

SCOPE OF WORK

VR-BASED STRESS DETECTION SIMULATOR

1. **Introduction.** This document defines the scope, requirements, deliverables, and acceptance tests for a Virtual Reality-based Stress Detection Simulator for Indian Army personnel. The simulator will present controlled immersive 360° video scenarios and record non-invasive physiological responses. The outcome will support screening and training by providing objective stress indicators that complement existing self-report processes. The system will recommend if a person is under stress or not.
2. **Aim.** To design, develop, and validate an on-prem, offline simulator that plays graded VR video scenarios and computes a stress indicator from defined sensor inputs and analysis methods, with complete documentation of scientific basis, thresholds, and repeatable procedures suited to Indian Army use.
3. **Definitions.**
 - 3.1. **Simulator.** It includes a VR video application, an operator console, sensors, a data layer, and reports.
 - 3.2. **Vendor.** Organisation contracted to make the Stress Detection Simulation as per this Scope of Work.
 - 3.3. **SME.** A psychiatrist or psychologist is engaged for protocol review and oversight.
 - 3.4. **Stress Indicator.** Composite derived from physiological signals within standardised measurement windows.
4. **Scope.**
 - 4.1. System design, development, integration, and delivery of the simulator with the operator console.
 - 4.2. Indigenous VR video content creation with SDD IP ownership, English and Hindi voiceover with subtitles.
 - 4.3. Integration of defined sensors and channels with time synchronisation and event markers.
 - 4.4. Computation of the stress indicator using the specified analysis methods.
 - 4.5. Pilot deployment and analysis on a representative cohort as acceptance evidence.
 - 4.6. Delivery of source code, project files, build scripts, and deployment images for on-prem installation.

- 4.7. Training, SOPs, maintenance documentation, one-year warranty, and priced AMC options for two additional years.
- 4.8. **Out of scope.** Cloud services, Clinical diagnosis or treatment.

General Instructions

5. All computation and storage shall be fully on-prem. No data shall leave SDD networks.
6. Vendor shall employ an SME psychiatrist or psychologist for protocol review, risk controls, and interpretation guidance.
7. Use open, documented data formats and interfaces. Core computation shall not be an opaque black box.
8. Substitutions to listed classes of hardware or software require prior written approval.
9. Security, safety, and data protection requirements of SDD shall be followed at all times.
10. User interface text shall be in plain English with an option for Hindi labels.
11. Accessibility and comfort: seated mode, adjustable IPD, prominent panic stop.

System Design Requirements

12. **Functional.**
 - 12.1. Playlist of scenarios with play, pause, stop, next, previous, and panic stop.
 - 12.2. Session flow with baseline, exposure, and recovery windows.
 - 12.3. Live sensor quality indicators.
 - 12.4. Compute and display scenario-wise and session-level stress indicators.
 - 12.5. One-page PDF report per session and anonymised CSV export.
 - 12.6. Role-based access with audit trail.
13. **Non-functional.**
 - 13.1. Offline operation with no Internet requirement.
 - 13.2. End-to-end time synchronisation error across channels at or below 50 ms.
 - 13.3. Data capture uptime per session at or above 95 percent.

- 13.4. Reproducible build instructions on SDD machines.
 - 13.5. Mean time to set up a participant at or below 10 minutes after training.
14. **VR Video Scenarios.**
 - 14.1. **Format.** 360° equirectangular video, seated viewing only, no user interaction.
 - 14.2. **Scenario Count.** 6 to 7 realistic situations across combat and non-combat contexts, graded by intensity.
 - 14.3. For each scenario, provide title, intent, duration, stop criteria, safety notes, and language assets.
 - 14.4. All raw project files and mastered assets shall be delivered. IP shall vest with SDD.
 - 14.5. Quality, performance and comfort requirements are defined in Appendix B and are binding for acceptance.
15. **Hardware and Sensors.**
 - 15.1. **Physiological Channels/ Sensors.** Heart Rate via PPG or ECG, Heart Rate Variability, Electrodermal Activity or Galvanic Skin Response, Respiration, and EEG. Optional Blood Oxygen and Blood Pressure, which will be part of the research.
 - 15.2. **VR Platform.** PC-VR or enterprise standalone HMD suitable for seated use.
 - 15.3. **Operator Workstation PC.** as per Appendix A.
 - 15.4. **Ancillary.** Sanitisation kit, Charging hub, Cables, Spares.

