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Wireless Body Area Networks: A Framework of Network-integrated Sensing and Energy-aware Protocols for Resource-constrained Applications in Wireless Body Area

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Abstract: In this book, a framework for network integrated sensing and energy-aware protocols for resource-constrained applications in WBAN is developed. The key contribution is to develop a novel network-integrated sensing modality, which is inferred from the measured RSSI of the RF signal between each pair of WBAN sensors. The concept of RSSI-based proximity is experimentally developed and then integrated within a HMM-based stochastic processing framework for accurately identifying postures in a subject-independent manner. Then, the issue of energy-aware communication is addressed by developing a human body posture-aware transmission power control framework using a closed loop link power assignment depending on the instantaneous postural of the subject. Finally, an on-body DTN routing framework has been developed. Ultra-short transmission range is a common constraint for low-power RF transceivers used for embedded applications with limited energy and small form-factors. The objective is to develop on-body store-and-forward packet routing algorithms with an analytical framework for modeling routing delay in the presence of network partitioning.