NATIONAL HACKATHON

AI-Powered Battery Fitness Assessment Application

Digitising India's 10 Battery Fitness Assessment Tests

Concept Note & Participant Guide

Organised by the National e-Governance Division (NeGD),
Ministry of Electronics and Information Technology (MeitY),
in partnership with the Ministry of Youth Affairs and Sports (MYAS).

Project: Unified Digital Sports Ecosystem

Document Information

Field	Detail
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Public document. This Concept Note is issued as an open call for the National Hackathon on AI-Powered Battery Fitness Assessment. It may be freely circulated to all prospective participants and the general public. It contains everything a team needs to understand the problem, build a solution and prepare a submission. Please read it in full before you begin.

Table of Contents

1. Overview & Context

This initiative sets out to develop an AI-assisted Battery Test Application that digitises India's 10 Battery Fitness Assessment Tests using mobile technology and AI video analytics. The goal is to replace a manual, resource-intensive process with an intelligent, scalable and practically deployable tool that works at the grassroots.

The intended users of the app are primarily:

- **School-level stakeholders** for grassroots talent identification (PE teachers and students) will be used by more than 1 lakh schools.
- **Talent Identification & Development Committee (TIDC) and Talent Identification Zonal Committee (TIZC) members** conducting initial battery assessment tests at district, state and regional levels.
- **Coaches** when assessments are conducted in Akhaadas, STCs, NCOEs or any other sports facilities.
- **Any other authorised personnel** wherever common assessment tests are required for talent identification, selection or performance monitoring.

This ensures the app serves as a practical tool across the entire athlete development pipeline — from grassroots school-level screening to structured TIDC/TIZC evaluations and ongoing coaching use.

The app must serve two primary use cases:

- **Individual athletes** who record training videos to receive automated fitness measurements and AI-powered feedback.
- **Coaches / TIDC/TIZC Committee** administering structured assessments in schools and sports facilities — able to record and store test data on the app without additional equipment.

Currently, the 10 Battery Fitness Assessment Tests are conducted and recorded entirely manually, making the system resource-intensive, inconsistent and difficult to scale. The Battery Test App must be practical for grassroots deployment across India's districts, including rural areas with limited infrastructure, and must function reliably on basic Android smartphones.

> **Who really uses this:** Most users will be PE teachers in schools, not tech-savvy specialists. The app must be simple enough for someone with basic smartphone skills to operate, in Hindi and English at a minimum.

2. The 10 Battery Fitness Assessment Tests - Annexure Handbook

These are the 10 tests your app must cover. Every test has a specific physical quality it measures, a standard protocol, and a target measurement accuracy. The accuracy targets are the production goals for a fully validated system; see Section 12 for what is realistically expected within the hackathon.

No.	Test	What It Measures	How It Works	Accuracy Target
1	Height	Body height	Standing height, feet to the top of the head. No stadiometer available in field settings.	Within ±1 cm
2	Weight	Body mass	Weight from a scale; app auto-calculates BMI using age and gender.	Correct entry with OCR assist
3	Flexibility (Sit & Reach)	Hip and trunk flexibility	Seated forward reach, legs extended. Best of multiple attempts.	Within ±2 cm
4	Vertical Jump	Explosive	Standing vertical jump. Detect take-off	Within ±2 cm

No.	Test	What It Measures	How It Works	Accuracy Target
		power	and landing, compute height. Best of multiple attempts.	
5	Broad Jump	Explosive strength	Standing horizontal jump. Measure from take-off line to rear heel landing. Best of multiple attempts.	Within ±2 cm
6	Medicine Ball Throw	Upper body strength	Backward overhead throw. Measure from release to first landing. 1 kg for under-12 and girls; 2 kg for boys over 12. Best of 2 attempts.	Within ±5 cm
7	30m Sprint	Speed	Standing start, 30 m sprint. Automatic start and finish detection. Best of 2 attempts.	Within ±1 second
8	4×10m Shuttle Run	Agility	Four-leg shuttle (10 m each). Detect turns and compute total time and per-leg splits.	Within ±5 seconds
9	Sit-Ups	Abdominal strength	Count valid reps in 30 s (under-12) or 45 s (12+). Distinguish valid from incomplete reps.	Counting accuracy ≥95%
10	Endurance Run	Endurance	800 m for under-12; 1.6 km for 12+. Auto-start, auto-finish, record completion time.	Within ±10 seconds

