**Code for Designing an automated ECG analysis system for arrhythmia detection in MATLAB:**

% Sample code for preprocessing

ecg\_signal = load('ecg\_data.mat'); % Load ECG data

fs = 1000; % Sampling frequency

% Remove baseline wander (example: using a high-pass filter)

ecg\_filtered = highpass(ecg\_signal, 0.5, fs);

% Filter out noise (example: using a bandpass filter)

low\_freq = 0.5; % Low cutoff frequency

high\_freq = 50; % High cutoff frequency

[b, a] = butter(2, [low\_freq, high\_freq]/(fs/2), 'bandpass');

ecg\_filtered = filtfilt(b, a, ecg\_filtered);

% Detect R peaks (example: using Pan-Tompkins algorithm)

r\_peaks = pan\_tompkins(ecg\_filtered, fs);

% Sample code for feature extraction

rr\_intervals = diff(r\_peaks) / fs; % RR intervals

qrs\_duration = mean(diff(r\_peaks)) / fs; % QRS duration

% Sample code for classification

% Assuming 'features' is a matrix of extracted features

labels = classify(features, trained\_classifier); % Classify using trained classifier

% Sample code for performance evaluation

% Assuming 'true\_labels' are the ground truth labels

confusion\_matrix = confusionmat(true\_labels, labels);

accuracy = sum(diag(confusion\_matrix)) / sum(confusion\_matrix(:));

sensitivity = confusion\_matrix(1,1) / sum(confusion\_matrix(1,:));

specificity = confusion\_matrix(2,2) / sum(confusion\_matrix(2,:));