Sofamea

Société Francophone d'Analyse du Mouvement chez l'Enfant et l'Adulte.

SofameH@CK 1

Overview of the data repository

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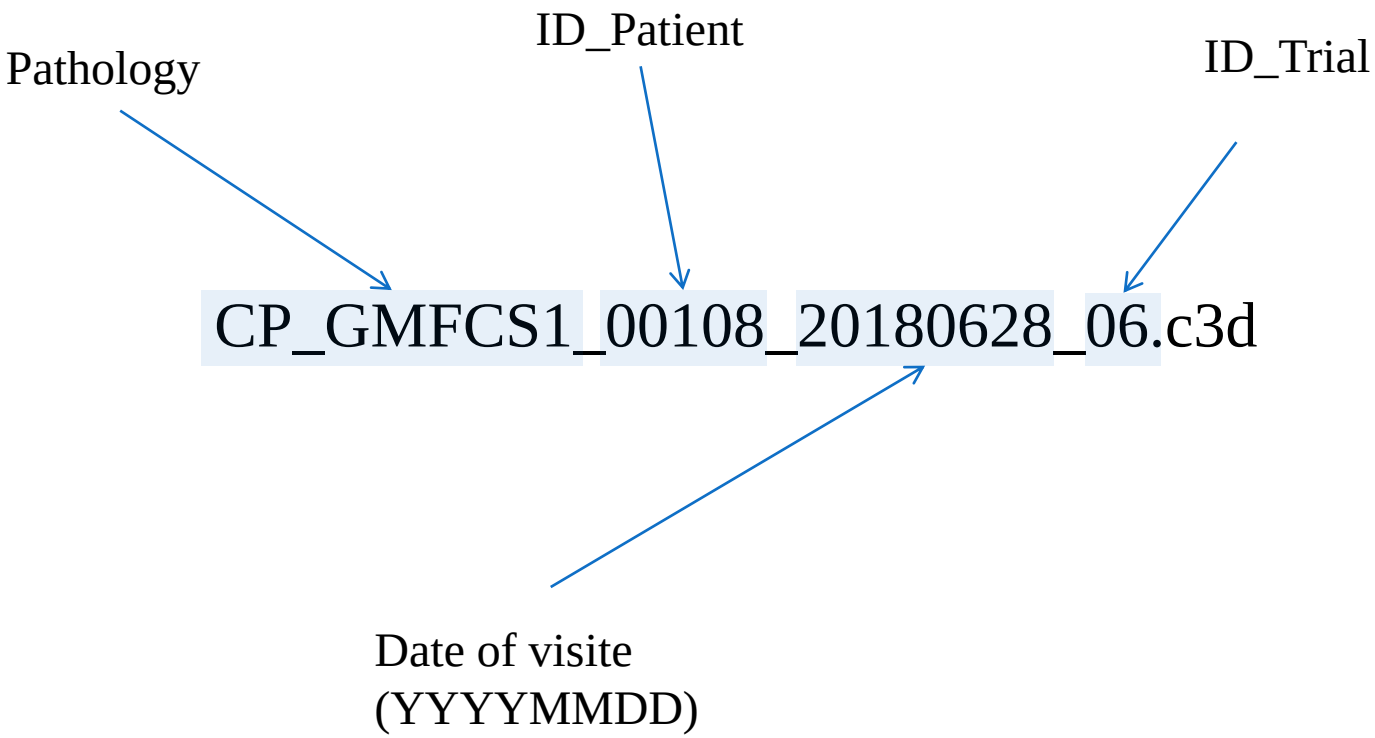
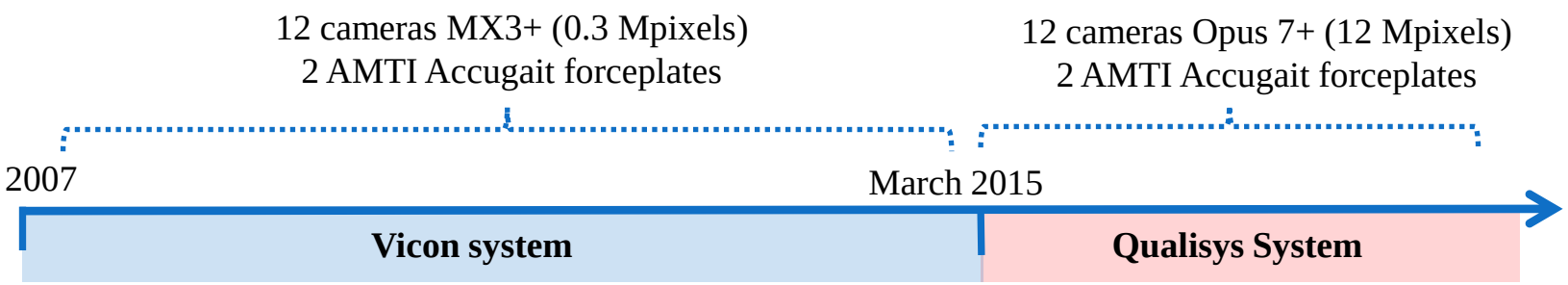
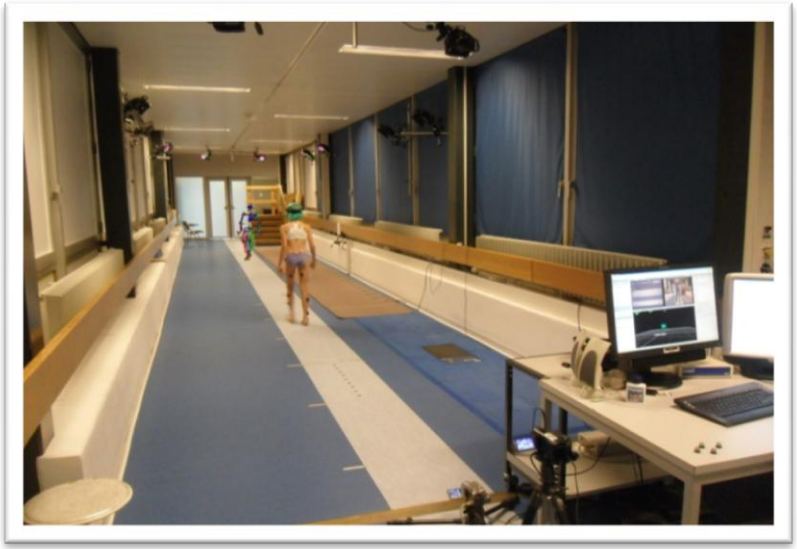
C3D Filename Convention