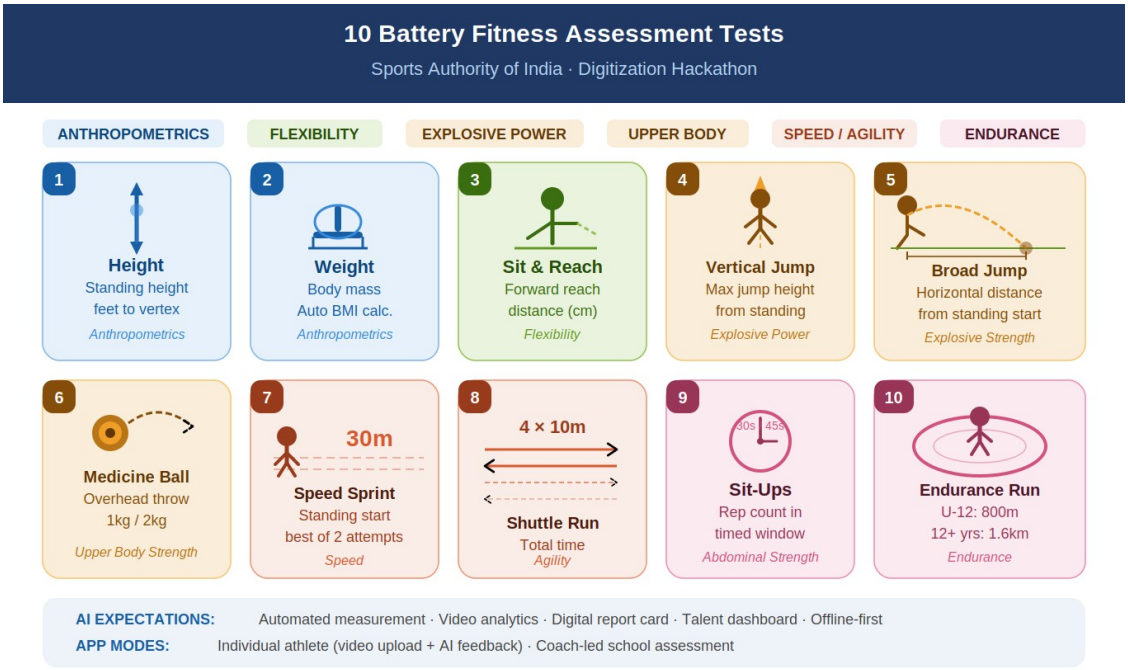

Figure 1 — The 10 Battery Fitness Assessment Tests

For the full test procedures — equipment, setup, starting positions, number of attempts and scoring participants should refer to the **Technical Handbook**, provided at the end of the document in **Annexure A**.

3. What Makes Each Test Hard

Not all tests are equally difficult from an AI standpoint. Some can use existing technology; others require approaches that have never been built for Indian conditions. Understanding this will help teams allocate their time.

Test	Difficulty	Why
Weight	Low	Manual entry with optional OCR of the scale display. Straightforward.
Sit-Ups	Medium	Joint-angle state machine for rep counting is a known approach. Challenge: distinguishing valid from invalid reps with loose clothing and a side-angle camera.
Endurance Run	High	GPS plus phone sensors for distance and time. Challenge: consumer GPS has 5–15 metre error per lap on Indian terrain.
Height	Medium-High	A phone camera sees a flat 2D image, not 3D. Without a known-size reference object in the frame, the AI cannot convert pixels to centimetres. Achieving ±1 cm requires a calibration reference.
Vertical Jump	Medium-High	Flight-time method is sound, but accuracy depends on frame rate. At 30 fps (budget phones), a one-frame error shifts the result by 2–4 cm.
Broad Jump	Medium-High	Needs ground-plane calibration to convert pixels to distance. Outdoor field surfaces (dust, uneven ground) make this harder than a lab setup.
30m Sprint	High	Consumer GPS cannot reliably time 30 metres. Video-based line-crossing is the viable approach but needs a fixed camera, stable framing and good frame rate.
Shuttle Run	High	Detecting direction reversals in a cluttered outdoor environment, with multiple students nearby, is challenging. Touch detection at the turn line is hard to verify from video.
Flexibility	High	Measuring fingertip reach distance from a side-angle camera with loose clothing is hard. Seated body proportions vary across age groups.
Medicine Ball Throw	Very High	Requires detecting and tracking a specific ball from release to landing. No off-the-shelf AI model does this; custom training data that does not yet exist would be needed.

