Group #7

Portable ECG Module for Educational Outreach

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Abstract

This project presents a low-cost portable electrocardiogram (ECG) module designed for educational outreach and hands-on bioengineering learning. The system acquires cardiac electrical signals using surface electrodes, processes the data through AD8232 analog front-end, displays real time six-lead ECG waveforms through Matlab, and processes the data using digital filtering methods including Butterworth, Kalman, and adaptive LMS filtering. Hardware integration; including dual AD8232 modules, microcontroller firmware, and a custom 3D‑printed enclosure was developed to improve portability, electrical safety, and usability in classroom environments. Signal testing demonstrated successful isolation of cardiac activity within the 0.5-50 Hz target bandwidth, with effective suppression of motion artifacts and 60 Hz interference. This project aims to increase student engagement in physiology and bioengineering through accessible, interactive ECG technology.