

## Sports Lab – Current tracking solutions

Created by Alex Ward on behalf of the knowledge-based team

| Physcial   | Pro's   | Con's   | Usecase   |
|--|---|---|---|
| <a href="#">Empatica Embraceplus</a><br>(More vital sign during sport) | <p>Portable and wearable, allowing for real-time data collection during physical activities.</p> <p>Can provide insights into the impact of emotional and physiological states on sports performance.</p>   | Limited to tracking physiological data and may not provide detailed information on skeletal movements   | Use in combination with other technologies to analyze the correlation between physiological responses and skeletal movements during sports activities.              |
| <a href="#">HTC Vive Tracker</a> / <a href="#">Tundra tracker</a>      | <p>Enables full-body skeletal tracking in a virtual reality (VR) environment.</p> <p>High accuracy and precision in capturing movement data.</p> <p>Can be easily attached to different body parts and used for various sports simulations or training scenarios.</p>                           | <p>Requires a VR setup and may have a learning curve for users unfamiliar with VR technology.</p> <p>Limited to indoor use and may require a controlled environment for optimal tracking.</p> | Virtual reality-based sports training, biomechanical analysis, and immersive sports simulations.  |
| <a href="#">Movella XSens dot straps</a> / Xsens DOT motion tracker    | <p>Provides full-body skeletal tracking with high accuracy and precision.</p> <p>Suitable for professional sports analysis, biomechanical research, and motion capture applications.</p> <p>Can capture detailed joint angles and movement data for comprehensive analysis.</p>                 | <p>Higher cost compared to some other technologies.</p> <p>Requires proper setup and calibration for optimal performance</p>  | Professional sports analysis, biomechanics research, and sports performance evaluation in a controlled environment.   |
| <a href="#">OptiTrack PC</a>   | <p>Offers high-precision motion capture with multiple camera setups for full body skeletal tracking.</p> <p>Provides accurate and detailed data for sports analysis, gait analysis, and biomechanical research.</p> <p>Suitable for professional sports settings and research laboratories.</p> | <p>Requires a controlled environment, with proper camera placement and calibration.</p> <p>Can be very expensive compared to some other tracking technologies</p>                             | Professional sports analysis, gait analysis, biomechanical research, and sports performance evaluation in a controlled environmen, great for full skeletal tracking |

| Software                               | Pro's   | Con's  | Usecase   |
|--|---|--|---|
| <a href="#">OpenPose</a>               | Open source, flexible, good accuracy, multiple subjects   | Challenging install, high compute requirements, controlled environments                                  | Pose estimation, motion capture, gesture control.   |
| <a href="#">Detectron</a> / Frankmocap | Highly customizable, high accuracy models, supports Kinect for better tracking  | Facebook, complex setup, high compute requirements   | Object tracking, automated inventory, better for single objects   |
| AR Based Solutionmns                   | Built into android/IOS, easy to use (ARcore and Arkit)  | Limited tracking, operating system specific, i.e., IOS or android, not fully open source (not real time) | Mobile AR experiences, spatial computing  |
| <a href="#">Media Pipe</a>             | Opensource, versatile and compatible on multiple devices, supports Kinect for better tracking                                   | Limited flexibility compared to other open-source solutions since it is google                           | MediaPipe is suitable for sports labs that require real-time pose tracking and hand tracking on various devices without extensive customization.  |
| <a href="#">Open pifpaf</a>            | Opensource, Utilized PyTorch (low processing requirements), supports any Webcam , flexible, supports Kinect for better tracking | Limited to tracking via webcam, high-speed movements requires good calibration                           | OpenPifPaf is suitable for sports labs that require real-time pose estimation using webcams and prefer the flexibility of PyTorch for experimentation and customizatio, great for a free to use, easy to use local software |