15.5 EEG and Other Sensors' Utility Determination. As part of Milestone 1, the vendor shall conduct an analysis of EEG and all other sensors' utility for this use case and submit a brief concluding whether these sensors materially improve the rule-based indicator.

15.6 Runtime use. Regardless of the conclusion in 15.5, the EEG and all other hardware remain a part of the supplied system. If a sensor is found to be non-useful, it may be **disabled in the live Stress Indicator** while remaining available for **data capture and export** for future R&D per 16.2.6.

Note. Detailed Golden Parameters and proofs are in Appendix A and are binding for acceptance.

16. **Software and Computation.**

16.1. Measurement Methods to Implement and Report.

- 16.1.1. HRV analysis: at minimum RMSSD and LF/HF ratio.
- 16.1.2. **EEG analysis.** Patterns such as an increase in beta and a decrease in alpha or theta, where applicable to stress exposure in video.
- 16.1.3. **EDA.** Tonic level and phasic skin conductance responses.
- 16.1.4. **Multimodal fusion.** Combine HR/HRV, EDA, respiration, and EEG for improved robustness.

16.2. Classifier Approach. **Stress Indicator method (Rule-based only).** The Stress Indicator shall be computed **exclusively by a transparent rule-based system** derived from peer-reviewed literature. **Machine learning is out of scope** for this contract.

16.2.1 Literature Review Dossier. The vendor shall submit a structured, peer-reviewed Literature Review Dossier mapping physiological parameters to stress responses (e.g., short-term HRV indices, EDA tonic/phasic measures, respiration rate/variability, optional EEG band powers). The dossier shall include search strategy, inclusion/exclusion criteria, and a synthesis matrix of effect directions and recommended ranges.

16.2.2 Rule Derivation Protocol. The vendor shall pre-declare the rule structure, thresholds, and combination logic (decision table and pseudocode), citing sources from 16.2.1. Any calibration ranges shall be declared up-front with numeric bounds and be recorded.

16.2.3 Calibration. Limited calibration of thresholds is permitted within the pre-declared bounds using a subset of pilot data; any revision outside bounds requires written approval under Para 25 and to be recorded with proper reasoning.

16.2.4 Implementation Artefacts. The vendor shall deliver the decision table, commented source code, and unit tests demonstrating correct rule execution across representative edge cases.

16.2.5 Validation and Repeatability. During the pilot test, the rule-based system shall meet the repeatability targets already specified in Para 20.2.3 and Appendix E, using a pre-registered analysis note that compares indicator stability across repeat sessions.

16.2.6 Data export for future enhancement. Although ML is out of scope now, the system shall have the ability to record and export **de-identified (anonymised)** raw signals, event markers, derived features, and the rule-based outputs to a **CSV/ Parquet** file.

