



Supplementary Item 3:

Camera event detection

When the horse was in view of the camera system, the camera system could also be used to detect the hoof-on and hoof-off moments in the horse's strides. We developed an algorithm to detect these moments based on the elevation of camera markers on the hoof. On each hoof, one camera marker was located near the toe and the other was close to the heel. These markers were evaluated separately, so that heel and toe on/off moments could be distinguished.

For event detection, the marker elevation (z-axis) signal was first low-pass filtered with a zero-phase maximally flat FIR filter with a cut-off frequency of 11 Hz. Subsequently, a threshold was applied to the resulting signal to find moments at which the hoof elevation would rise and fall significantly. This threshold was applied relatively to a low-pass-filtered version of the signal which followed the local mean of the signal. This signal mean resulted from a zero-phase running average filter with a window of 7 seconds. When the elevation raised 13 mm above the mean. It was provisionally recognised as a hoof-off event and when it subsequently fell below 7 mm above the mean, it was provisionally recognised as a hoof-on event. The detected events were subsequently refined to find a better estimate of the time the event occurred. This was done by following the elevation signal down its slope (forwards or backwards in time depending on the type of the event) to where the steepness of the signal drops below 1.3 mm/s. To prevent false-positives, the variance of the signal before a considered hoof-off event and after a considered hoof-on event was checked to be sufficiently low. If the variance in a window of 133 ms exceeded 1 mm, the event was rejected and the refinement process continued until the necessary conditions were achieved.