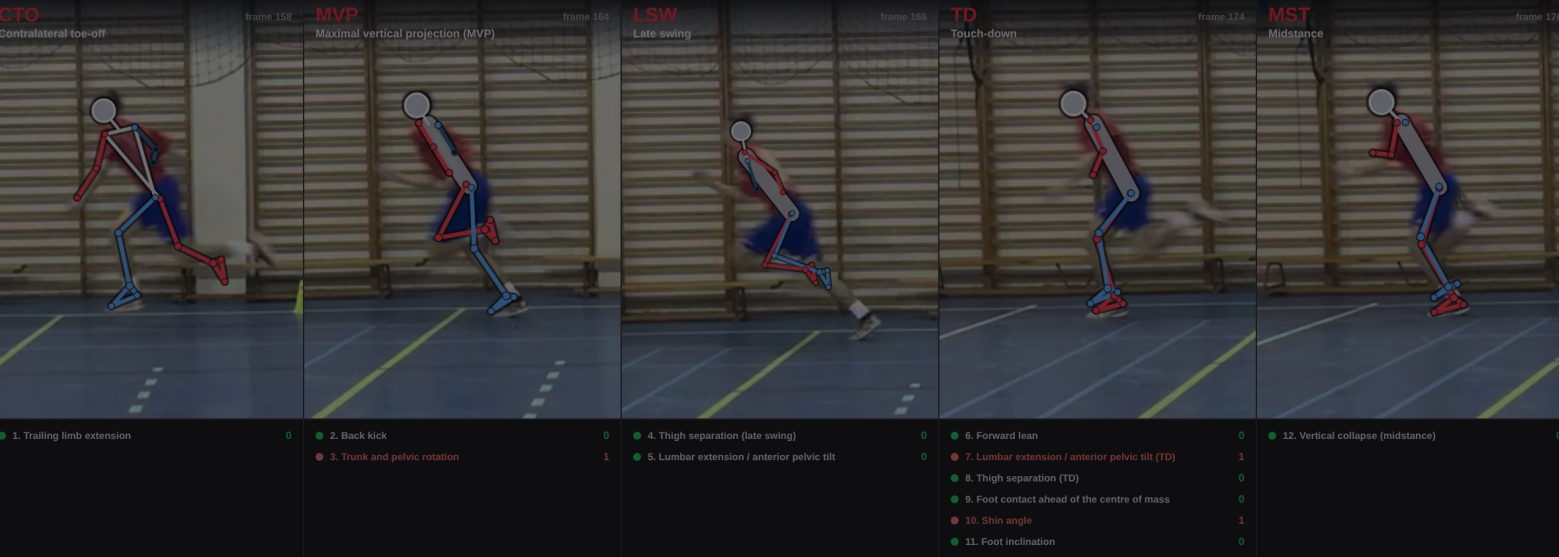




S-MAS Sprint

Qualitative sprint mechanics analysis from a phone

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S-MAS Sprint is free and runs in the browser, on a phone or a computer, in twelve languages. No installation, no account.

What S-MAS is

S-MAS (Sprint Mechanics Assessment Score) is a twelve-item qualitative scale for sprint running mechanics at maximal velocity. Each item is scored 0 or 1: 0 means sound mechanics, 1 means the trait is present. The total runs from 0 to 12 and lower is better.

