



MD-PAEDIGREE



SAPIENZA
UNIVERSITÀ DI ROMA

Stength protocol

NND group - WP 11

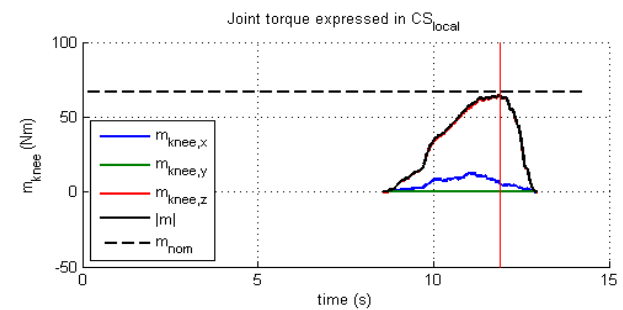
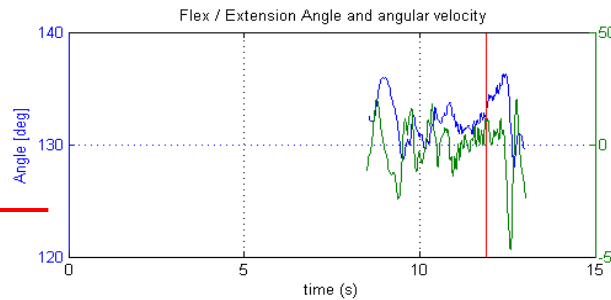
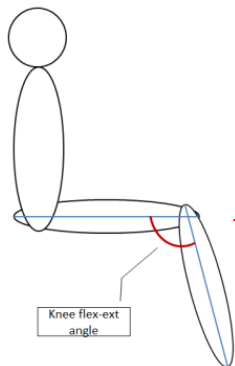
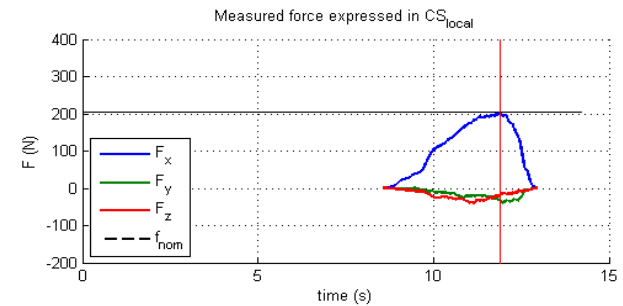
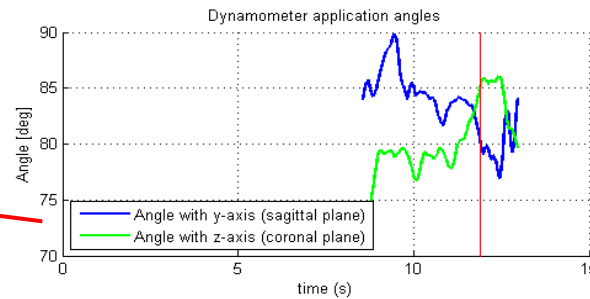
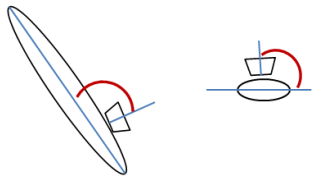
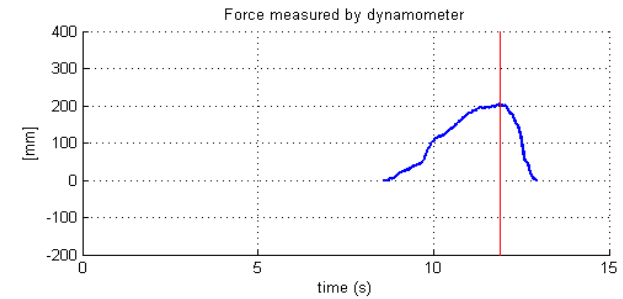
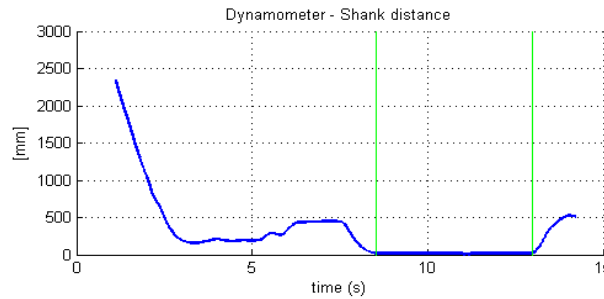
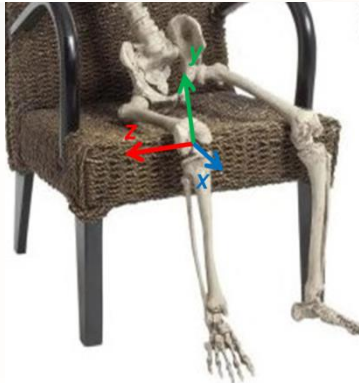
WP Leader: MOTEK

