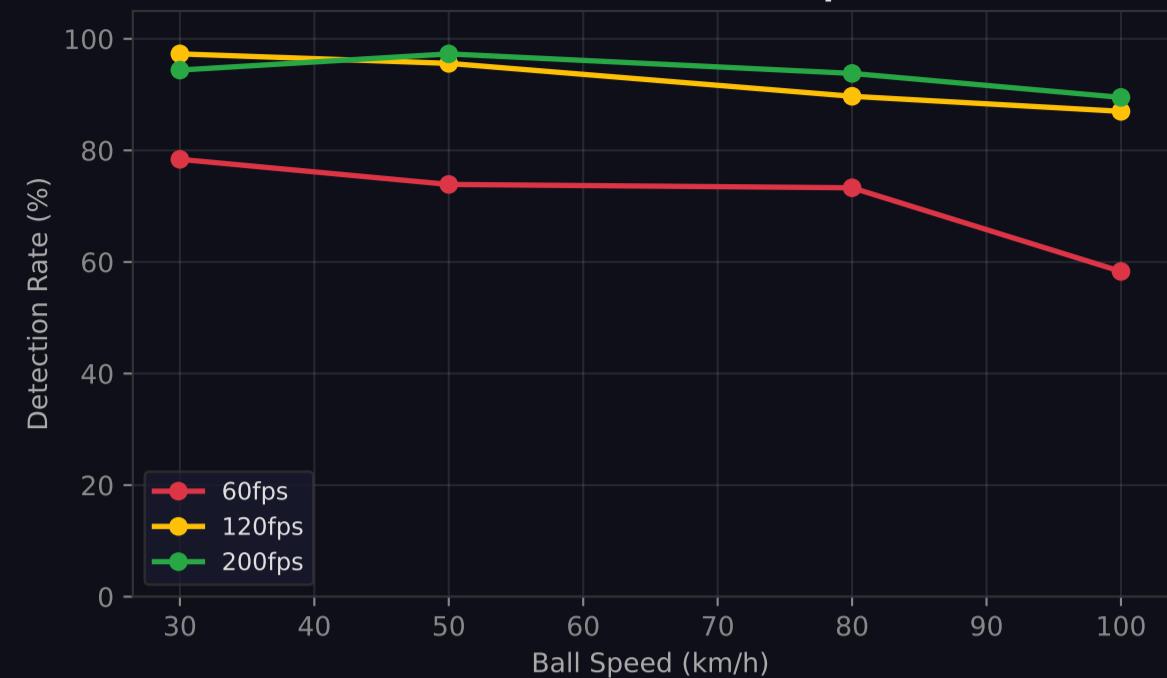


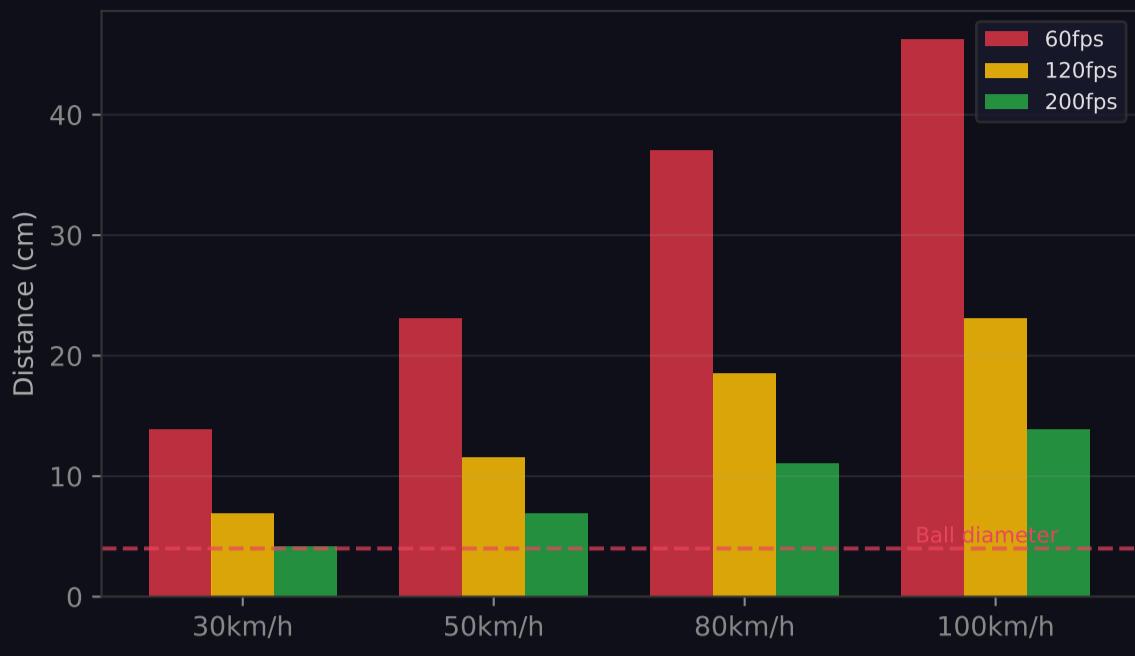
# AI Table Tennis Referee — Hardware Justification

