Product Scope Document: SwingAI

1. Idea Summary

SwingAI is a software-first, dual-interface biomechanics platform designed to democratize professional cricket analysis. By leveraging a semi-supervised self-training method for fine-tuning human pose estimations in videos, SwingAI detects minute technical errors in stance, swing mechanics, and delivery stride using only a standard smartphone camera.

The application addresses the suboptimal, manual data-tracking methods currently used by the 2,000+ registered "feeder" academies in India. It serves two distinct user bases through a B2B2C strategy:

1. **The Player Application (B2B2C):** Provides real-time technical feedback, personalized training recommendations, and a gamified path to selection, increasing perceived value and academy retention.
2. **The Coach Dashboard (B2B):** Replaces subjective human observation and paper notes with automated biomechanical analysis, assisting coaches in identifying top talent and generating easy-to-read progress reports.

2. Module A: The Player Terminal

Primary Objective: Self-correction, gamified improvement, and real-time process tracking.

2.1. Biometric Capture Interface (The "Smart Net")

The core recording interface supports distinct workflows for Batting and Bowling without the need for specialized sensors.

- **Mode Selection Toggle:**
  - **Batting Mode:** Optimizes frame capture for stance, swing mechanics, and bat speed.
  - **Bowling Mode:** Optimizes for delivery stride, release point, and landing impact.
- **Intelligent Viewfinder Overlay:**
  - **Skeletal Guide:** A semi-transparent overlay on the camera feed to guide the user to the correct distance and angle before recording.
  - **Auto-Clip Trigger:** Visual indicator (pulsing ring) showing that the system is actively detecting cricket-specific motion and auto-cropping the clip to the exact sequence.
- **Live Session HUD (Heads-Up Display):**
  - **Instant Metric Feedback:** Immediately post-shot, a notification pill appears displaying the primary biomechanical metric (e.g., *"Bat Speed: 112 kmph"* or

"Release Angle: 12°").

2.2. The "Noticeability" Engine (Gamification)

A dashboard widget designed to align student incentives with academy selection criteria.

- **The "Selection Zone" Meter:**
  - **Visual:** A radial gauge showing the student's current "Technical Rating" relative to the "State Selection Benchmark" or academy averages.
  - **Target Setting:** Clearly displayed actionable recommendations. *Example: "Increase average bat speed by 4 kmph to enter the 'Elite Batch' visibility zone."*
- **Rank & Percentile:** Displays the student's percentile ranking within the academy for key mechanics, providing a transparent path to professional selection.

2.3. Health & Biomechanics Dashboard

- **The "Body Battery" (Fatigue Monitor):**
  - **Visual:** A green-to-red battery gauge that drains based on session intensity and workload.
  - **Logic:** Triggers a "High Injury Risk" warning when workload exceeds safe biomechanical limits, advising the player to rest.
- **Posture Heatmap:**
  - A visual model highlighting stress zones based on calculated strain from the session's delivery strides or swings.

2.4. Session Archives & Actionable Recommendations

- **Categorized Feeds:** Tabs for historical "Batting" and "Bowling" sessions.
- **Shot Detail View:**
  - **Video Player:** Loop playback with the fine-tuned pose-estimation skeleton overlaid.
  - **Error Highlight:** Frame-by-frame scrubber that freezes on the critical point of failure in the stance or swing.
  - **Correction Prompt:** Personalized, actionable training recommendations based on the specific mechanical flaw detected.

3. Module B: The Coach Terminal

Primary Objective: Replacing manual tracking, identifying top talent, and generating long-term development reports.

3.1. Academy Overview (The Home Screen)

A high-level dashboard focusing on identifying talent and managing risk across the academy.

- **The "Red Flag" Ticker (Priority Inbox):**
  - **Injury Risk Alerts:** Notifications for students whose biomechanics indicate potential injury or severe fatigue.
  - **Form Slump Alerts:** Notifications for students whose average metrics have dropped significantly over recent sessions.
- **Talent Discovery Feed:**
  - **"New Peaks" List:** Auto-generated list of students who achieved a personal best metric, assisting coaches in identifying rapidly improving talent without manual observation.

3.2. Roster Management & Filtering

- **Student List View:** Searchable roster replacing traditional paper notes. Includes status indicators (On Form, Fatigued, Improving).
- **Metric-Based Sorting:**
  - Ability to sort the entire roster by raw technical data (e.g., *Sort by Bat Speed*, *Sort by Delivery Stride Consistency*). This empowers data-backed selection decisions.

3.3. Deep Analysis Toolset

- **"Ghost Mode" Comparison:**
  - **Split Screen Interface:** Left side = Student Video; Right side = Reference Video.
  - **Reference Selector:** Coach can select a "Gold Standard" clip to play synchronously with the student's clip.
  - **Synchronization:** Aligns both videos to the exact moment of impact or release.
- **Long-Term Development Tracking:**
  - **Progression Charts:** Line graphs plotting specific biomechanical metrics over weeks or months.
  - **Consistency Maps:** Visual representations of grouping and accuracy over long-term form.

3.4. Automated Progress Reports

- **Report Generation:** A one-click feature to export "Progress Reports" for parents and players.
- **Content:** Summarizes key charts, long-term development trends, and actionable recommendations in an easy-to-read, academy-branded format, driving perceived value and retention.

4. User Flows & Demonstrations

Flow A: The Student

1. Student opens app -> Selects **"Batting"**.

2. Aligns smartphone camera using the **Skeletal Guide**.
3. Plays a session. The system auto-clips each complex sequence.
4. Session ends -> **"Noticeability Meter"** updates.
5. Student receives personalized correction prompt: *"You are 85% of the way to the Benchmark. Work on 'Head Stability'."*

Flow B: The Coach

1. Coach receives automated alert: *"Injury Alert: Top Bowler (Net 3) stride deviation."*
2. Taps notification -> Opens **Deep Analysis View**.
3. Reviews video of the last delivery with **Posture Heatmap** highlighting stress.
4. Coach scrolls to **Development Tracker** -> Sees metric dropping over the session.
5. Action: Coach intervenes, preventing injury and tracking the process via data rather than memory.