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Motion Detection Method for Clutter Rejection in the Bio-Radar Signal Processing

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Abstract : The cardiopulmonary signal monitoring, without the usage of contact electrodes or any type of in-body sensors, has several applications such as sleeping monitoring and continuous monitoring of vital signals in bedridden patients. This system has also applications in the vehicular environment to monitor the driver, in order to avoid any possible accident in case of cardiac failure. Thus, the bio-radar system proposed in this paper, can measure vital signals accurately by using the Doppler effect principle that relates the received signal properties with the distance change between the radar antennas and the person’s chest-wall. Once the bio-radar aim is to monitor subjects in real-time and during long periods of time, it is impossible to guarantee the patient immobilization, hence their random motion will interfere in the acquired signals. In this paper, a mathematical model of the bio-radar is presented, as well as its simulation in MATLAB. The used algorithm for breath rate extraction is explained and a method for DC offsets removal based in a motion detection system is proposed. Furthermore, experimental tests were conducted with a view to prove that the unavoidable random motion can be used to estimate the DC offsets accurately and thus remove them successfully.

Keywords : bio-signals, DC component, Doppler effect, ellipse fitting, radar, SDR
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