Why the Arducam OV9281 (200fps, Global Shutter) is the right camera for real-time ball tracking

**Detection Rate vs Ball Speed**



**Ball Travel Between Frames**



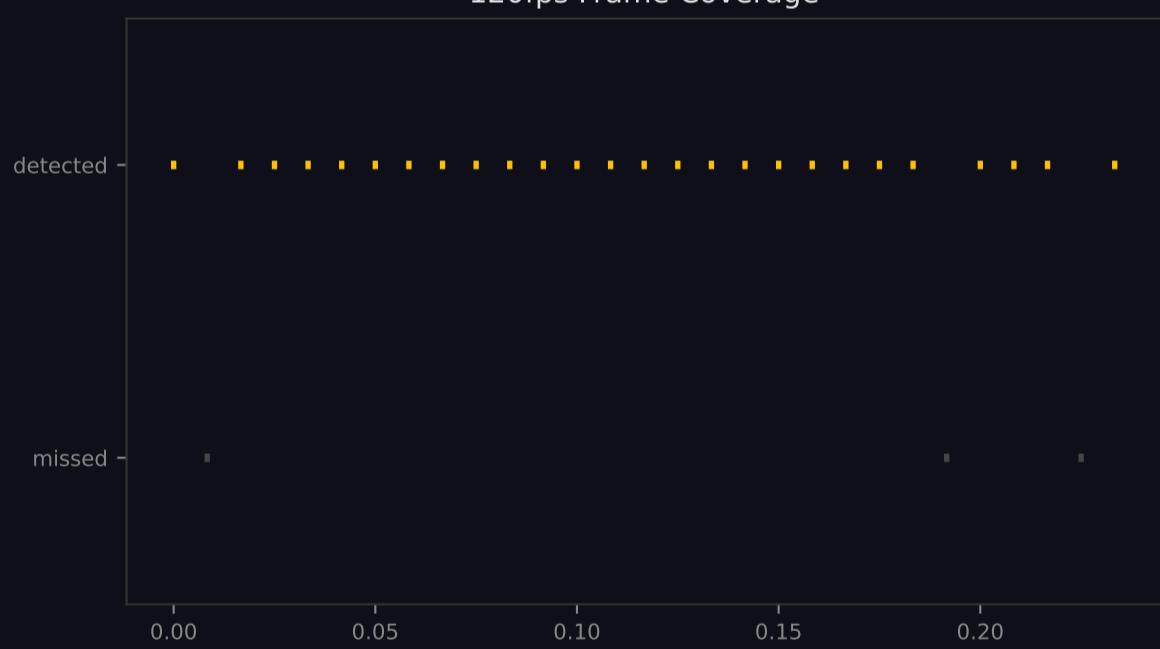
**Camera Comparison at 80 km/h (Fast Topspin)**

Camera	FPS	Resolution	Shutter	Detection %	Confidence %	Blur (px)	Cost
Budget USB (60fps)	60	640x480	Rolling	73.3%	63.5%	5.3	€25
Mid-range (120fps)	120	1280x720	Rolling	89.7%	91.9%	5.5	€45
Arducam OV9281 (200fps)	200	1280x800	Global	93.8%	97.1%	0.3	€75

