PlayLikePro: Turning Pose Estimation into Personalized Basketball Coaching

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Cal Poly AI Day | Student Research Showcase

INTRODUCTION

The problem

Private coaching is expensive, and tutorial videos can't watch your shot. Most players with a phone have no way to tell which part of their form is off.

The approach

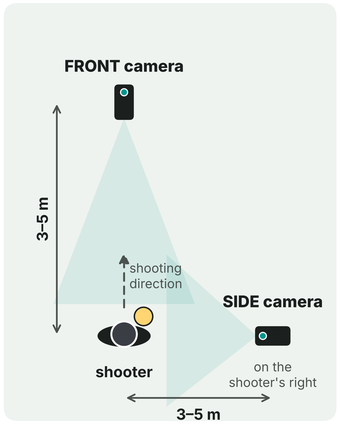
Two phones record a jump shot. Pose estimation turns every frame into body points. A rule-based engine finds the key moments of the shot, takes the measurements a coach would look at, and compares each one with a calibrated target.

How the feedback is made

Each check compares a measurement with a fixed target, so the same shot always gets the same result. A large language model then rewrites those results as coaching tips. It doesn't judge the shot itself.

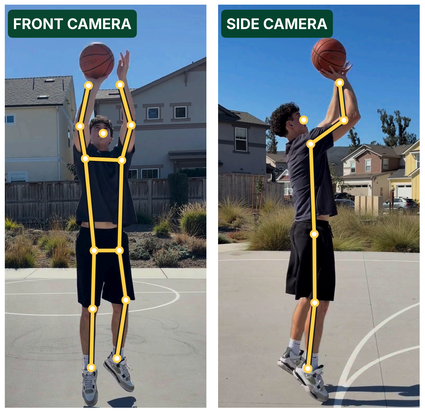
1. SET UP

One phone faces the shooter, one sits on the shooter's right. **The front view shows stance width and elbow position. The side view shows knee bend, release and timing.** Phones in portrait at chest height, 30 fps.



2. RECORD & TRACK

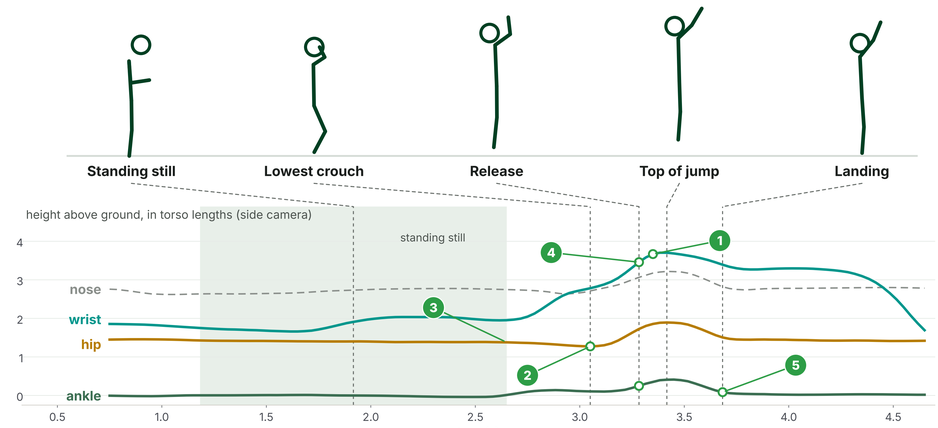
MediaPipe Pose tracks the body in every frame of both videos, and the engine uses 17 of its points. The side camera only uses the joints facing it, since the far side is hidden.



3. FIND THE SHOT

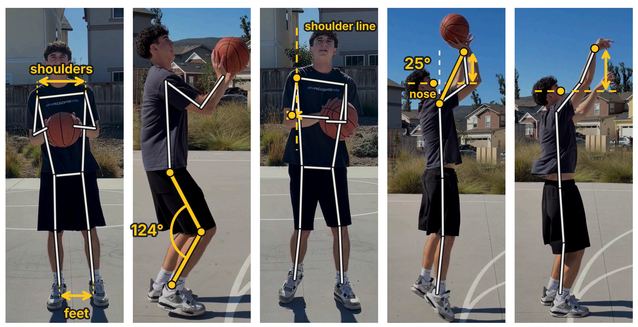
The software **first finds the hand's highest point, then works backward and forward from there**, so walking or dribbling before the shot doesn't confuse it. Heights are measured in torso lengths, so camera distance doesn't matter.

