

Application of Compressed Sensing to Sensing and Processing of Biomedical Signals

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Technical Abstract:

Compressed Sensing (CS) is an emerging signal processing concept, wherein significantly fewer measurements than that suggested by Nyquist-Shannon sampling theorem can be used to recover a class of signals with arbitrarily fine resolution. CS is a perfect match for low power sensing and telemetry of vital signs for remote patient monitoring, as one can effectively shift complexity from sensors to receivers with better power budgets. We present details of system design and simulation results for reducing the power of photo-electric sensors such as pulse oximeters.

The receiver in this approach is agnostic to whether the information was not sensed or was dropped by a noisy channel. We leverage this property to improve error resiliency of Electrocardiogram (ECG) telemetry in the context of Personal Area Networks (PAN). We present results comparing CS with traditional approaches such as re-transmissions.