- 16.3. **Operator Outputs.** Simple traffic-light status, scenario-wise values, session summary, one-page PDF, anonymised CSV export.
17. **Protocol and SOPs.**
- 17.1. Baseline seated 3 minutes, exposure 2 to 4 minutes per scenario, recovery 2 minutes or until stabilisation, session cap 40 minutes.
 - 17.2. **Exclusions.** History of epilepsy, severe vertigo, recent head injury, or as advised by medical authority.
 - 17.3. **Abort Rules.** Panic press, operator judgement, or adverse sign.
 - 17.4. Sanitisation SOP for headset and sensors.
 - 17.5. Two training rounds for operators, minimum half-day each.
18. **Data Governance.**
- 18.1. Participant information sheet and consent form.
 - 18.2. Anonymised export mode for research.
 - 18.3. Role-based access and audit trail.
 - 18.4. Adverse event log recorded with each session.
19. **Deliverables.**
- 19.1. System Requirements Specification and Design Document.
 - 19.2. Scene pack with storyboards, scripts, safety notes, raw and mastered assets.
 - 19.3. Sensor integration layer with APIs and time-sync tests.
 - 19.4. Operator Console and VR Video Player builds, installers, and source code.
 - 19.5. Data schema and export tools.
 - 19.6. SOP set: Operator, Maintenance, Sanitisation, Safety and Distress, Installation.
 - 19.7. Research Report with thresholds, repeatability, and limitations.
 - 19.8. Pilot Plan and Pilot Results Report.
 - 19.9. Training materials.
 - 19.10. Spares list and three-year AMC proposal.
 - 19.11. Vendor Compliance Matrix filled and signed (Appendix D).

- 19.12. Acceptance Test Pack completed and signed (Appendix E).
20. **Acceptance Criteria and Milestones.**
- 20.1. **Milestone 1: Research, Design Freeze, and Procurement.**
Milestone outputs are given below:-
- 20.1.1. Literature Review Dossier (Para 16.2.1).
 - 20.1.2. Rule Derivation Protocol with decision table and pseudocode (Para 16.2.2).
 - 20.1.3. Calibration bounds note (Para 16.2.3).
 - 20.1.4. Data schema freeze and export plan, including schema versioning.
 - 20.1.5. Procurement and delivery of all sensors and HMDs; basic bench integration and device QC.
 - 20.1.6. EEG and other sensors' Utility Note (Para 15.5).
 - 20.1.7. Implementation plan for Milestone 2 with test matrix aligned to Appendix E.
 - 20.1.8. **Acceptance.** Documents mentioned in para 20.1.1. to 20.1.7. approved; devices delivered and powered on with connectivity validated; sample data capture performed for all sensors and exported via the utility.
- 20.2. **Milestone 2: Implementation, Pilot, and Handover.**
Milestone outputs are given below:-
- 20.2.1. Complete rule-based implementation with unit tests (**Para 16.2.4**).
 - 20.2.2. Scenario set integrated; performance and comfort targets met as already specified in Appendix B.
 - 20.2.3. Pilot execution, validation, and **Repeatability** results as per Para 16.2.5 and Appendix E.
 - 20.2.4. Operator SOPs, training, and golden image (master, restorable system image); export utility delivered and demonstrated.
 - 20.2.5. Full source code and documentation, bills of materials, licences, and warranty/AMC onboarding.

20.2.6. **Acceptance.** All outputs in para 20.2.1. to 20.2.5. accepted against Appendix E; final demonstration shows end-to-end capture, rule execution, reporting, and export on the SDD network.

21. **Intellectual Property and Licensing.** All IP created, including source code, content, datasets, and build pipelines, shall belong to SDD. Vendor shall deliver full source with build instructions, and grant SDD perpetual, irrevocable rights to use, modify, and extend. No third-party licence shall restrict offline use by SDD.

22. **Warranty, Support, and AMC.**

22.1. One-year comprehensive warranty from Final Acceptance.

22.2. Response within two working days for defects, with temporary workarounds where needed.

22.3. Priced AMC options for Years 2 and 3, including sensor consumables and spares.

23. **Quality Assurance and Configuration Management.**

23.1. Version control for all code and content.

23.2. Configuration management for thresholds, scenario versions, and player versions.

23.3. Test records maintained and provided at handover.

24. **Compliance and Standards.**

24.1. Safety, ergonomic, and electrical standards applicable to supplied equipment.

24.2. Data handling in line with SDD policies.

25. **Change Control.** Any change to scope, milestones, or key components shall follow a written change note approved by SDD before implementation.