1. **Highest point** the hand at its highest
2. **Lowest crouch** deepest knee bend before the shot
3. **Standing still** last stationary moment before the shot
4. **Release** when the hand moves fastest
5. **Jump & landing** when the feet leave and touch the ground



4. MEASURE

Five checks, each looking at one part of the shot. Shown on a normal shot; all five are within target. L = torso length.



Stance width	Knee bend	Elbow flare	Release	Follow-through
front · standing still	side · lowest crouch	front · lifting the ball	side · release	side · landing
0.73×	**124°**	**0.10×**	**0.43 L · 25°**	**0.57 L**
target 0.58–1.57×	target under 142°	target under 0.25×	target > 0.11 L · < 45°	target over 0.38 L

Smoothed

Each value is the middle of 5 frames, so one glitchy frame can't throw it off.

No guessing

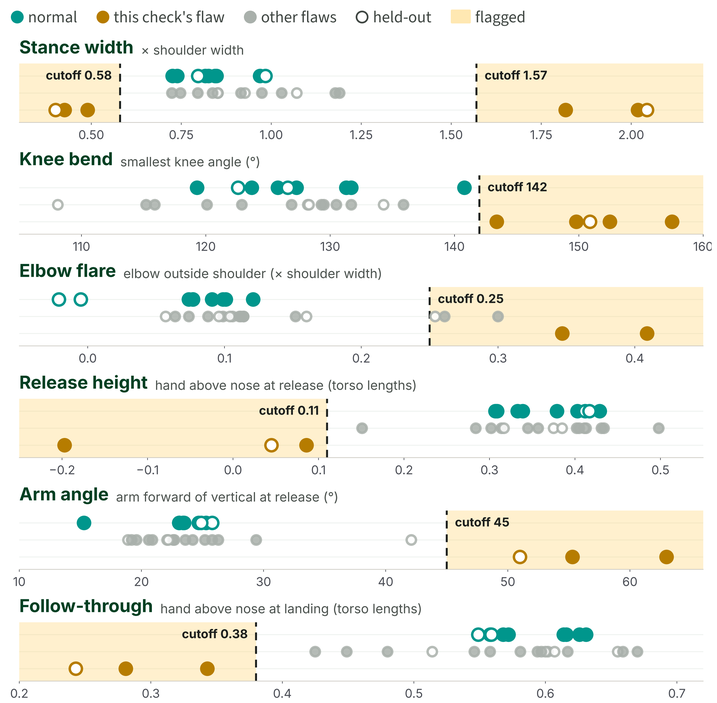
If the tracker isn't sure where a joint is, the check says **"couldn't measure."**

Any distance

Lengths are divided by body size, so camera distance doesn't matter.

5. CALIBRATE & TEST

I recorded **28 takes** of my own shot: 9 normal and 19 with one deliberate flaw. Each cutoff sits between the normal and flawed values. 7 takes were held out for testing.



6. FEEDBACK

Rule findings — a shoot-from-chest take

Check	Value	Target
Stance width	0.92×	0.58–1.57×
Knee bend	132°	under 142°
Elbow flare	**0.30×**	under 0.25×
Release height	**−0.20 L**	over 0.11 L
Arm angle	**63°**	under 45°
Follow-through	0.48 L	over 0.38 L

▼

LLM coaching

- You're pushing the ball from your chest, so it goes out instead of up.
- Start the shot with the ball above your forehead.
- That one fix should also bring your elbow in and your arm angle down.

Drill: one-hand form shots close to the rim. Start with the ball above your forehead, elbow under the ball, and shoot straight up.

7. RESULTS

✓ Caught every flaw

All 19 flawed takes were flagged by the right check.

✓ No false alarms

None of the 9 normal shots were flagged. The one overlap: shooting from the chest also pushes the elbow out.

✓ Every result can be checked

Feedback shows the number and its target, like "arm angle 63°, target under 45°."

Limitations

- **Tested only on my own shot**, so the cutoffs may not fit every player.
- No ball tracking; right-handed shooters and a fixed two-camera setup only.

Next steps

- Test on more shooters and compare with a coach's calls.
- Add more checks, like balance on landing and fading back.
- Support left-handed shooters.

REFERENCE
Bazarevsky, V., Grishchenko, I., Raveendran, K., Zhu, T., Zhang, F., & Grundmann, M. (2020). BlazePose: On-device real-time body pose tracking. *arXiv:2006.10204*. Google MediaPipe Pose.