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Wi-Fi Sensing for Post-Crash Occupant Assessment: Promise, Scope, and Pitfalls

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Abstract

Vehicles increasingly ship with multi-antenna Wi-Fi for connectivity and diagnostics. With the arrival of IEEE 802.11bf (WLAN Sensing), the same radios can be used to sense people by interpreting channel state information (CSI), opening a path to low-cost, privacy-preserving in-cabin perception that works in darkness, smoke, or when cameras are occluded by airbags. This talk surveys the state of Wi-Fi sensing and its relevance to post-crash telematics: we outline how CSI can recover coarse-to-fine human pose and micro-motion (breathing), and how those signals could augment Advanced Automatic Crash Notification (AACN) datasets to communicate occupant state (e.g., motionlessness, posture consistent with injury) to PSAPs and EMS. We position Wi-Fi against today's in-cabin modalities, especially 60 GHz radar used for occupancy/child-presence detection, and discuss semiconductor and integration implications for TCUs. We then map the limits: RF variability across cabins, antenna placement and MIMO geometry, interference, domain shift and generalization, structural pose fidelity issues, calibration/aging, standards compliance, Euro NCAP expectations for in-cabin monitoring, and privacy/regulatory considerations when deriving biometrics from RF. Finally, we sketch a practical roadmap: data collection via Wi-Fi/vision pairs, cross-domain training and evaluation protocols, bench and sled testing tied to AACN fields, and deployment options leveraging 802.11bf primitives.