APPENDIX A: HARDWARE DETAILS WITH TECHNICAL SPECIFICATIONS

A1. Operator Workstation PC

Purpose: Run VR video at native HMD refresh with concurrent sensor capture and recording.

Minimum Parameters

Parameter	Minimum Requirement / Goal	Examples / Notes
CPU	8 physical cores or more; base 3.4 GHz or higher; AVX2 support	Examples: Intel Core i7-13700 or higher; AMD Ryzen 7 7700 or higher.
GPU (discrete, desktop)	VRAM \geq 12 GB GDDR6/GDDR6X; Memory bus \geq 192-bit; Memory bandwidth \geq 400 GB/s; 3DMark Time Spy Graphics Score \geq 13,000	Examples: NVIDIA GeForce RTX 4070 or higher; AMD Radeon RX 7800 XT or higher.
RAM	32 GB DDR4-3200 or DDR5-4800 (or higher), 2 \times 16 GB dual-channel; expandable to 64 GB	
Storage	NVMe SSD 1 TB or higher; PCIe Gen 3 \times 4 or Gen 4 \times 4; sequential read \geq 3,000 MB/s; write \geq 2,500 MB/s	
Motherboard	TPM 2.0; \geq 2 \times M.2 NVMe; 4 \times DIMM; one spare PCIe slot	
Ports	\geq 6 \times USB-A (min 2 \times USB 3.2 Gen1); \geq 1 \times USB-C; DisplayPort/HDMI per HMD; 1 \times RJ-45 Gigabit Ethernet	
Networking	1 Gbps Ethernet mandatory	
PSU	750 W 80+ Gold or higher; BIS certified	
Chassis & cooling	Mid-tower with adequate airflow; CPU cooler sized for 125 W or higher TDP	

OS	Windows 11 Pro 64-bit with digital licence	
Security	Full-disk encryption capable; BIOS/UEFI password; Secure Boot enabled at handover	
Warranty	3 years onsite from OEM or OEM-authorised service partner	

Decode and Throughput Proofs

Parameter	Minimum Requirement / Goal	Examples / Notes
Hardware decode	Support HEVC Main10 hardware decoding for 8K 60 fps monoscopic streams and the chosen stereoscopic profile (if offered)	
Throughput proof	Sustain 8K 360 HEVC Main10 \geq 80 Mbps with 0 decoder drops and \geq 90 FPS in HMD for a continuous 10-minute run	
Storage streaming	NVMe must support smooth playback without buffer underruns; provide 10-minute telemetry capture	

Acceptance Benchmarks and Proofs

Parameter	Minimum Requirement / Goal	Examples / Notes
VR playlist performance	HMD native resolution at \geq 90 Hz while sensor capture and recording are active	Supplier demo playlist
3DMark proof	Time Spy Graphics Score \geq 13,000	Submit result file with machine serial number
System reports	Provide DxDiag report and component list with exact make and model	

A2. VR Headset

Parameter	Minimum Requirement / Goal	Examples / Notes
Tracking	6DoF seated mode supported; guardian or equivalent safety boundary	
Per-eye resolution	$\geq 1,920 \times 1,920$	
Refresh rate	≥ 90 Hz	
Comfort	Adjustable IPD; replaceable, wipeable face interface; balanced strap	
Passthrough	Mono or colour for safety	
Hygiene	Two spare face interfaces per headset; sanitisation kit included	
Enterprise features (preferred)	Device management and offline operation	
Cables	If PC-VR, include certified cable for Link or DisplayPort as applicable	
Warranty	2 years or more, with one replacement face interface set per unit	

A3. Heart Rate and HRV

Parameter	Minimum Requirement / Goal	Examples / Notes
Option A (ECG)	Sampling rate \geq 250 Hz; resolution \geq 12-bit; BLE or USB with timestamps; contact quality flag	Chest strap or recorder
Option B (PPG)	Sampling rate \geq 100 Hz; motion artefact flags; BLE or USB with timestamps	
Derived metrics	HR and short-term HRV (RMSSD and LF/HF) computed in software	
Goal	Valid HRV windows \geq 60 seconds in baseline and exposure; artefact rate \leq 5 percent	