4. Objective

The objective is to design and build a Battery Fitness Assessment Test App covering all 10 Battery Fitness Tests. Participants are free to propose any technology architecture, AI methodology or hardware approach that best achieves the goals set out in this document. The app does not prescribe specific tools — it seeks innovative, scalable and practically deployable solutions.

5. Per-Test Expectations

For each of the 10 tests, participants must propose and build solutions that automate measurement, reduce assessor dependency and generate reliable digital records.

5.1 Height

Accurately measure standing height using a mobile device in a field setting, without reliance on a stadiometer. The solution must display a confidence indicator, allow re-measurement, and auto-calculate BMI when weight data is available.

5.2 Weight

Provide seamless weight-data capture that supports manual entry as a baseline (with optional OCR of a scale display) and reduces entry errors. Auto-calculation of BMI using age- and gender-appropriate categories is expected.

5.3 Flexibility (Sit & Reach)

Measure forward reach distance using a mobile device, automatically identifying the best attempt across multiple trials without requiring manual entry by the assessor.

5.4 Standing Vertical Jump

Measure maximum vertical jump height using a mobile device without specialised lab equipment. The system must detect take-off and landing events, compute jump height, and auto-select the best of multiple attempts.

5.5 Standing Broad Jump

Provide a contactless method to measure horizontal jump distance using a mobile device. The system must handle multiple attempts, identify the best result, and minimise assessor intervention.

5.6 Medicine Ball Throw (Backward Overhead)

Measure throw distance from release to first landing using mobile technology. Must support the standard protocol (1 kg for girls and boys under 12 years; 2 kg for boys above 12 years), capture the best of two attempts, and record results digitally.

5.7 Speed (30m Standing Start)

Eliminate assessor reaction-time error inherent in manual stopwatch timing. The system must automatically detect start and finish over 30 m — whether through video analytics, GPS, sensor-based triggers or other approaches. Best of two attempts captured.

5.8 Agility (4×10m Shuttle Run)

Automatically detect shuttle-run turns and compute total time and individual leg splits without assessor tapping, working reliably in both outdoor and indoor settings.

5.9 Sit-Ups

Automatically count valid sit-up repetitions within a timed window (30 or 45 seconds per age-group protocol), distinguishing valid reps from incomplete movements and recording the final count when the timer expires.

5.10 Endurance Run (800m for U-12 · 1.6km for 12+ years)

Propose a solution for automated distance tracking and time recording. Carrying a mobile device might not be possible for the athlete. We must make sure to handle this use case. The system must handle auto-start and finish detection, support the age-appropriate distance variation, and record completion time without assessor intervention once the run begins.

6. What You Need to Build

6.1 The Core App

- **A single application** that guides a user through all 10 Battery Fitness Assessment Tests. These tests should be AI Powered and Video Analysis should be performed on each of these tests for assessment.
- **Two modes:** (a) *Individual Mode*, where an athlete records and uploads videos of themselves for personal feedback; and (b) *Coach / Assessor Mode*, where a coach registers a batch of athletes and assesses them. **Coach Mode must support two sequencing options**: selectable by the assessor at the start of a session: **athlete-wise**, where each athlete completes all applicable tests before the next athlete begins; and **test-**

wise (station-based), where the assessor picks one test and runs the whole roster through it one by one, then moves to the next test. The app must produce identical, correctly indexed results regardless of which sequence is used.

