

Supplementary Table S1. Status of trial execution and data acquisition

| ID | sex | Walking | | | Running | | | | |
|----|--------|---------|-------|-------|---------|-------|--------|------------------------|------------------------|
| | | 2km/h | 4km/h | 6km/h | 6km/h | 9km/h | 12km/h | 12km/h forefoot strike | 12km/h rearfoot strike |
| 1 | Male | ● | ● | ● | ● | ● | ● | ● | ● |
| 2 | Female | ● | ● | ● | ● | ● | | | |
| 3 | Female | † | ● | ● | ● | ● | ● | | |
| 4 | Female | ● | ● | ● | ● | ● | ● | ● | ● |
| 5 | Male | ● | ● | ● | ● | ● | ● | ● | ● |
| 6 | Male | ● | ● | ● | ● | ● | ● | ● | ● |
| 7 | Male | ● | ● | ● | ● | ● | ● | ● | ● |
| 8 | Male | ● | ● | ● | ● | ● | ● | † | ● |
| 9 | Male | ● | * | * | * | * | * | * | * |

●: Data with no deficits, †: Deficient left plantar-embedded sensor data, *: Deficient right plantar-embedded sensor

data, no marker: the trial was not executed

Supplementary Table S2. Number of gait cycles from motion sensor data for the analysis

| | ID | Walking | | | | | | Running | | | | | | | | | |
|------------------|----|---------|----|--------|----|--------|----|---------|----|--------|----|---------|----|----------------------------|----|----------------------------|----|
| | | 2 km/h | | 4 km/h | | 6 km/h | | 6 km/h | | 9 km/h | | 12 km/h | | 12 km/h forefoot strike | | 12 km/h rearfoot strike | |
| | | L | R | L | R | L | R | L | R | L | R | L | R | L | R | L | R |
| Plantar-embedded | 1 | 29 | 29 | 36 | 37 | 43 | 43 | 55 | 56 | 54 | 58 | 53 | 58 | 68 | 67 | 67 | 67 |
| | 2 | 18 | 19 | 33 | 33 | 47 | 47 | 58 | 58 | 58 | 56 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 3 | 0 | 17 | 31 | 32 | 31 | 32 | 55 | 55 | 58 | 59 | 54 | 53 | 0 | 0 | 0 | 0 |
| | 4 | 13 | 14 | 30 | 29 | 48 | 48 | 59 | 59 | 64 | 63 | 56 | 69 | 58 | 69 | 39 | 47 |
| | 5 | 13 | 12 | 27 | 27 | 39 | 38 | 40 | 39 | 44 | 44 | 47 | 47 | 53 | 53 | 45 | 46 |
| | 6 | 17 | 15 | 28 | 27 | 36 | 35 | 54 | 54 | 58 | 58 | 56 | 57 | 53 | 52 | 54 | 62 |
| | 7 | 14 | 15 | 27 | 27 | 35 | 35 | 52 | 52 | 52 | 53 | 60 | 59 | 57 | 57 | 64 | 65 |
| | 8 | 12 | 14 | 32 | 32 | 40 | 40 | 59 | 61 | 47 | 50 | 47 | 49 | 0 | 50 | 47 | 48 |
| | 9 | 12 | 13 | 23 | 0 | 34 | 0 | 43 | 0 | 41 | 0 | 44 | 0 | 44 | 0 | 45 | 0 |
| Instep-mounted | 1 | 29 | 29 | 36 | 37 | 43 | 42 | 55 | 55 | 58 | 58 | 57 | 58 | 68 | 66 | 67 | 66 |
| | 2 | 20 | 19 | 32 | 33 | 47 | 47 | 58 | 59 | 58 | 56 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 3 | 14 | 17 | 31 | 32 | 31 | 30 | 56 | 55 | 57 | 58 | 53 | 53 | 0 | 0 | 0 | 0 |
| | 4 | 12 | 14 | 29 | 29 | 48 | 48 | 59 | 59 | 64 | 63 | 69 | 67 | 68 | 70 | 48 | 48 |
| | 5 | 13 | 12 | 27 | 27 | 39 | 39 | 40 | 40 | 44 | 44 | 47 | 47 | 53 | 53 | 45 | 45 |
| | 6 | 17 | 13 | 28 | 28 | 36 | 35 | 54 | 54 | 57 | 58 | 57 | 57 | 53 | 53 | 61 | 58 |
| | 7 | 14 | 15 | 27 | 27 | 35 | 35 | 52 | 52 | 53 | 53 | 60 | 60 | 57 | 50 | 64 | 65 |
| | 8 | 12 | 14 | 32 | 32 | 40 | 39 | 59 | 61 | 49 | 51 | 47 | 50 | 46 | 50 | 47 | 48 |
| | 9 | 13 | 13 | 23 | 23 | 34 | 34 | 43 | 43 | 41 | 41 | 44 | 44 | 41 | 44 | 45 | 46 |