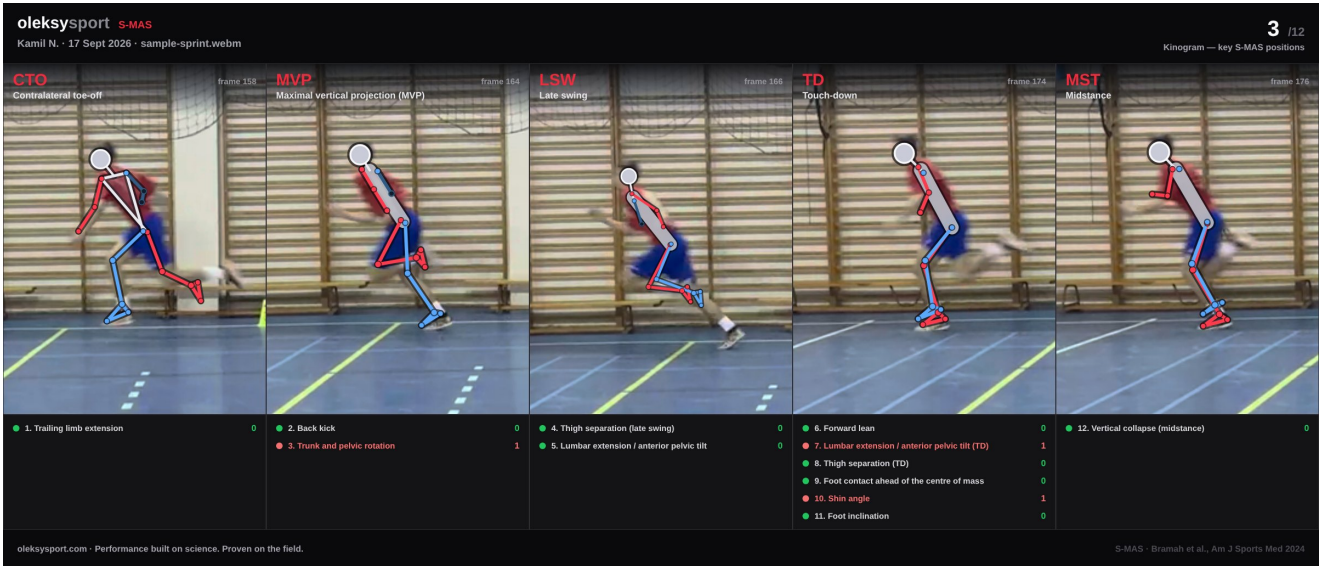
The scale was designed as a clinical tool for assessing running form without a laboratory: a higher score is associated with mechanics typical of hamstring injury. The measurement error is about one point (SEM $\approx$ 1), so a one-point difference between two assessments is not a change — two points or more is the signal worth acting on.

The assessment rests on five phases of the step. Each phase is a single frame of the video, and each frame carries the items that are scored on it.

The app supports visual assessment; it is not a medical device. Decisions about training, load and return to play are made by a human.

The five phases of the step

CTO	Contralateral toe-off	The instant just before the contralateral foot leaves the ground.
MVP	Maximal vertical projection (MVP)	Mid-flight — pelvis at its highest point.
LSW	Late swing	Point of maximal knee extension during swing.
TD	Touch-down	First contact of the foot with the ground.
MST	Midstance	Pelvis directly over the ankle joint of the stance leg.



Phase: CTO · MVP · LSW · TD · MST

Before you film: gear and setup

A phone or camera with slow-motion

You need at least 120 frames per second. At 60 fps the key frames fall too far apart and several items cannot be scored reliably. On iPhone, set slow-motion to 120 or 240 fps in the camera settings.

A tripod or a stable rest

The camera must not follow the athlete. Camera movement breaks both the automatic tracking and the angles you are about to judge.

A strictly sagittal view

The lens axis perpendicular to the running line. Any angled setup inflates or deflates hip and trunk angles. This is the single most common fault in footage sent in for assessment.

About 7 metres away, about 0.8 metres high

The athlete should fill roughly one third of the frame height when passing the camera. A lens at hip height limits perspective distortion.

Maximal velocity, not the start

Film the section where the athlete is no longer accelerating — usually after a 25–30 m run-up. Assessing the start and assessing maximal velocity are two different things.

Background and light

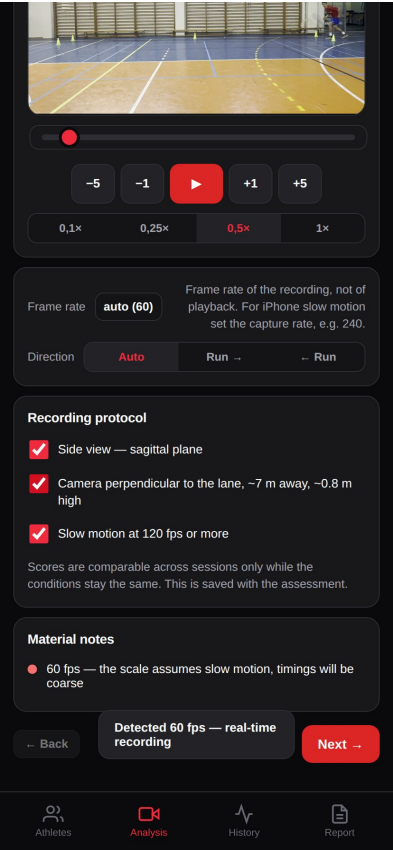
The calmer the background, the more reliable the tracking. Wall bars, nets and cables attract the automatic tracker; in such a hall, draw the athlete box by hand.