- **Each test must have** clear protocol instructions (what to do, how to stand, how many attempts), in-app capture guidance (where to place the camera, what angle, how far away), and AI-powered measurement that produces a result without the coach having to type a number.
- **Fully offline operation.** A coach in a village with no internet signal must be able to register athletes, record all 10 tests, see results and generate a report card — all without connectivity. When the phone later connects, data syncs automatically.
- **A digital report card** generated on the device after the battery is complete, showing raw scores for all 10 tests in a clean layout, exportable as a PDF, in Hindi and English at a minimum.

6.2 AI-Powered Measurement

- **On-device AI:** The AI must run on the phone itself, not on a cloud server. Open-source models may be used or participants can create their own model.
- **For each AI-measured test, show:** (a) how the model detects the relevant action (take-off, landing, rep completion, line crossing); (b) how it converts the detection into a measurement (centimetres, seconds, count); and (c) a confidence indicator showing how reliable the measurement is.
- **Calibration reference.** For distance tests (height, jump, throw), consider using a printed marker of known size placed in the camera frame to convert pixels to real-world centimetres.

6.3 Video Recording and Storage

- **One video per test.** For a single athlete, only one video per test should be recorded. (Re-take can be there but for each athlete only 10 battery test videos should be uploaded).
- **Continuous, unedited single take** from an appropriate angle that clearly captures the full performance. Each video should be detected by the model itself whether the uploaded is uncut or edited or not.
- **Metadata tagging:** every video must be automatically tagged with the test name, athlete ID, timestamp and GPS location.
- **Minimum quality:** 720p resolution, 30fps, MP4 format. The app should reject videos below this threshold or exceeding the per-test duration and size limits specified in Section 7.3.1 below.
- **Encrypted local storage:** videos and results stored securely on the device, with no data loss on app crash, supporting at least 500 athlete sessions locally. Once the videos are synced to the cloud, there should be option with the user to delete videos from the local storage to save space.
- **Authenticity declaration:** submissions should carry a digitally signed declaration from the athlete and coach confirming the video is authentic and original.

6.3.1 Per-Test Video and Photo Duration & Size Limits

Baseline assumptions: 720p resolution, 30 fps, MP4 (H.264), standard compression — roughly 4–5 MB per minute of video. Weight is captured as a single photo rather than a video. The limits below let the app automatically reject non-compliant footage (too short to contain a valid attempt) and keep storage under control (the full 10-test battery generates roughly 500 MB per athlete, up to about 1 GB at higher quality).

No.	Test	Min Duration	Max Duration	Min Size	Max Size	Rationale

1	Height	10 sec	30 sec	2 MB	15 MB	Stand still, single measurement; very short capture. Allow re-measurement within the same clip.
2	Weight	—	—	100 KB	1 MB	Single photo, not a video (manual entry with optional OCR of the scale display).
3	Flexibility (Sit & Reach)	10 sec	30 sec	2 MB	15 MB	Best of multiple trials; each attempt 5–10 sec, plus setup and verbal announcement.
4	Vertical Jump	15 sec	30 sec	3 MB	15 MB	Best of multiple attempts; each jump 3–5 sec plus reset. Typically 2–3 attempts.
5	Broad Jump	15 sec	30 sec	3 MB	15 MB	Multiple attempts with reset; camera must capture both take-off line and landing zone.
6	Medicine Ball Throw	15 sec	30 sec	3 MB	15 MB	Best of 2 attempts; each throw 5–10 sec plus walk to retrieve the ball and reset.
7	30m Sprint	10 sec	45 sec	2 MB	25 MB	Best of 2 attempts; each sprint 4–7 sec, walk-back between. Stationary camera covering the full 30 m.
8	4×10m Shuttle Run	15 sec	60 sec	3 MB	30 MB	Single attempt 10–15 sec for four legs; setup, announcement and wind-down add buffer.
9	Sit-Ups	30 sec	60 sec	5 MB	30 MB	Timed window 30 sec (U-12) or 45 sec (12+), plus countdown and stop buffer; the timer sets the floor.
10	Endurance Run	2 min	15 min	20 MB	200 MB	800 m U-12 (3–5 min) / 1.6 km 12+ (6–12 min). Longest test and the largest storage driver per athlete.