A4. Electrodermal Activity

Parameter	Minimum Requirement / Goal	Examples / Notes
Range	0.05 μ S to 100 μ S or wider	
Resolution	\leq 0.01 μ S	
Sampling	\geq 4 Hz	
Mounting	Finger or palm electrodes with motion or contact quality indicator	
Goal	Detect phasic SCR at \geq 80 percent of marked scenario onsets in group aggregate during pilot	

A5. Respiration Belt

Parameter	Minimum Requirement / Goal	Examples / Notes
Sampling	≥ 25 Hz	
Signal & fit	Relative expansion waveform suitable for rate estimation; adjustable strap	
Goal	Continuous respiration trace with dropout ≤ 5 percent per scenario	

A6. EEG Headset

Parameter	Minimum Requirement / Goal	Examples / Notes
Channels	4 to 14	
Sampling	≥ 250 Hz	
Electrodes	Dry or wet; contact quality indicator	
Use	Non-diagnostic research use	
Goal	Stable alpha and beta estimation across baseline and exposure with good contact for ≥ 90 percent of session time	

A7. Blood Pressure Cuff (Optional)

Parameter	Minimum Requirement / Goal	Examples / Notes
Type	Upper-arm oscillometric	
Compliance	ISO 81060-2 or equivalent validation	
Recording	Readings at baseline and recovery recorded with timestamps in the session record	

A8. Pulse Oximeter (Optional)

Parameter	Minimum Requirement / Goal	Examples / Notes
Compliance	ISO 80601-2-61 compliant or equivalent	
Accuracy	± 2 percent in 70 to 100 percent range	
Recording	Reading recorded with a timestamp	

A9. Time Synchronisation and I/O

Parameter	Minimum Requirement / Goal	Examples / Notes
Timebase	Common monotonic clock; event markers for baseline, exposure start, exposure end, recovery	
Drift	Cross-channel alignment drift ≤ 50 ms per hour after alignment	
Connectivity	BLE 5.0 and USB 2.0 or higher, or wired interfaces as applicable	

A10. Power, Furniture, Spares

Parameter	Minimum Requirement / Goal	Examples / Notes
UPS	1.5 kVA or higher for PC, HMD base, and sensor chargers; 15 minutes backup	
Furniture	Operator desk and stable, height-adjustable chair with armrests	
Hygiene kit	Disinfectant wipes; spare face interfaces; sensor cleaning supplies	
Spares and consumables	One full spare set of electrodes or straps per sensor kit; one spare cable and charger per type; two spare rechargeable batteries per device where applicable	

APPENDIX B: VR VIDEO OUTPUT AND COMFORT ACCEPTANCE (VIDEO-ONLY)

B1. Output Format and Deliverables.

Parameter	Requirement	Notes
Format	360° equirectangular video; seated viewing only	
Monoscopic baseline	7,680 × 3,840 at 60 fps	
Stereoscopic (optional)	7,680 × 7,680 over-under at 60 fps	
Codec	HEVC Main10 (H.265 10-bit)	AV1 permitted if hardware-decoded on delivered GPU
Bitrate	80–120 Mbps per 8K mono stream	Proportionally higher for stereo
Audio	Ambisonic first-order or spatial stereo	No sustained peaks above 85 dB
Masters	ProRes 422 HQ or DNxHR HQX at native resolution and 60 fps	Plus distribution encodes
Proof files	Provide MD5 checksum and MediaInfo report for each clip	