Recording protocol

In the first step of the wizard you confirm three conditions: sagittal view, camera placement and slow-motion. This is not paperwork — the ticks are stored with the assessment, so months later you still know how it was filmed.

The app reads the frame rate of the loaded file and warns you when it is below slow-motion. If the detected rate looks wrong (some phones store a different rate than they advertise), set it by hand in the field next to it — every millisecond figure depends on it.

Only assessments filmed under the same conditions are comparable. Same angle, same distance, same part of the run — otherwise comparing two dates measures your camera, not your athlete.

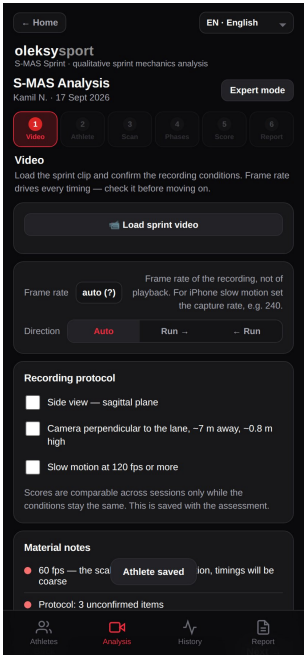


load the file, frame rate, protocol and notes on the footage

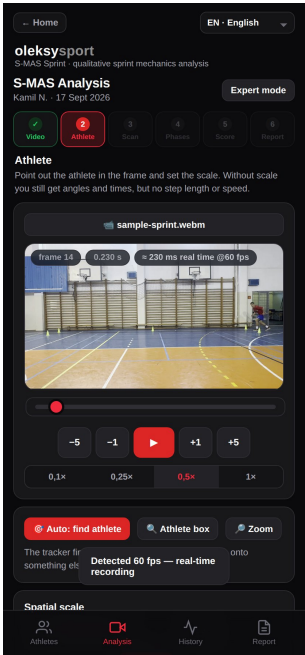
The six-step wizard

The analysis view walks through six steps in a fixed order. "Athlete" and "Scan" may be skipped, the rest must be completed — the bar at the top shows which are done. If you prefer the old layout with every panel visible at once, turn on Expert mode in the header.

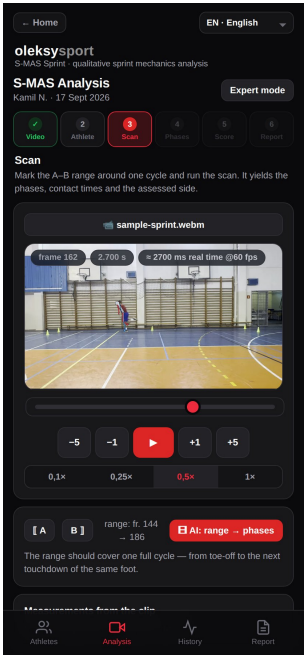
1	Video	load the file, frame rate, protocol and notes on the footage
2	Athlete	pick the athlete and set the scale: by height or by two points
3	AI scan	A–B range around one cycle, athlete box, pose detection
4	Phases	five markers: CTO, MVP, LSW, TD, MST
5	Score	twelve items, each 0 or 1
6	Report	kinogram, correction plan, save the assessment