Material and gait conditions



- 10m walkway
- Gait condition:
  - Barefoot
  - Without external help
  - Self-selected speed
- Sample frequency : 100Hz



Overview of the population

	CP GMFCS I	CP GMFCS II	CP GMFCS III	Idiopathic Toe-Walker	Foot Deformity
N	20	20	5	20	23
Age (years)	12.4 (4.0)	15.9 (8.5)	11.4 (4.0)	9.3 (3.0)	19.2 (13.3)
GPS	6.7 (1.7)	9.9 (3.2)	10.4 (1.7)	6.9 (2.1)	5.1 (1.2)

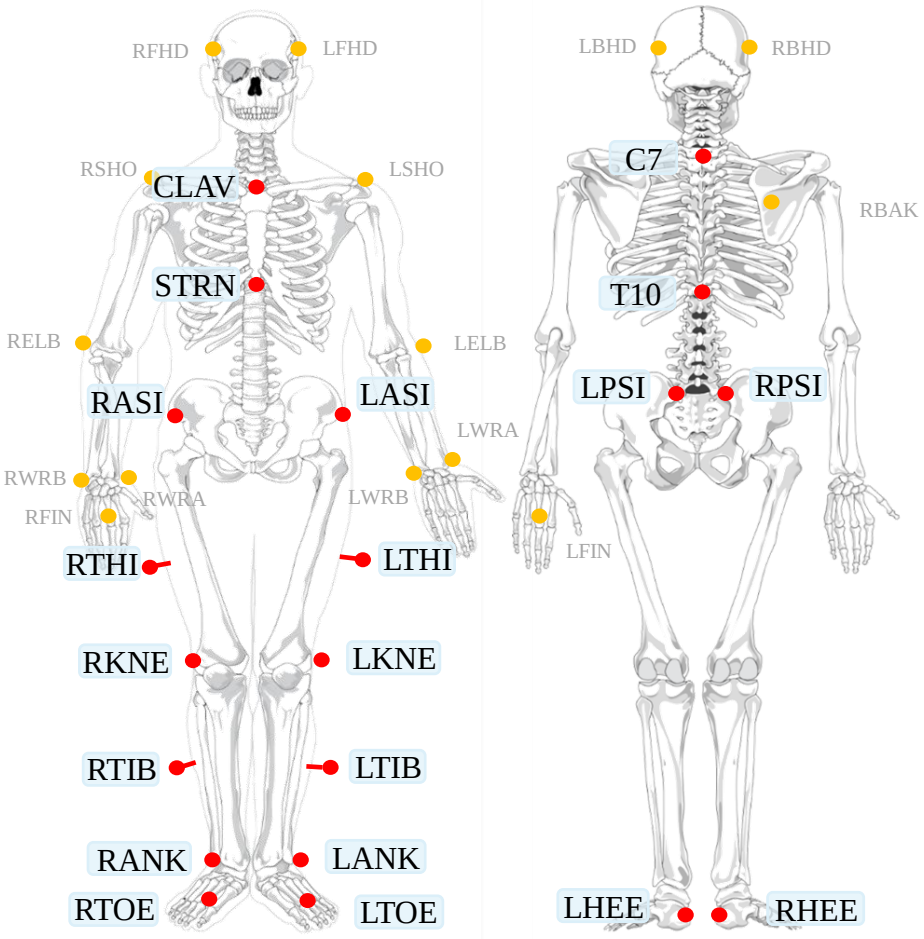
Results are presented as mean (standard deviation)
CP is Cerebral palsy
GMFCS is Gross Motor Function Classification System [1]
GPS is Gait Profile Score[2] *with mean value of right and left side*

