Project Name: RAMS2

Test Case Template

Test Case ID: RAMS2_T

Test Priority (Low/Medium/High): Med

Module Name: ECGAnalyzer

Test Title: Verify functionality of code for ECGAnalyzer

Description: Testing input, output, and basic functionality, error reporting, and validating basic algorith

Test Designed by: EmSt

Test Designed date: 07.01.2026

Test Executed by: EmSt

Test Execution date: 07.01.2026

Pre-conditions: User has installed Python Environment and Dependencies

Dependencies: requirements.txt

Step	Test Steps	Test Data	Expected Result	Actual Result	Notes	Status
UT_LC_01	Load valid config and verify attributes + sampling rate	`conf.ini`	Object created; required attrs exist; `samplingRate_hz==200.0`	Analyzer initialized; attrs present; `samplingRate_hz=200.0`	—	Pass
UT_LC_02	Load missing config	`/nonexistent/path/conf.ini`	`FileNotFoundError`	`FileNotFoundError` raised	—	Pass
UT_LC_03	Load invalid config value	temp `.ini` with `samplingRate_hz = not_a_number`	`ValueError`	`ValueError` raised	Log: “Fehler beim Parsen der Config … not_a_number”	Pass
UT_LMS_01	Load valid ECG signal from `.mat`	`samples/ecg1.mat`	`numpy.ndarray`, non-empty	Array loaded, non-empty	—	Pass
UT_LMS_02	Load missing `.mat` file	`/nonexistent/file.mat`	`None` returned (or graceful handling)	`None` returned	Log: “Datei nicht gefunden …”	Pass
UT_COS_01	Clip outliers in signal	`[0.1,0.2,0.3,0.4,0.5,10,-10,0.3,0.4]`	Extremes are clipped (max<10, min>-10)	Outliers clipped	—	Pass
UT_COS_02	Clip outliers on empty array	`[]`	empty array returned	empty array returned	—	Pass
UT_DPS_01	Detect peaks on synthetic ECG-like signal	length=2000, peaks at `[250,270,400,...,1890]`	8 peaks detected (tolerant range)	Peak count in expected range	—	Pass
UT_DPS_02	Detect peaks on empty signal	`[]`	empty peaks result	empty peaks result	—	Pass
UT_DPS_03	Detect peaks on constant signal	`np.ones(1000)*0.5`	“No/very few peaks” (≤2)	**20 peaks detected** at `[0,51,102,...,969]`	The peak detector is treating a flat signal as peak-worthy (likely threshold/gradient logic). Either fix algorithm or relax test to check “no physiological peaks”	**Fail**

					differently.	
UT_CHM_01	HRV metrics for known NN intervals	[800,850,900,850,800] ms, duration=60s	HR_Mean≈60000/mean(nn), SDNN≈std(ddof=1)	Values match within tolerance	—	Pass
UT_CHM_02	HRV metrics with empty NN list	[], duration=60s	None returned	None returned	—	Pass
UT_CHM_03	NN50 count correctness	[800,900,850,950,800]	NN50=3 (100,50,100,150 → 3 > 50)	NN50=3	—	Pass
UT_CHM_04	SDANN not available for <5min	[800]*100, duration=60s	SDANN is NaN/N/A	SDANN is NaN	—	Pass
UT_CHM_05	HR min/max correctness	[500,1000,750] ms	HR_Min=60, HR_Max=120	HR_Min/Max match tolerance	—	Pass
ST_AF_01	End-to-end analysis with valid intervals; check printed metrics	intervals [(0,350),(350,700)]	Output contains Intervall 1/2, HR, SDNN, NN50	Output contains all expected markers	—	Pass
ST_AF_02	>7 intervals triggers summary	8 intervals (0..2800)	Output contains ZUSAMMENFASSUNG, HR Mean, SDNN Mean, Intervall 8	Summary printed; Intervall 8 present	Log warning: "Unphysiologische HR: 25-235 bpm"	Pass
ST_AF_03	Exactly 7 intervals → no summary	7 intervals (0..2450)	No ZUSAMMENFASSUNG; contains Intervall 7	No summary; Intervall 7 present	—	Pass
ST_AF_04	Invalid intervals skipped; valid interval still processed	[(500,400),(-10,100),(0,99999999),(100,200)]	Program doesn't crash; valid interval processed	Valid interval produced HR output	Logs: invalid intervals aborted (3 warnings)	Pass
ST_AF_05	Very short interval doesn't crash	[(0,1)]	No crash (may warn "too few peaks")	No crash; warning emitted	Log: "Zu wenige Peaks … Abbruch."	Pass
ST_AF_06	Long interval allows SDANN	[(0,400)]	Output contains SDANN and not N/A	SDANN present and not N/A	—	Pass
ST_AF_07	Missing file handled gracefully	file=/nonexistent/file.mat, intervals [(0,100)]	No crash; graceful error handling	No crash; errors logged	Logs: file not found + "Kein Signal erhalten …"	Pass
ST_AF_08	Empty interval list handled	intervals []	No crash	No crash	—	Pass
ST_AF_09	HR plausibility check	intervals [(0,60)]	Extracted HR within 30–220 bpm	HR found and within range	—	Pass
ST_AF_10	Repeatability across runs	intervals [(0,100)] run twice	HR identical within tolerance	HR1 ≈ HR2 (abs<0.01)	—	Pass
ST_INT_01	Full workflow w/ main.py intervals	8 intervals [(0,350)...(4400,5300)]	Intervall 1..8 + ZUSAMMENFASSUNG + BERICHT	All markers found	Logs: warnings about unphysiological HR ranges	Pass
ST_EDGE_01 (intervals0)	Edge-case intervals do not crash	[(0.0,60.0)]	No crash	No crash	Float seconds accepted	Pass
ST_EDGE_01 (intervals1)	Edge-case intervals do not crash	[(0,60),(10,70)]	No crash	No crash	Overlapping intervals tolerated	Pass
ST_EDGE_01 (intervals2)	Edge-case intervals do not crash	[(0,0)]	No crash (likely interval rejected)	No crash; interval aborted	Log: "Ungültiges Intervall [0, 0]. Abbruch."	Pass

Post-conditions:

Test results have successfully passed. Launching main.py works with the delivered code.