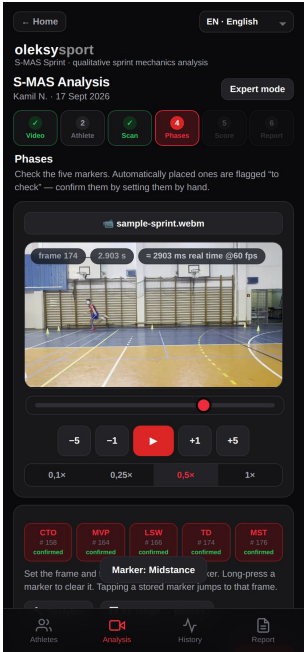
Step 1 · Video



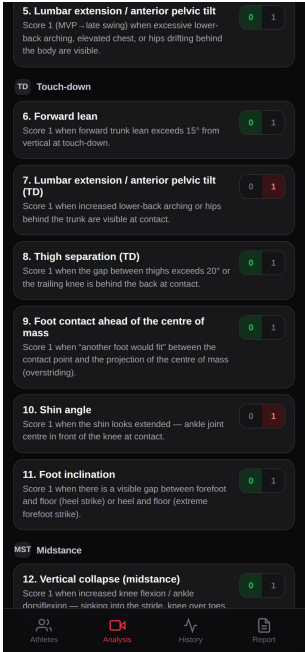
Step 2 · Athlete



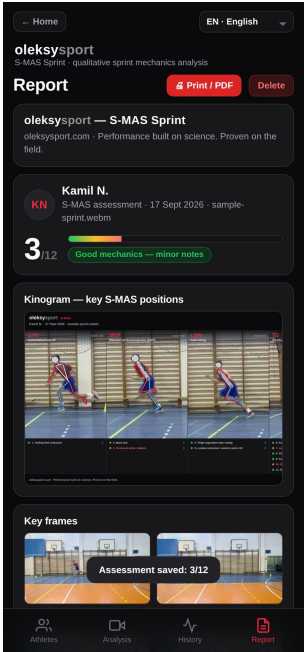
Step 3 · AI scan



Step 4 · Phases



Step 5 · Score



Step 6 · Report

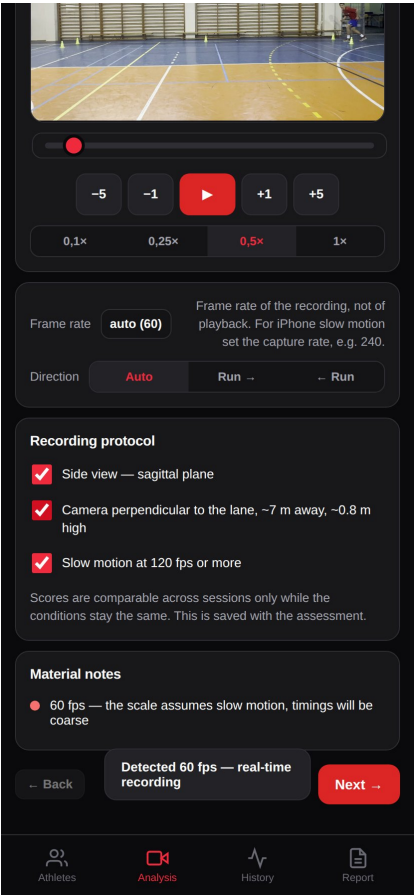
Step 1 • Video

Load the file with "Load sprint video". Nothing is uploaded — the browser opens it straight from your phone.

Check the detected frame rate. The "Frame rate" field shows the automatic value; if you filmed at 240 fps and it reads 30, set it manually. The recording rate drives contact time, flight time and step frequency.

Tick the three protocol boxes and read the notes on the footage. A red dot marks a condition that lowers the confidence of the assessment.

Set the running direction if the automatic guess is wrong — it decides which side of the body is scored for items judged separately for the lead and trail leg.



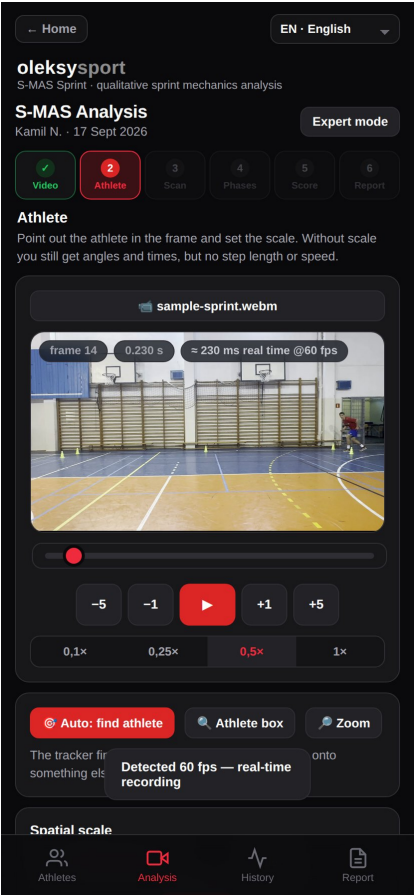
load the file, frame rate, protocol and notes on the footage

Step 2 • Athlete and scale

Pick an athlete from the list or add a new one. Year of birth and height are optional, but height lets the app derive the scale of the recording without any extra measurement.

