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Link Power Assignment in Wireless Body Networks by Linear Quadratic Gaussian Control with Integrator

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Abstract: This paper presents a novel transmission power assignment mechanism for on-body wireless links formed between severely energy-constrained wearable and implanted sensors. The objective is to develop a model based framework in which RF signal strength is predicted and is regulated at a reference value. In particular, the body movement has been modeled as a stochastic linear system and a quantized Linear Quadratic Gaussian control with an Integrator (LQGI) approach has been utilized to achieve this objective. Experimental results from linear and binary search based closed-loop design along with simulation results from LQGI approach are presented and compared. It is shown that the LQGI approach with quantizer is able to enhance the performance of the system.