Enforcement rules:

- **Reject below the minimum, at the point of capture.** The app must block any video shorter than the per-test minimum as soon as it is recorded, with a clear message explaining why — for example: “This video is too short to contain a valid sit-up test; the test requires at least 30 seconds of recording.”
- **Warn, then auto-stop at the maximum.** The app should warn as recording approaches the maximum duration and automatically stop at the limit with a notification, rather than silently truncating the attempt.

Duration is the hard limit; size has tolerance. Enforce the duration limit strictly. Apply the size limit with a 50% tolerance so that teams capturing at higher quality (1080p or 120 fps) for better AI accuracy are not penalised for larger files — relative to the 720p/30fps baseline, 1080p/30fps roughly doubles file size and 720p/120fps roughly quadruples it.

Note: Uploading activity should be done in the background so that the user can perform the next activity without any delay

6.4 Platform Integration Capabilities

The platform is designed for robust two-way integration with other relevant sports applications and systems, enabling seamless exchange of athlete profiles, performance data and assessment results with external systems such as national talent-identification databases, sports-federation portals and coaching-management tools.

The final output (assessment results, digital report cards, performance data) must be easy to push to downstream applications via well-documented, modular APIs. This plug-and-play architecture should allow the app to feed data into systems such as NSRS, the Khelo India Portal, state-level dashboards and federation tools without custom development effort.

6.5 Modus Operandi: Conduct of the Battery of Tests

The assessment follows a structured battery of standardised physical-fitness evaluations. Participants (athletes and coaches) can visualise the sequence through the following steps:

1. **Pre-assessment preparation:** upon NSRS / APAAR / Aadhaar-based registration and login, participants receive detailed test protocols, equipment requirements, setup diagrams and sample videos demonstrating correct execution. A general warm-up (jogging, dynamic stretches) is mandatory before starting the battery.
2. **Assessment sequencing (assessor's choice):** at the start of a Coach / Assessor Mode session, the assessor chooses how the battery is conducted — (i) **athlete-wise**, taking one athlete through all applicable tests in a logical order (e.g. speed and power first, then agility, strength, endurance) before the next athlete begins; or (ii) **test-wise (station-based)**, selecting one test and recording it for every athlete on the session roster in turn, then returning to the test list and repeating for the next test. Test-wise mirrors real ground practice — a single test is administered to a lined-up group before moving on — and significantly reduces total assessment time. In both modes, the assessor first sets up the list of athletes for the session, and the app saves each result against the correct athlete and the correct test no matter what order the tests are taken in. Athletes don't have to finish all their tests in one sitting: the app keeps partly-completed assessments so the assessor can come back and finish them later. The rules for each test (rest between tests, number of attempts, and what counts as a valid result) stay the same whichever order the assessor picks
3. **Video recording and upload:** each attempt is recorded in-app and auto-tagged to the correct athlete and test. The current attempt must be recorded before the app advances to the next athlete (test-wise mode) or the next test (athlete-wise mode)
4. **On-ground safety and standardisation:** coaches must ensure a safe testing environment — even surface, proper cone marking, adequate spacing between stations, hydration breaks and medical readiness.
5. **Post-assessment:** after all tests are completed and videos recorded, the platform facilitates automated scoring and generation of performance reports.

7. Constraints and Rules

These are non-negotiable. Solutions that violate these constraints will be disqualified.

7.1 Data Protection

- **No athlete video may be uploaded to any commercial cloud service.** This includes Google Cloud, AWS, Azure, Google Colab, Kaggle, Google Drive, Dropbox and any similar platform. All videos must stay on the device or on hardware under the team's direct physical control (your own laptop or local server).
- **Consent for minors.** If you collect any video footage involving athletes under 18 during prototyping, you must obtain written consent from their parent or guardian before recording. This is a legal requirement under the Digital Personal Data Protection Act, 2023.
- **Consent for adults.** Even for adult athletes, informed consent is required before recording. Explain what the video will be used for and how long it will be retained.
- **No cloud AI on athlete video.** Do not use any cloud-based AI service to process athlete video. AI inference must run on the device or on your own local hardware. Cloud AI services may be used only for non-video tasks, such as generating text feedback from numerical scores.