L: left-side, R: right-side

Supplementary Table S3. Gait-cycle detection ratio for the conditions

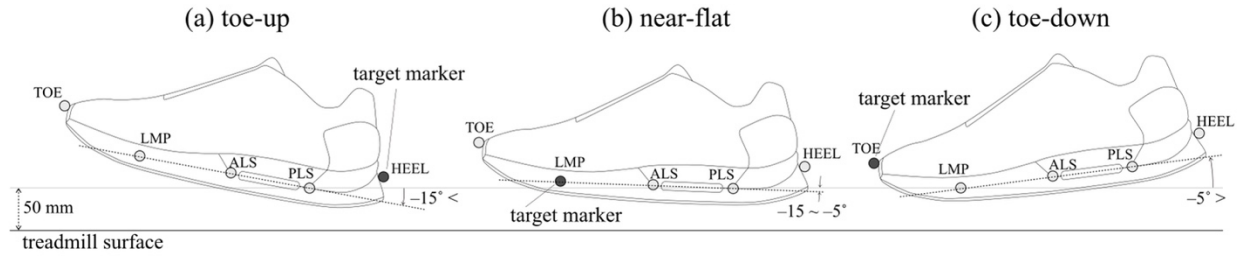
| Condition | Plantar-embedded | | Instep-mounted | |
|-----------------|------------------|-------------|----------------|-------------|
| Overall | 99.16 % | (5981/5931) | 99.54 % | (6343/6372) |
| Walking | 99.94 % | (1675/1676) | 99.83 % | (1758/1761) |
| Running | 98.88 % | (4269/4303) | 99.84 % | (4595/4611) |
| Forefoot strike | 98.67 % | (740/750) | 98.13 % | (841/857) |
| Rearfoot strike | 99.16 % | (761/779) | 99.28 % | (823/829) |

Gait-cycle detection ratio (%) (number of gait cycles detected based on motion sensor data divided by the number of gait cycles detected based on motion capture data). Running: All running tasks, including the forefoot and rearfoot strike conditions