B2. Runtime Performance Thresholds on the Delivered System

Metric	Limit	Notes
Native refresh	Maintain HMD native refresh throughout playback	For 90 Hz HMDs, ≥ 90 FPS
Frame pacing (GPU)	Frame time ≤ 11.1 ms at 90 Hz	
Frame pacing (CPU)	Frame time ≤ 6 ms	
Dropped frames	$\leq 0.5\%$ per scene; no runs > 3 consecutive drops	
Reprojection	$\leq 3\%$ per scene	
A/V sync drift	< 30 ms over any 10-minute segment	
Jitter	Frame-to-frame variance ≤ 3 ms sustained	Auto-flag if exceeded > 2 s
Loading	Fade-to-black transitions only, 300–600 ms	No hitches during head movement

B3. Motion Envelope Limits for Rendered Content

Motion Limits (output-level)

Aspect	Limit	Notes
Angular velocity (yaw/pitch)	95th percentile $\leq 20^{\circ}/\text{s}$; 99th percentile $\leq 45^{\circ}/\text{s}$	
Translational motion	3-second moving average $\leq 1 \text{ m/s}$ (if present)	
FOV zoom / flicker	No FOV zoom within a shot; no rapid strobing/flicker in 3–70 Hz band	

Evidence

Item	Requirement	Notes
Evidence required	Motion Metrics JSON per clip sampled at 60 Hz (yaw, pitch, roll rates; linear speed)	SDD may validate via optical-flow analysis

B4. Comfort Validation

Validation Methods

Method	Description	Notes
Preferred QA method	Short Simulator Sickness Questionnaire pre and post session	Results not stored with personal identifiers
Fallback method	Operator log counts: unscheduled breaks, visible distress, early aborts	

Pass Criteria

Criterion	Threshold	Notes
Completion rate	$\geq 90\%$ across pilot participants	
Comfort threshold (SSQ-S path)	Median SSQ-S $\Delta \leq 10$ points; $\leq 10\%$ participants > 20 points	
Comfort threshold (fallback path)	Unscheduled breaks \leq 10% sessions; early aborts $\leq 5\%$ sessions	

Medical incidents	Zero incidents requiring medical attention	
Performance linkage	All performance thresholds in B2 met	

B5. Player Instrumentation and Logs

Telemetry and Reporting

Item	Content	Notes
On-screen indicators	FPS; dropped frames; reprojection %; A/V sync estimate	
Per-scene CSV log	Timestamp; FPS; GPU/CPU frame time; dropped frames; reprojection; buffer underruns; A/V sync drift; panic presses; breaks; aborts	
Per-session PDF	Playlist with durations; pass/fail against thresholds; operator notes	

B6. Acceptance Test Procedure

Procedure

Step	Action	Evidence/Output
1	Verify masters and distribution encodes	Checksums and MediaInfo reports
2	Play each clip end-to-end in HMD while recording telemetry	Per-scene CSV logs captured
3	Confirm thresholds in B2 and B4 are met	Performance + comfort pass
4	Validate Motion Metrics JSON against B3 limits	Review JSON + optional optical-flow check
5	Generate Acceptance Pack	Per-scene CSV + per-session PDF submitted

APPENDIX C: DATA SCHEMA, LOGS AND REPORTS MINIMUM

C1. Raw signal files

Raw Signal File Requirements

Field	Requirement	Notes
Format	CSV or Parquet	
Headers	participant_code; session_code; scenario_code; start_time; sampling_rates; units; quality_flags	Exact field names may be extended if documented
Channels	ECG or PPG; EDA; respiration; EEG; event_markers	At a minimum, these channels are required

C2. Derived metrics

Derived Metrics Set

Metric	Description / Calculation	Notes
Heart rate (HR)	Per-window average and series as applicable	
HRV (RMSSD)	Short-term HRV: RMSSD	
HRV (LF/HF)	Frequency-domain LF/HF ratio	
EDA tonic	Skin conductance level	
EDA phasic count	Number of SCR events per window	
Respiration rate	Breaths per minute	
EEG band powers (if used)	Alpha, beta, and other bands as defined	Include only if EEG used

C3. Session report (PDF)

