

Wirelessly Powered Sensors using P-FCB in Wearable Body Sensor Network for Continuous Vital Signal Monitoring

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Technical Abstract:

Continuous vital signal monitoring is essential to detect and to treat an increasing number of patients with chronic diseases. Realization of continuous vital signal monitoring during everyday life requires convenience and reliability. This talk will discuss the implementation of a self-configured wearable health monitoring system with wirelessly powered patch sensors that continuously monitors ECG and other vital signals at selected locations on the body with low power consumption. The adhesive bandage type sensor patch is composed of a sensor chip, a Planar-Fashionable Circuit Board (P-FCB) inductor, and a pair of dry P-FCB electrodes printed on fabric. The dry P-FCB electrodes enable long term monitoring without skin irritation, whose characteristics will be discussed. The sensor chip harvests its power from surrounding health monitoring band by the Adaptive Threshold Rectifier (ATR) with 54.9% efficiency at 13.56MHz, and it consumes 12 μ W with an electrocardiogram (ECG) analog front-end. The network controller automatically locates the sensor position, configures the sensor type (self-configuration), wirelessly provides power to the configured sensors, and transacts data with only the selected sensors, while dissipating 5.2 mW at single 1.8 V supply. Both the sensor and the health monitoring band are implemented using P-FCB for enhanced wearability and lower production cost.