects were enrolled, showing a high correlation (r = 0.93 for SBP and r = 0.86 for DBP) and good MAE ± SDAE: 6.4 ± 5.2 mmHg for SBP and 5.1 ± 3.7 mmHg for DBP.

Conclusion: This novel capacitive pressure sensing array embedded in the mattress holds promise for unobtrusive, continuous tracking of NBP, causing less sleep disruption and effectively capturing episodic BP surges from sleep events.

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CONTINUOUS NOCTURNAL BLOOD PRESSURE MONITORING USING AN INTEGRATED PRESSURE SENSING MATTRESS PAD

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Introduction: Nonintrusive and continuous nocturnal blood pressure (NBP) measurement is crucial but challenging, as it relies on repeated cuff inflations that disrupt sleep. Intermittent BP measurements also miss episodic surges caused by events like sleep apnea. This study introduces an integrated pressure-sensing mattress designed to capture heartbeat signals from two major arterial sites. We suggest that the time difference between these sites represented pulse transit time (PTT), the time for an arterial pulse to travel between two locations, which is inversely correlated with BP and serves as the foundation for cuffless BP monitoring.

Methods: Subjects lay on a mattress pad embedded with a nanofabricated capacitive pressure sensor array that detected subtle heartbeat signals from the chest and leg (popliteal) areas