Calibration by height converts the silhouette height into metres, with a correction for the fact that a sprinter is not standing upright. Calibration by two points: mark two points of known distance on the image (court lines, for instance) and enter that distance.

Without calibration you still get every timing figure and the score, but no step length or speed in metres. This step can be skipped.



pick the athlete and set the scale: by height or by two points

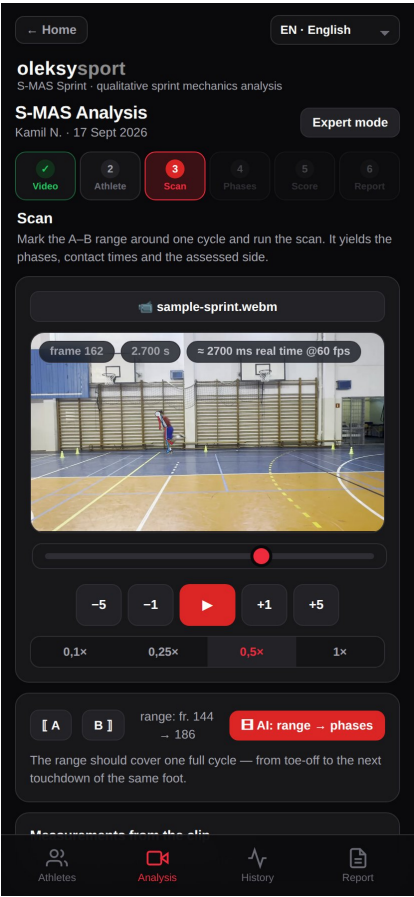
Step 3 • AI scan

Play the clip and mark the A–B range covering one full cycle — from one foot leaving the ground to the same foot landing again. A shorter range means a faster scan and less noise.

"Auto: find athlete" runs motion tracking, no neural network involved: it is fast and good enough to cut the athlete out of the frame. In a hall with wall bars, nets or a second person in the background, draw the box by hand with "Athlete box".

The scan runs the pose model only on the crop around the athlete — the silhouette reaching the model is several times larger, and detection climbs from a few per cent to most of the frames. After the scan the app proposes the five phase markers and moves to "Phases".

The first scan downloads the AI model (a few dozen megabytes). After that it works offline.

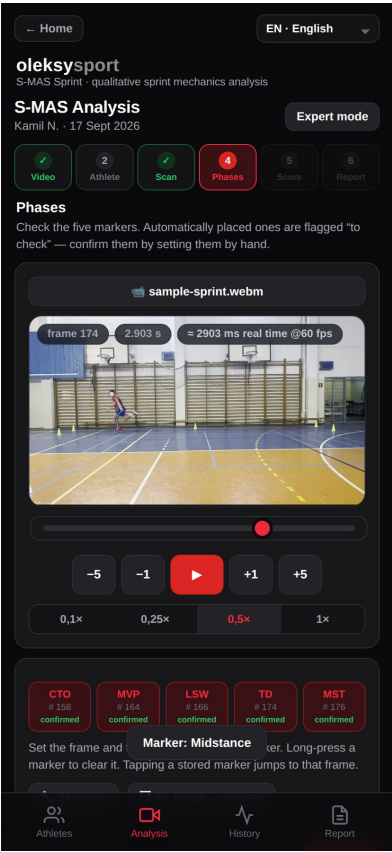


A–B range around one cycle, athlete box, pose detection

Step 4 • Phases

Five key frames. Markers set automatically are flagged "to check" — step through them frame by frame and confirm or correct. The -5/-1/+1/+5 buttons move the video one frame at a time.

- CTO** — Contralateral toe-off
- MVP** — Maximal vertical projection (MVP)
- LSW** — Late swing
- TD** — Touch-down
- MST** — Midstance



Step 5 • Scoring the twelve items

Every item has two buttons: 0 (sound mechanics) and 1 (trait present). Items are grouped by the phase they belong to, and the hint under each one describes exactly what a 1 looks like.

Score what you see in the marked frame, not your general impression of the run. If the frame does not settle it, go back to "Phases" and nudge the marker.

The total updates as you go. Keep the measurement error in mind: a one-point difference sits inside the uncertainty of the method.