- **Violation of any data-protection rule results in disqualification.**

7.2 Dataset Rules

> *This is critical: no labelled Indian video dataset of these 10 tests exists anywhere. You are building on a blank slate.*

- **Pre-trained open-source models** (MediaPipe, MoveNet, YOLO, etc.) trained on international datasets are acceptable as a starting point.
- **International datasets** (COCO, MPII, Human3.6M) and synthetic data may be used for initial model training, but this must be clearly disclosed in your submission.
- **Accuracy claims must be validated on India-based footage** — video recorded in Indian conditions (Indian subjects, Indian clothing, Indian outdoor settings, Indian devices). Accuracy numbers produced solely on international or synthetic datasets will not be accepted as production accuracy claims.
- **Own validation footage** must follow all data-protection rules in Section 8.1.

7.3 Technical Constraints

- **Android and iOS is mandatory.**
- **Fully offline** for all 10 tests, video recording, measurement and report-card generation. Sync happens only when the device connects to the internet.
- **Target device:** the app must run on a phone with Android 10 or later, 3 GB RAM and a standard rear camera at 30 fps. Higher-end features (120 fps, AI-chip acceleration) are bonuses but must not be hard requirements.
- **UI language:** Hindi and English at a minimum. Additional Indian languages are a bonus.

8. Limitations You Should Know About

> *These are realities of the problem, not failures of the hackathon. Understanding them will help you build a more honest and credible solution.*

8.1 No Training Data Exists

- No video footage of these 10 tests has been recorded under this programme. A custom AI model cannot be trained on Indian battery-test data, because that data does not yet exist.
- Pre-trained models (MediaPipe, MoveNet, YOLO) will work out of the box, but their accuracy on Indian athletes, in Indian outdoor conditions and with Indian clothing is unknown. Expect some degradation compared with lab conditions.
- Custom models for specific tasks (such as medicine-ball tracking) require training data that does not exist. If you attempt these tests, acknowledge the limitation in your submission.

8.2 India's Phone Diversity

- **Budget phones :** 30 fps camera, slow processor, 2–3 GB RAM. AI inference runs 2–5 times slower; jump accuracy will be lower due to frame-rate limitations.
- **Mid-range phones :** 120–240 fps slow-motion, faster processor, 4–6 GB RAM. Significantly better accuracy possible.

- **Adapt to the device tier:** use the confidence indicator to show when accuracy may be reduced due to hardware limitations, rather than silently giving wrong results.

8.3 Real Field Conditions

- **Untrained camera operators.** PE teachers and coaches have no videography experience. Videos will be shaky, at wrong angles and at wrong distances. The app must guide them with overlays and warnings, not assume perfect video.
- **Harsh outdoor conditions:** direct midday sunlight causing overexposure, monsoon overcast, winter fog, dusty grounds, brightly coloured school walls, and indoor spaces with poor lighting. Test in varied lighting where possible.
- **Clothing affects AI accuracy.** Athletes may wear salwar kameez, school uniforms with blazers, long kurtas and loose clothing, which occlude the body landmarks that pose-estimation models rely on.

8.4 Connectivity

- Rural India has slow and intermittent mobile data. One athlete's 10 test videos total roughly 500 MB, up to about 1 GB at higher quality. At rural 4G speeds (2–5 Mbps), uploading 30 students' batteries takes longer durations. Your sync design must handle this with resumable uploads, compression and patience.