Session Report Contents

Section	Content	Notes
Participant details	Participant code, date and time, and exclusions noted	
Windows	Scenario list with baseline, exposure, and recovery windows	
Outputs	Traffic-light outputs per scenario and overall	
Operator notes	Remarks and adverse events section	

C4. Telemetry logs

Telemetry and Reporting

Item	Content	Notes
Per-scene CSV	As defined in Appendix B: timestamp; FPS; GPU/CPU frame time; dropped frames; reprojection; buffer underruns; A/V sync drift; panic presses; breaks; aborts	
Per-session PDF	Playlist with durations; pass/fail summary against thresholds; operator notes	

APPENDIX D: VENDOR COMPLIANCE MATRIX TEMPLATE

Complete and attach with bid. Tick each item and provide evidence link or file name.

Section	Requirement	Meets	Exceeds	Evidence file or link	Notes
A1	CPU \geq 8 cores, \geq 3.4 GHz, AVX2	<input type="checkbox"/>	<input type="checkbox"/>		
A1	GPU VRAM \geq 12 GB, bus \geq 192-bit, bandwidth \geq 400 GB/s	<input type="checkbox"/>	<input type="checkbox"/>		
A1	3DMark Time Spy Graphics \geq 13,000	<input type="checkbox"/>	<input type="checkbox"/>		
A1	NVMe \geq 1 TB, \geq 3,000 MB/s read	<input type="checkbox"/>	<input type="checkbox"/>		
A1	Hardware HEVC Main10 decode 8K60 proof	<input type="checkbox"/>	<input type="checkbox"/>		
A2	HMD per-eye \geq 1,920 \times 1,920, \geq 90 Hz	<input type="checkbox"/>	<input type="checkbox"/>		
A3	ECG or PPG specs met, quality flags	<input type="checkbox"/>	<input type="checkbox"/>		
A4	EDA range, sampling, quality flags	<input type="checkbox"/>	<input type="checkbox"/>		
A5	Respiration belt sampling \geq 25 Hz	<input type="checkbox"/>	<input type="checkbox"/>		
A6	EEG 4–14 ch, \geq 250 Hz	<input type="checkbox"/>	<input type="checkbox"/>		
B1	360 video masters and	<input type="checkbox"/>	<input type="checkbox"/>		

	distribution encodes				
B2	HMD native refresh maintained, FPS logs	<input type="checkbox"/>	<input type="checkbox"/>		
B2	Dropped frames \leq 0.5%, reprojection \leq 3%	<input type="checkbox"/>	<input type="checkbox"/>		
B2	A/V sync drift < 30 ms	<input type="checkbox"/>	<input type="checkbox"/>		
B3	Motion Metrics JSON within limits	<input type="checkbox"/>	<input type="checkbox"/>		
B4	Comfort validation method and pass stats	<input type="checkbox"/>	<input type="checkbox"/>		
C	Data schema, reports, and telemetry logs	<input type="checkbox"/>	<input type="checkbox"/>		
Para 19	Complete deliverables set	<input type="checkbox"/>	<input type="checkbox"/>		
Para 22	Warranty and AMC terms	<input type="checkbox"/>	<input type="checkbox"/>		

APPENDIX E: ACCEPTANCE TEST CHECKLIST AND FORMS

Use this matrix at delivery. Record pass or fail for each line. Attach evidence files. Complete one pack per delivered system.

E1. Hardware and OS

Item	Method	Evidence	Pass	Remarks
PC make and model list	Visual inspection and DxDiag	DxDiag, photos	<input type="checkbox"/>	
CPU cores and base clock	System info	Screenshot	<input type="checkbox"/>	
GPU make, VRAM, bus width, bandwidth	GPU-Z or equivalent	Screenshot	<input type="checkbox"/>	
3DMark Time Spy Graphics $\geq 13,000$	Run test	Result file	<input type="checkbox"/>	
NVMe size and speed	CrystalDiskMark	Result file	<input type="checkbox"/>	
HEVC Main10 8K60 hardware decode	10-min test stream	Telemetry log	<input type="checkbox"/>	
Ports and PSU rating	Visual inspection	Photos	<input type="checkbox"/>	
OS licence and updates	Settings	Screenshot	<input type="checkbox"/>	
Secure boot and encryption	Settings	Screenshot	<input type="checkbox"/>	