5. Lumbar extension / anterior pelvic tilt

Score 1 (MVP → late swing) when excessive lower-back arching, elevated chest, or hips drifting behind the body are visible.

0

1

TD Touch-down

6. Forward lean

Score 1 when forward trunk lean exceeds 15° from vertical at touch-down.

0

1

7. Lumbar extension / anterior pelvic tilt (TD)

Score 1 when increased lower-back arching or hips behind the trunk are visible at contact.

0

1

8. Thigh separation (TD)

Score 1 when the gap between thighs exceeds 20° or the trailing knee is behind the back at contact.

0

1

9. Foot contact ahead of the centre of mass

Score 1 when "another foot would fit" between the contact point and the projection of the centre of mass (overstriding).

0

1

10. Shin angle

Score 1 when the shin looks extended — ankle joint centre in front of the knee at contact.

0

1

11. Foot inclination

Score 1 when there is a visible gap between forefoot and floor (heel strike) or heel and floor (extreme forefoot strike).

0

1

MST Midstance

12. Vertical collapse (midstance)

Score 1 when increased knee flexion / ankle dorsiflexion — sinking into the stride. knee over toes.

0

1

Athletes

Analysis

History

Report

twelve items, each 0 or 1

The twelve items

The full list with the condition for scoring 1. This is the same text the app shows under each item.

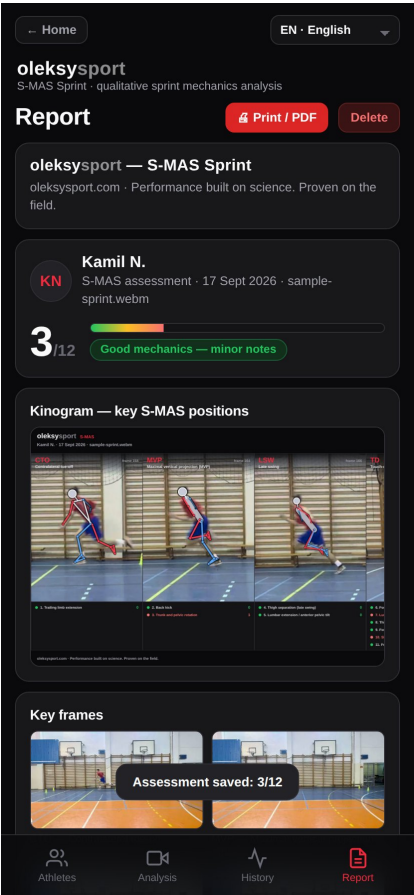
Item	Phase	Score 1 when...
1. Trailing limb extension	CTO	Score 1 when the trailing hip is oriented ≥45° from vertical with a fully extended knee (excessive hip extension behind the body).
2. Back kick	MVP	Score 1 when the trailing heel is above the calf / shin higher than parallel to the floor.
3. Trunk and pelvic rotation	MVP	Score 1 for excessive rotation — large arm movements, trunk twisting, far-side shoulder/upper arm visible.
4. Thigh separation (late swing)	LSW	Score 1 when the trailing knee remains behind the gluteal line.
5. Lumbar extension / anterior pelvic tilt	LSW	Score 1 (MVPlate swing) when excessive lower-back arching, elevated chest, or hips drifting behind the body are visible.
6. Forward lean	TD	Score 1 when forward trunk lean exceeds 15° from vertical at touch-down.
7. Lumbar extension / anterior pelvic tilt (TD)	TD	Score 1 when increased lower-back arching or hips behind the trunk are visible at contact.
8. Thigh separation (TD)	TD	Score 1 when the gap between thighs exceeds 20° or the trailing knee is behind the back at contact.
9. Foot contact ahead of the centre of mass	TD	Score 1 when “another foot would fit” between the contact point and the projection of the centre of mass (overstriding).
10. Shin angle	TD	Score 1 when the shin looks extended — ankle joint centre in front of the knee at contact.
11. Foot inclination	TD	Score 1 when there is a visible gap between forefoot and floor (heel strike) or heel and floor (extreme forefoot strike).
12. Vertical collapse (midstance)	MST	Score 1 when increased knee flexion / ankle dorsiflexion — sinking into the stride, knee over toes, foot flat.