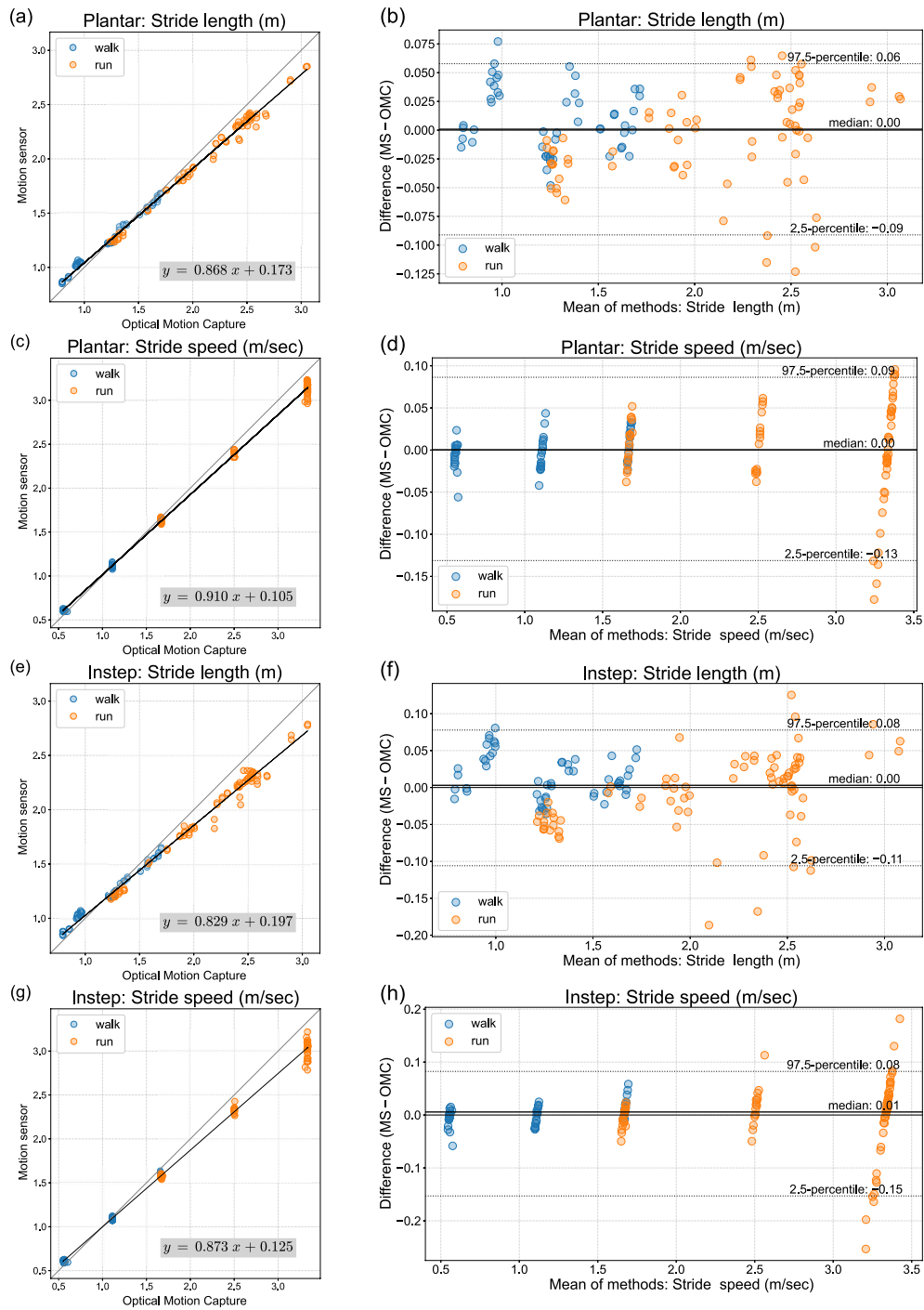
Supplementary Table S4. Percentage of gait cycles including outliers for the conditions

| Condition | Plantar-embedded | | Instep-mounted | |
|-----------------|------------------|------------|----------------|------------|
| Overall | 10.84 % | (578/5334) | 9.52 % | (543/5701) |
| Walking | 8.50 % | (122/1436) | 9.25 % | (139/1503) |
| Running | 11.70 % | (456/3898) | 9.62 % | (404/4198) |
| Forefoot strike | 13.36 % | (91/681) | 13.60 % | (105/772) |
| Rearfoot strike | 11.06 % | (77/696) | 6.64 % | (50/753) |

Percentage of gait cycles including outliers: number of gait cycles excluded in outlier processing divided by the number of gait cycles detected by the motion sensor. Running: All running tasks, including the forefoot and rearfoot strike conditions



Supplementary Figure S1. Definition of target markers for detecting the initial foot contact timing. (a) The HEEL marker was assigned as the target marker when the angle between the anteroposterior axis of the motion sensor and global horizontal plane was less than -15° (toe-up). (b) The LMP marker was assigned when the angle ranged from -15° to -5° (near-flat). (c) The TOE marker was assigned when the angle was more than -5° (toe-down).



Supplementary Figure S2. Scatter plots and regression lines of the stride length and speed from ORPHE ANALYTICS and the optical motion capture and the Bland–Altman plots of corrected data using regression lines.

(a) Scatter plot: stride length (plantar); (b) Bland–Altman plot: stride length (plantar); (c) scatter plot: stride speed

(plantar); (d) Bland–Altman plot: stride speed (plantar); (e) scatter plot: stride length (instep); (f) Bland–Altman plot: stride length (instep); (g) scatter plot: stride length (instep); (h) Bland–Altman plot: stride length (instep). MS: motion sensor, OMC: optical motion capture. The IQR% of stride length (plantar), stride speed (plantar), stride length (instep), and stride speed (instep) were 3.2, 2.6, 2.0, and 3.6, respectively.