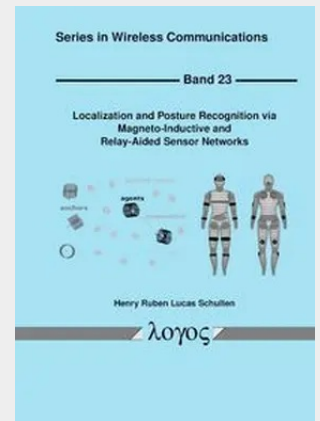


Localization and Posture Recognition via Magneto-Inductive and Relay-Aided Sensor Networks

Body-centric wireless sensor networks are expected to enable future technologies such as medical in-body micro robots or unobtrusive smart textiles. These technologies may advance personalized healthcare as they allow for tasks such as minimally invasive surgery, in-body diagnosis, and continuous activity recognition. However, the localization of individual sensor nodes within such networks or the determination of the entire network topology still pose challenges that need to be solved. This work provides both theoretic and simulative insights to enable the required sub-millimeter localization accuracy of such sensors using magneto-inductive networks. It identifies inherent localization issues such as the asymmetry of the position estimation in magneto-inductive networks and outlines how such issues may be addressed by using passive relays or cooperation. It further proposes a novel approach to recognize the entire structure of a magneto-inductive network using simple impedance measurements and clusters of passive tags. This approach is evaluated extensively by simulation and experiment to demonstrate the feasibility of low-cost human body posture recognition.

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