E2. HMD and accessories

Item	Method	Evidence	Pass	Remarks
Per-eye resolution and refresh	Device info	Screenshot	<input type="checkbox"/>	
Seated guardian setup	Functional check	Photo	<input type="checkbox"/>	
Spare face interfaces and hygiene kit	Count	Photo	<input type="checkbox"/>	

E3. Sensors

Channel	Spec to verify	Method	Evidence	Pass	Remarks
ECG or PPG	Sampling rates, quality flags	Live capture	Screenshot, CSV	<input type="checkbox"/>	
EDA	Range, sampling, quality flag	Live capture	Screenshot, CSV	<input type="checkbox"/>	
Respiration	Sampling rate	Live capture	Screenshot, CSV	<input type="checkbox"/>	
EEG	Channels, sampling, contact quality	Live capture	Screenshot, CSV	<input type="checkbox"/>	
BP (opt)	ISO validation, records	Device docs, app log	Photo, PDF	<input type="checkbox"/>	
SpO ₂ (opt)	ISO validation, records	Device docs, app log	Photo, PDF	<input type="checkbox"/>	

E4. Software build and player

Item	Method	Evidence	Pass	Remarks
Installer integrity	Hash check	Hashes	<input type="checkbox"/>	
Version control tag	About screen	Screenshot	<input type="checkbox"/>	
Role-based access and audit log	Functional test	Screens	<input type="checkbox"/>	
Panic stop on HMD and console	Functional test	Video	<input type="checkbox"/>	

E5. VR video performance and comfort (per scene)

Scene code	Duration	FPS ≥ native	Dropped frames ≤ 0.5%	Reprojection ≤ 3%	A/V drift < 30 ms	Motion JSON limits	Pass	Remarks
		<input type="checkbox"/>						
		<input type="checkbox"/>						
		<input type="checkbox"/>						
		<input type="checkbox"/>						
		<input type="checkbox"/>						
		<input type="checkbox"/>						

Session-level comfort result

Method used: SSQ-S Operator log

Completion rate ≥ 90 percent:

SSQ-S median delta ≤ 10 and ≤ 10 percent above 20, or breaks ≤ 10 percent and early aborts ≤ 5 percent:

Medical incidents: Zero required:

E6. Data, logs, and reports

Item	Method	Evidence	Pass	Remarks
Raw signal files present with headers	Inspect files	Samples	<input type="checkbox"/>	
Derived metrics present	Inspect files	Samples	<input type="checkbox"/>	
Telemetry CSV per scene	Inspect files	Files	<input type="checkbox"/>	
Session PDF summary	Generate	PDFs	<input type="checkbox"/>	
Data export CSV anonymised	Generate	CSV	<input type="checkbox"/>	

E7. Documentation and training

Item	Method	Evidence	Pass	Remarks
SRS and Design Document	Review	PDFs	<input type="checkbox"/>	
SOPs: Operator, Maintenance, Sanitisation, Safety and Distress, Installation	Review	PDFs	<input type="checkbox"/>	
Research Report with thresholds and repeatability	Review	PDF	<input type="checkbox"/>	
Training materials delivered	Review	Slides	<input type="checkbox"/>	
Two operator training rounds completed	Attendance	Sign-in sheets	<input type="checkbox"/>	

E8. Warranty and AMC

Item	Method	Evidence	Pass	Remarks
One-year comprehensive warranty	Verify letter	OEM letter	<input type="checkbox"/>	
AMC options for Years 2 and 3	Verify quote	PDF	<input type="checkbox"/>	

Acceptance Test Pack completion

All checklists signed:

Evidence bundle attached:

Variations and waivers recorded:

Final recommendation: Accept Withhold