[1] Palisano et al. 1997
[2] Baker et al. 2009

Minimal MarkerSet: Lower Limb Conventional Gait Model

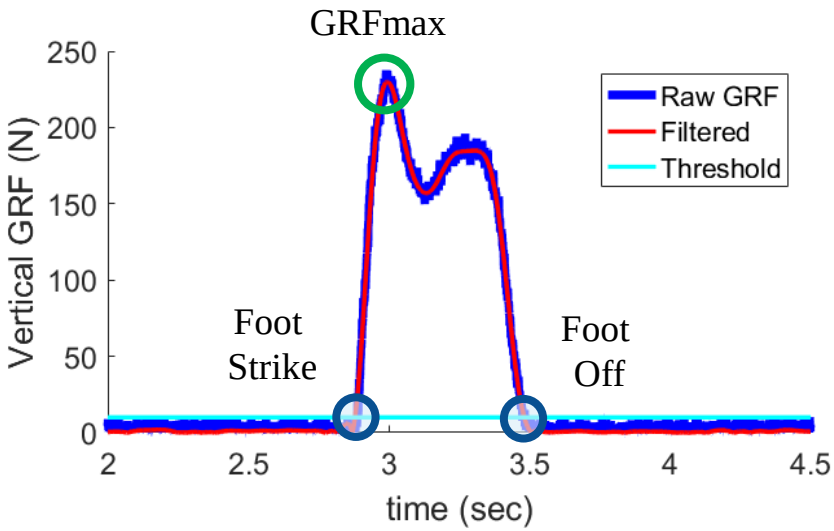
Segment	Marker Name	Marker Description
Trunk	C7	*Spinal Process of the 7th cervical vertebra*
	T10	*Spinal Process of the 10th thoracic vertebra*
	STRN	*Processus Xyphoideus*
	CLAV	*Incisura Jugularis*
Pelvis	R/LASI	*Right/Left Anterior Superior Iliac Spines*
	R/LPSI	*Right/Left Posterior Superior Iliac Spines*
R/L Thigh	R/LTHI	*Right/Left Mid-Thigh Wand*
	R/LKNE	*Right/Left Lateral Femoral Epicondyle*
R/L Shank	R/LTIB	*Right/Left Mid-Tibia Wand*
	R/LANK	*Right/Left Lateral Malleolus*
R/L Foot	R/LHEE	*R/L Posterior Calcaneus*
	R/LTOE	*R/L 2nd Metatarso-Cuneiform Joint*

Note: All the C3D file contain this minimal markerset (●) and most files also contains optional markers (●) on the upper limbs & hands (right and left) and four markers on the head.



Conventional Gait Model 1.0
(Davis, Ounpuu, Tyburski,&Gage, 1991)

Event Detection with forceplates: Step 1



Input: Raw vertical Ground Reaction Force

Step 1: 4th order Low-Pass Butterworth (10Hz)

Step 2: Identify Max of GRF

Step 3: Set threshold **(10N)**

Step 4: Identify events

- **Foot Strike** is the first frame **before** GRFmax that is below the threshold
- **Foot Off** is the first frame **after** GRFmax that is below the threshold

Step 5: Right or Left foot?

- Compute the midpoints of the right and left foot markers.
- Compute *dR* & *dL* the distance between the midpoints and the centre of the forceplate
- If *dR* > *dL* then the event are associated to the left foot and conversely

Output: Time of Foot Strike and Foot Off associated with Right or Left foot

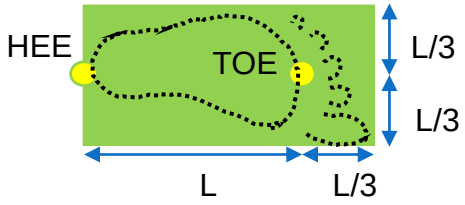
Event Detection with forceplates: Step 2

After the identification, two checks need to be done before validation of the event:

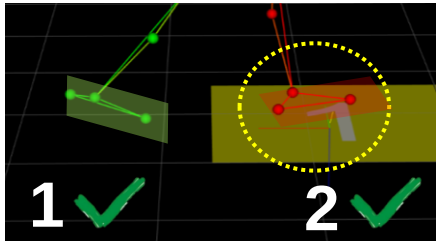
1. Is the ipsilateral foot fully on the forceplate?
2. Is the contralateral foot outside of the forceplate?

The two markers on the foot are used to define a rectangle representing the foot dimension

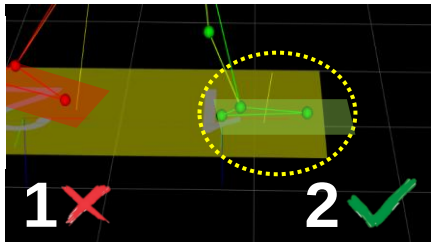
Foot Dimension



Event validated



Event removed: Case 1



Event removed: Case 2