8.5 What is not Expected in Demonstrate in the Hackathon

- **Production-grade accuracy on Indian populations.** Without a validated Indian dataset, you cannot prove you have met the ±1 cm or ±2 cm benchmarks on Indian subjects. You can demonstrate your approach on sample footage — be honest about the distinction.
- **Indian population fitness norms (percentile tables).** No Indian norm data exists for these tests. Any percentile or rank shown in a report card is illustrative only and must be labelled as such.
- **Talent identification, ranking, performance bands.** These depend on norms that do not exist. Dashboard mockups may be shown as design work, but not presented as functional features.
- **Year-on-year progression monitoring.** Requires at least two years of real assessments. Cannot exist yet.
- **ML-based anti-cheat detection.** Requires genuine and fraudulent footage for training. Neither exists.
- **10,000 concurrent-user load.** This is a production-scale target, not expected in a hackathon demo.

9. What You Must Submit

9.1 Mandatory Deliverables

> *Every team must submit all items in this section. Incomplete submissions will not be evaluated.*

No.	Deliverable	Details
1	Working Android app	An installable APK demonstrating the full assessment workflow: registration, test selection, protocol guidance, video recording, AI measurement (on at least 3–4 tests), manual-entry fallback (for the remaining tests) and report-card generation.
2	Offline mode (live demonstration)	The evaluator will switch the device to aeroplane mode and complete at least 3 tests. The app must record video, compute measurements, store data locally and generate a report card — all without internet. No crash, no data loss.
3	AI measurement on 3–4 tests (minimum)	Working AI measurement on at least 3–4 tests, shown on real video (not a pre-recorded loop). Show the detection (what the AI sees), the measurement (computed result) and the confidence indicator.

No.	Deliverable	Details
4	Digital report card	Generated on the device showing raw scores for all 10 tests. Clean layout, Hindi and English, exportable as PDF. May be template-based; AI-generated narrative text is a bonus.
5	Video integrity measures	Automatic metadata tagging (test name, athlete ID, timestamp, GPS). One-video-per-test enforcement. Rejection of videos below 720p or exceeding duration limits.
6	Data-protection compliance	Demonstrate that no video leaves the device to any commercial cloud service during the demo. Explain your data-handling approach.
7	Technical documentation	A 5–10 page document describing: AI method used for each test, models and frameworks used, dataset used for any training or validation, devices tested on, known limitations and accuracy gaps, and your architecture for production scale.

9.2 Bonus Deliverables (Extra Points)

No.	Deliverable	Details
1	AI coverage on all applicable tests	Working AI measurement on all applicable tests.
2	Calibration reference integration	A marker or known-size mat detected automatically in the video to provide absolute scale. Demonstrate it improving accuracy for height, jump or throw.
3	In-app capture guidance	On-screen overlays guiding the operator: target silhouette, distance indicator, angle warning, exposure guidance. Quality of guidance directly affects measurement quality.
4	Coach/Assessor batch mode	Register a batch of athletes and assess them either athlete-wise or test-wise (station-based), with per-test completion tracking across the roster and a summary dashboard of all results.
5	AI-generated narrative feedback	A language model converting scores into encouraging, age-appropriate coaching text in Hindi and English. May use a cloud LLM on de-identified scores (no video, no names) or an on-device model.
6	Anti-cheat or quality checks	Detecting whether a video is a screen recording, whether the camera angle is unusable, or whether the video does not match the claimed test type.
7	Production architecture document	A detailed architecture showing how data syncs to government infrastructure, the de-identification gateway design, the sovereign-versus-managed-service split, and how you would handle 10,000+ concurrent users.
8	Additional Indian-language support	UI and voice prompts in languages beyond Hindi and English (Tamil, Telugu, Bengali, Marathi, etc.).

10. Performance Targets (Production Goals)

How to read this section. The thresholds below are the targets for a fully built and validated production system. They are provided so teams understand the eventual quality bar. They are NOT hackathon pass/fail criteria — several cannot be demonstrated in a hackathon (see Section 9.5). Hackathon submissions are judged on the approach and honest evidence, per Section 11.

