

ADVANCED CARDIAC MONITORING PLATFORM: INTEGRATION OF ECG AND VECTORCARDIOGRAPHY WITH AUTOMATED SEGMENT AND R-R PEAK DETECTION

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Introduction: The electrocardiogram (ECG) is a cornerstone tool in the diagnosis of cardiac diseases. On the other hand, vectorcardiography (VCG) offers an advanced three-dimensional analysis of atrial and ventricular electrical activity, being more sensitive to detecting diagnostic subtleties. Advanced machine learning and software integration in automated systems heightens diagnostic accuracy and treatment effectiveness. **Objective:** To develop a Python-based system that plots ECG graphs, integrates colored VCG, automatically detects ECG segments and R-R intervals, and calculates heart rate. **Methods:** The system was developed using Python, employing the NeuroKit2 library for signal processing and analysis of the electrocardiographic trace. Colored ECG and VCG graphs were generated and analyzed using algorithms that automatically detect P, QRS, and T waves by importing and reading a CSV file containing voltage and time values related to the ECG. **Results:** The system successfully plotted ECG and VCG graphs with precision (Figure 1B), automatically detecting the main ECG segments (Figure 1A) and R-R intervals (Figure 1C). The integration of colored VCG provided an enhanced visualization of cardiac activities. **Conclusions:** The developed system proved to be a powerful tool for the analysis and diagnosis of cardiac conditions, combining ECG and VCG in an intuitive and automated interface. The inclusion of an automated detection system and treatment suggestions enhances its clinical utility, offering advanced support for healthcare professionals in monitoring and treating cardiac patients.

Palavras-chave: Telecardiology, Electrocardiography, Data Science, Cardiac Electrophysiology, Computer-Assisted Diagnosis