- We developed a MoCap protocol to support strength measurements. By this protocol we were able to accurately compute joint torques and to test quality of strength measurements.
- Numerical algorithms were designed to compute: effective direction of HHD application, application angles, joint range of motion, lateral components of force and moment, (due to the imperfect positioning of HHD).
- Preliminary analysis was completed and results were shown at the 1st motion analysis world conference (Rome, IT, 1-4 October 2014).
- 10 adult healthy subjects acquired so far.
- At the moment we are able to process knee and ankle trials.





Data processing: Knee ext.





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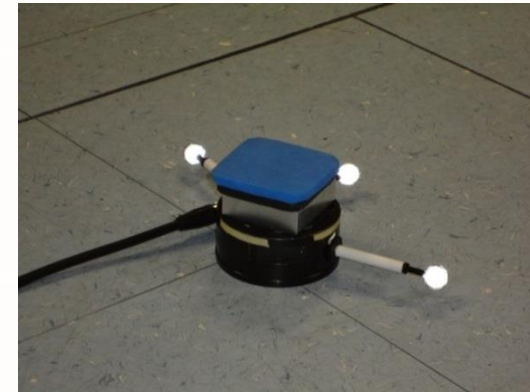
Kinematics											
	OP	Sex	Age	Mispositioning (mm)		Knee RoM [°]		Angle 1 [°]		Angle 2 [°]	
					CV		CV		CV		CV
Subj 1	1	F	29	7	0,89	11	0,66	89	0,06	79	0,09
Subj 2	2	M	26	55	0,29	29	0,34	81	0,08	57	0,25
Subj 3	1	M	30	-7	2,47	23	0,23	98	0,03	82	0,06
Subj 4	2	F	26	27	0,12	31	0,41	88	0,01	54	0,09
Subj 5	1	F	26	4	3,27	16	0,50	81	0,06	87	0,04
Subj 6	1	M	28	-17	0,72	36	0,10	91	0,02	89	0,08

Kinetics										
	OP	Sex	Age	Max Force [N]		Nominal Moment [Nm]	Moment Z	Moment X	Moment Y	Paired t-test Nominal vs Z
					CV					
Subj 1	1	F	29	170	0,13	55	52	10	0	0,0037
Subj 2	2	M	26	264	0,20	87	57	40	0	0,0024
Subj 3	1	M	30	234	0,07	74	73	10	0	0,4335
Subj 4	2	F	26	194	0,12	52	37	27	0	0,0109
Subj 5	1	F	26	219	0,07	71	70	3	0	0,3605
Subj 6	1	M	28	289	0,13	72	80	1	0	0,0006

Next steps:

An advanced device, composed of six components load cell (ATI Gamma, ATI Industrial Automation, USA) and force transferring layers, was designed and built. Data is recorded through the analog input port of the Vicon system and it is time synchronized with kinematic recording.

1 adult healthy subject was acquired as preliminary testing.



Next goals are:

- Record strength measurements by means of the six-components hand held load cell.
- Advanced study of lateral components of force and torque.
- Development of the numerical codes.
- Extend the study to subjects with pathology.



Upcoming Deliverable



The next deliverable for WP11 is D.11.2 due on February 2016

This deliverable will contain numerical results for the knee and ankle joints, investigated by means of the multi-component load cell.

The number of subjects will be extended.

We will define interesting parameters for the ankle joint and we will report a detailed analysis about HHD reliability on the ankle joint as well as numerical results of main and lateral components of force and torque that helps to characterize functionality of the anatomical joint.