Category	Production Target
Performance & Speed	App launch < 3 s · Test screen loads < 1 s · Data syncs in < 5 s on a stable connection · Offline queue syncs within 30 s of reconnection
AI & Measurement	Height within ±1 cm · Jump detection within ±2 cm · Sit-up accuracy ≥95% · Run timing (GPS) within the per-test target · Shuttle turn detection reliable across outdoor and indoor settings (see Section 2 for per-test accuracy targets)

Category	Production Target
Offline Capability	Full 10-test battery completable with zero connectivity · Minimum 500 athlete sessions stored locally · No data loss on crash
Usability & Access	UI in Hindi and English at minimum · Readable in low light and direct sunlight · Works with a standard rear camera
Reporting	Report card generated within 10 s of completion · Percentile rank shown instantly (illustrative until Indian norms exist) · PDF export without an internet connection
Scale & Security	Backend supports 10,000+ concurrent sessions · API response < 500 ms · Results tied to GPS and timestamp

11. How to Validate Your Accuracy Claims

- **Measure against a known ground truth:** use a stadiometer (or measuring tape against a wall) for height, a measuring tape on the ground for jumps, a calibrated stopwatch for timing, and manual expert counting for sit-ups. Record the same test with your app and compare.
- **Test on at least two device tiers** if possible — a budget phone (30 fps) and a mid-range phone (120 fps). Report accuracy separately for each.
- **Test in realistic conditions:** outdoor sunlight, indoor fluorescent light, and with at least some subjects in non-athletic clothing (school uniforms, loose clothing). Do not validate only in a controlled lab.
- **Report your validation honestly:** state the dataset source, sample size, device models, environmental conditions, ground-truth method and the resulting error distribution. A small but honest validation is far more valuable than a large but unsubstantiated accuracy claim.
- **If you could not validate on Indian subjects, say so.** State that your accuracy is measured on your own test footage and that Indian field validation is pending. This is acceptable and expected.

12. Production Vision & Long-Term Outcomes

Beyond digitisation, the AI-powered Battery Test App is intended to underpin a national-scale talent-identification and athlete-monitoring ecosystem. The capabilities below describe the long-term production vision that this hackathon lays the foundation for. They depend on data (validated Indian norms, multi-year assessment records) that does not yet exist, and are therefore not hackathon deliverables — but teams are encouraged to design toward them.

- **Scalable talent identification —** automated identification of top-percentile performers at district, block and state levels, with clustering into high-potential fitness archetypes and automated “Emerging Talent” lists.
- **District and sub-district level talent mapping —** AI-driven dashboards showing performance heatmaps, talent-density clusters, sport-specific suitability patterns, and gender- and age-wise comparative analysis.
- **Objective ranking & selection support —** automated age-group rankings, performance-band categorisation (Emerging / Promising / High Potential) and sport-suitability mapping to support transparent selection.
- **Future scalability —** the system must support the addition of new sports-related tests beyond the initial 10 tests. Each test would be defined by a configurable set of criteria; on video upload, the system validates the submission against those criteria to determine pass/fail. The platform must onboard new test types and their evaluation criteria without structural changes.

- **Storage as the dominant infrastructure cost —** at national scale, roughly 500 MB of video per athlete means about one million athletes a year generate on the order of 500 TB (0.5 PB) of video annually before compression or lifecycle management. Storage, rather than GPU compute, is expected to be the largest single infrastructure cost, so the production design must plan for compression, tiered retention and eventual deletion of source video after results are finalised.

Note on percentiles and rankings. Any percentile, rank or performance band shown in a hackathon prototype is illustrative only, because validated Indian norm data does not yet exist. It must be clearly labelled as illustrative.

13. Conclusion

This is an opportunity to transform India's grassroots sports-assessment framework from a manual, resource-intensive process into an intelligent, scalable national sports-development engine. The AI-powered Battery Test App built through this initiative will serve as the foundational entry point of India's national athlete-development pipeline — enabling every child, in every district, to be identified, assessed and nurtured on the basis of objective, data-backed evidence.

Participants are encouraged to bring innovative, practical and scalable solutions that align with India's vision of becoming a global sporting powerhouse.

Build something that works in a dusty school ground in rural India, on a budget phone held by a PE teacher who has never used an AI app before. That is the test. Good luck.

Annexures

Annexure A - Technical Handbook

Official test protocols for the 10 battery assessment tests covering equipment, setup, starting positions, number of attempts,etc. are attached below in the link. Participants should treat this handbook as the reference of how each test is conducted.

Link -