Why should I choose EquiGait movement analysis solutions for the gait analysis needs of my business?

With more and more systems entering the 'equine gait analysis' market which integrate artificial intelligence analysis into video or sensor-based products/apps, at EquiGait we are proud to be offering solutions with advanced features providing direct insights into the existence of compensatory patterns and multi-dimensional movement of the horse's back.

Our gait analysis products, from our entry-level 3-sensor system to our top of the range 9-sensor setup are trusted solutions for veterinary and allied professionals, biomechanists, animal physiotherapists and hoofcare providers, across the world. With multiple scientific validations and numerous publications in renowned peer-reviewed journals, we are a world-leader in aiding professionals with everyday decision making. Our systems continue to produce quantitative evidence with direct relevance for veterinary lameness and poor performance examinations. They are also providing professionals across the world with the means to evaluate how riding, training, or rehabilitation regimens or trimming and farriery affect the movement of horses. Our systems measure functionally relevant parameters such as movement symmetry indicative of imbalances in force production between limbs as well as more difficult to perceive movement deficits such as restrictions in back movement.

"All well and good!" you may think, but really, what are the specific advantages and disadvantages of EquiGait products in comparison to other sensor-based solutions or video analysis? We have created a brief summary table for you with our thoughts on some relevant topics from ease of use, cost and scientific validity to practical aspects and data privacy.

Table 1: Advantages and disadvantages of different gait analysis solutions for professional equine gait analysis. MoCap: optical motion capture systems with multiple cameras typically in fixed positions. EquiGait: inertial measurement units mounted on upper body. AI video analysis: artificial intelligence recognition of reference landmarks on moving horses.

Feature	MoCap	AI-video	EquiGait	Comments
Ease of Use	Multiple cameras \ on tripods or fixed to walls and ceiling. **Fixed setup.**	Handheld or tripod-mounted camera, e.g. SmartPhone. **Highly mobile.**	IMUs on upper body, wireless link to laptop/tablet. **Highly mobile.**	Take your IMUs to clients / customers. **Provide immediate results without network or internet.**
Precision / Limits of Agreement (LoA)	sub-mm precision with careful setup. **excellent precision**	≥ +/-5 mm [1] LoA to MoCap **Suitable for horse gait**	+/- 4-8 mm [2] LoA to MoCap **Suitable for horse gait**	LoA (AI-video / EquiGait compared to MoCap) in the order of magnitude stride-to-stride variability.
Cost	**high** cameras, tripods/ clamps, high powered computer, software, accessories	**low** subscription-based (+smartphone) (+phone contract)	**low – moderate** package price: £ 8,000 to 12,000 modular option: software: £ 500 IMUs: $ 750 (+smartphone) (+tablet or laptop)	for further details about pricing please contact: **thilo@equigait.co.uk**

Gait Parameters	**Anything goes!** MoCap allows for calculation of 3D position, velocity, acceleration, joint angles etc	**Depends on AI-model.** Typically: -'black box' approach with "in cloud" analysis and limited knowledge about underlying data and methods. -e.g. **normalized symmetry parameters.**	**Primary / compensatory symmetry. Translational and 3D rotational back range of motion**	EquiGait provides 'real world' data in millimeters or degrees. Together with range of motion values, normalized values can be calculated. This offers maximum flexibility for clinical/professional use as well as research.
Flexibility	Fixed setup requires horses to be brought to specialized facilities. **Limited**.	Anywhere with sufficient space and good lighting conditions. **High*.**	Anywhere with sufficient space. **High.**	*distributed data collection may be possible.
Video	Possible, e.g. hybrid cameras allow for synchronized 3D mocap and video collection. **Highly compatible.**	Native, i.e. the analysis is based on video. **Native.**	Possible, e.g. with additional hardware synchronization. **Somewhat compatible.**	Video analysis not integrated into EquiGait software. Hardware synchronized collection of video possible.
Scientific validity	High number of scientific studies. Typically, limited sample size and laboratory conditions.	Increasing number of scientific studies. High sample size possible. Analysis under real life conditions.	High number of scientific studies. High sample size possible. Analysis under real life conditions.	Taking the analysis where the horses are allows for increased sample sizes. Analysis of movement that is relevant for each horse's job.
Practicality	System calibration needed before use. Attachment of markers to horse.	Video capture very easy. **Analysis requires internet access to cloud computing.**	In-built wireless link or data storage on sensors. Attachment of sensors to horse. **Self-sufficient setup.**	Attachment of sensors with dedicated pouches in seconds. Wireless link: data available after seconds without needs for internet.
Data privacy	Data stored and analyzed on local computer	Video data uploaded to and stored on cloud. Cloud-based data analysis.	Data stored and analyzed on local computer	Be the master of your own data. Storage on local computer. No cloud storage. Use 'case numbers' for keeping data of client-owned horses confidential.

[1] F.J. Lawin, A. Byström, C. Roepstorff, M. Rhodin, M. Almlöf, M. Silva, P.H. Andersen, H. Kjellström, E. Hernlund, Is Markerless More or Less? Comparing a Smartphone Computer Vision Method for Equine Lameness Assessment to Multi-Camera Motion Capture, Animals 13 (2023) 390. https://doi.org/10.3390/ani13030390.

[2] S.M. Warner, T.O. Koch, T. Pfau, Inertial sensors for assessment of back movement in horses during locomotion over ground., Equine Veterinary Journal 42 Suppl 3 (2010) 417–424. https://doi.org/10.1111/j.2042-3306.2010.00200.x.

Table 1 provides a summary of advantages and disadvantages of different gait analysis modalities as we at EquiGait perceive them. While we are able to indicate very specific aspects in relation to our Equigait products, the view of MoCap and AI-video analysis is of more general nature that may be more or less relevant for specific products of these categories that you may have experience with.

In summary,EquiGait products provide you with a great combination of:

- **Mobility:**
  - **Take your gait analysis system with you in a neat backpack.**
  - **Quick set up, no infrastructure required.**
- **High accuracy, precision and validity:**
  - **scientifically validated against motion capture.**
- **Added benefit for your business:**
  - **Don't just replicate 'visual assessment' (head nod, hip hike).**
  - **Directly quantify primary and compensatory parameters through head, withers and pelvic movement.**
  - **Extended gait analysis applications:**
    - **lameness**
    - **back movement for poor performance exams or monitoring of rehabilitation or treatment regimens.**
    - **walk, trot and canter, in-hand, lunge and ridden exercise.**
- **Complete transparency, no 'black box' approach:**
  - **Know what your results mean:**
    - **scientifically validated methods.**
    - **carefully place the sensors where they need to be.**
  - **Own your data with confidence:**
    - **no data sharing or 'cloud computing' necessary.**
- **Cost-effectiveness:**
  - **Complete packages;**
    - **Ease of use.**
    - **Approximately £8,000 to £12,000.**
    - **Low maintenance costs and remote management.**
  - **Modular systems for customized solutions:**
    - **Provide your own smartphone and tablet for data collection analysis.**
    - **Sensors directly from manufacturer.**
    - **Remote install of analysis software on your computer.**

Contact:

Dr.-Ing. Thilo Pfau, Director EquiGait Ltd, thilo@equigait.co.uk