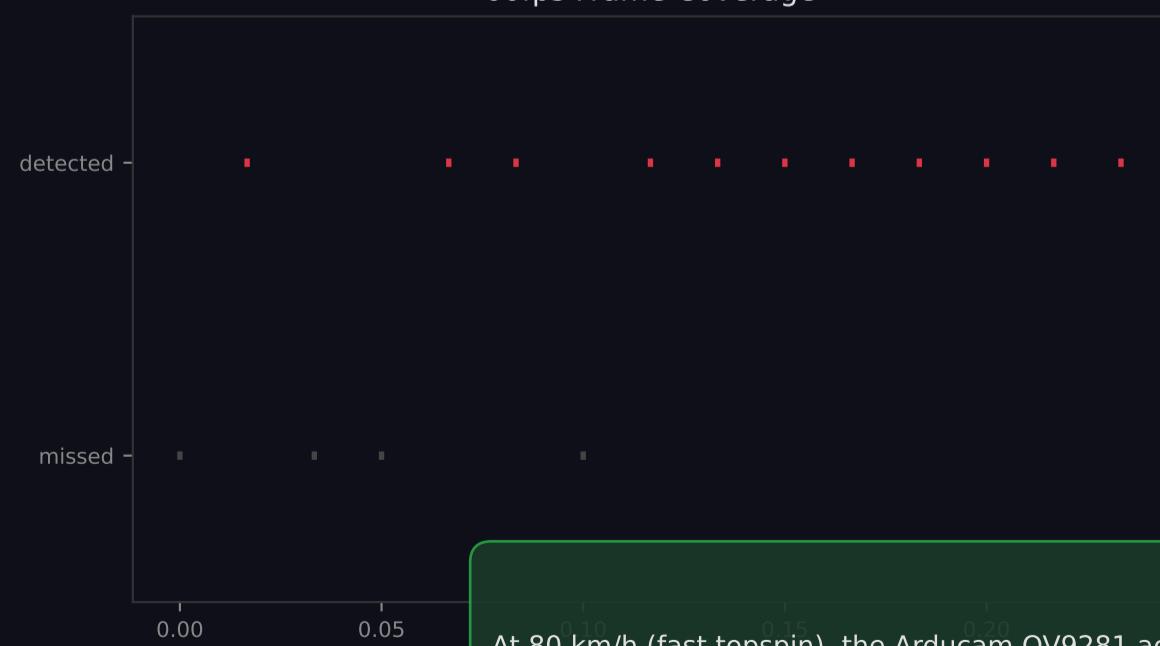
**Cost vs Accuracy (80 km/h)**



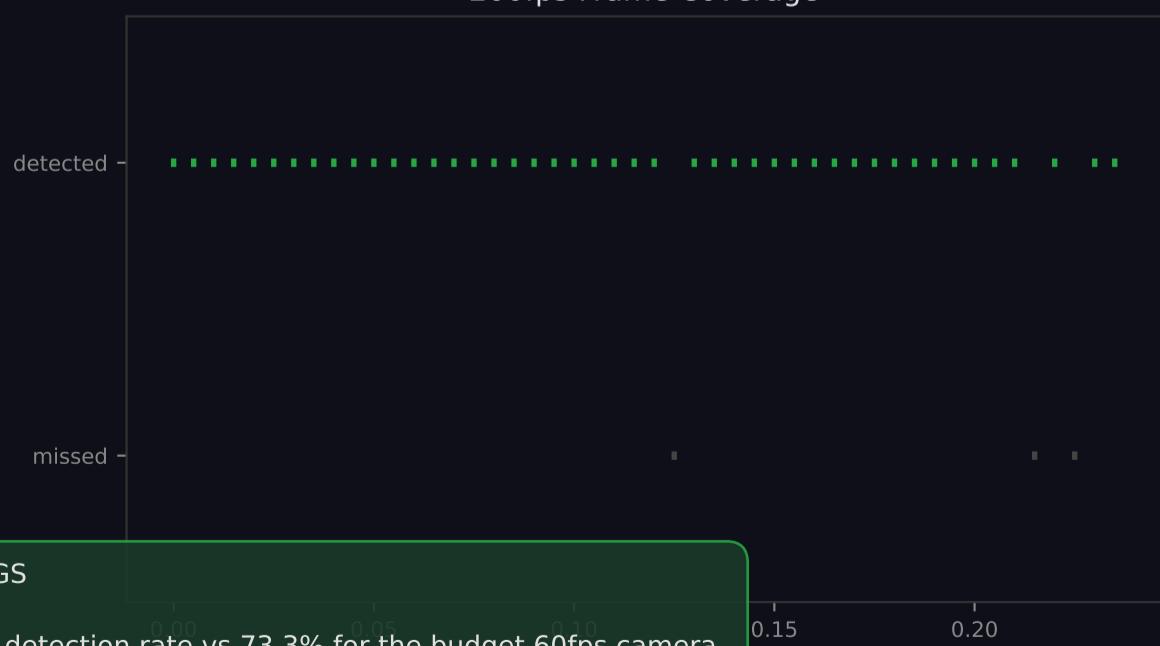
**120fps Frame Coverage**



**60fps Frame Coverage**



**200fps Frame Coverage**



## KEY FINDINGS

At 80 km/h (fast topspin), the Arducam OV9281 achieves 93.8% detection rate vs 73.3% for the budget 60fps camera.

The ball travels 37.0cm between frames at 60fps, but only 11.1cm at 200fps — critical for accurate bounce detection.

Global shutter eliminates motion blur entirely, averaging 0.3px blur vs 5.3px on the budget rolling-shutter camera.

For €50 more, you get 20.5% higher accuracy — the difference between a working referee and an unreliable one.