Step 6 • Report, kinogram, correction plan

The kinogram assembles the five key frames into one image with the name, date, score and the per-panel item list. The buttons underneath toggle the skeleton and the summary. "Save image" writes a file you can send to the athlete or the coach.

The correction plan lists only the items scored 1. For each one: the likely cause, a verbal cue to use on the pitch and a drill suggestion. These texts are a draft — edit them to your own in `src/data/smas-content.json`.

"Save assessment" closes the analysis and opens the report, which has a print button — that is your PDF for the file or for sending on.



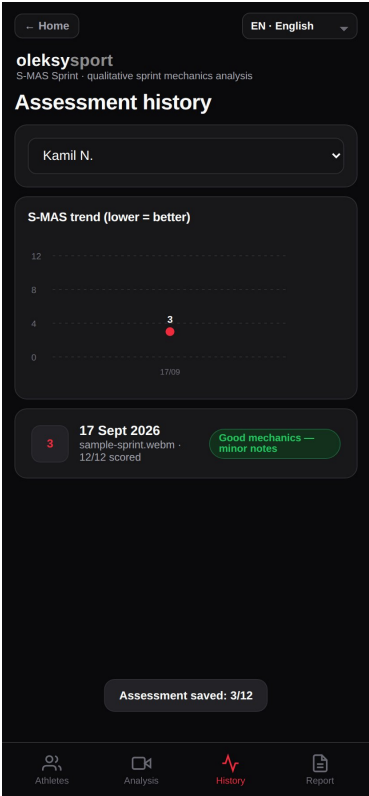
kinogram, correction plan, save the assessment

History, heat map, comparison

The History tab plots the score over time for the selected athlete. Lower is better.

The heat map puts the twelve items in rows and the dates in columns — you see at once which trait keeps coming back despite the work and which one has gone.

Comparing two dates builds both kinograms into one image with the score difference. This is the best material for a conversation with the athlete and for showing that the work paid off.



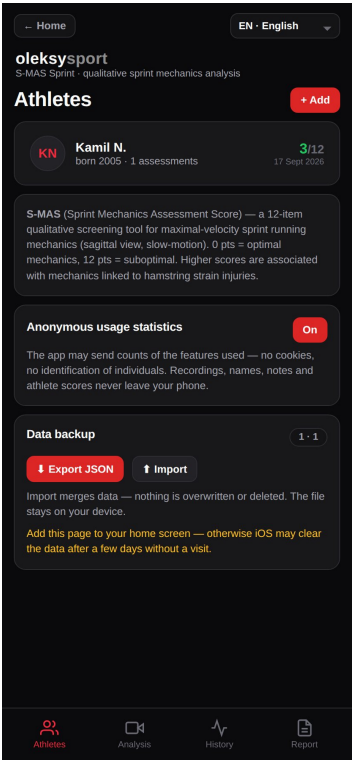
Data and privacy

Videos and assessments never leave the phone. The app stores them in the browser database (IndexedDB) on your device; no video file is sent to a server.

JSON export writes the whole database to a file; import merges it with what is already there instead of overwriting. It is the only way to move assessments between devices and the only backup.

On iOS, add the page to your home screen. Without that the system may clear the site data after a few days without a visit.

Anonymous usage statistics (event names and coarse buckets only — no names, files or individual scores) can be turned off with the switch in the Athletes tab.



When something goes wrong

The video will not load	Browsers do not play every HEVC variant. Open the file on the iPhone in Safari, or convert it to H.264. Files straight from the iPhone camera play in Safari without conversion.
The scan finds no silhouette	Usually the athlete is too small in the frame or the background is too busy. Draw the athlete box by hand and shorten the A–B range to a single cycle.
The millisecond figures look too long	Check the recording frame rate in step 1. Set to 30 on a 120 fps clip it makes every time four times too long.
Kinogram without a skeleton	The skeleton is drawn only on frames where the model found the silhouette. Move the marker one frame, or repeat the scan with a manual box.
The data disappeared	On iOS, without adding the app to the home screen, the system clears site storage. Export JSON after every session.
The AI model will not download	The first scan needs the internet. On a filtered club network the download is sometimes blocked — run the first scan on mobile data.

S–MAS scale: Bramah C. et al., Am J Sports Med 2024. The app is an independent OleksySport tool and is not affiliated with the authors of the scale.

Questions and roll-outs: oleksy-sport.pl · info@oleksy-sport.pl