



DeTOP

Dexterous Transradial Osseointegrated
Prosthesis with neural control
and sensory feedback

Grant Agreement number: 687905

Topic identifier: ICT-24-2015

Start date of project: 01/03/2016

Duration: 48 months

Project website: www.detop-project.eu

D1.2

DATA MANAGEMENT PLAN

Leader partner: SSSA

Due date of deliverable: 31/08/2016

Actual submission date: 31/08/2016

TYPE OF DELIVERABLE

R	Document, report (excluding the periodic and final reports)	X
DEM	Demonstrator, pilot, prototype, plan designs	
DEC	Websites, patents filing, press & media actions, videos, etc.	
OTHER	Software, technical diagram, etc.	

DISSEMINATION LEVEL OF DELIVERABLE

PU	Public, fully open, e.g. web	X
CO	Confidential, restricted under conditions set out in Model Grant Agreement	
CI	Classified, information as referred to in Commission Decision 2001/844/EC	

TABLE OF CONTENTS

1	Introduction	3
2	Intramuscular EMG	4
2.1	Data set description	4
2.2	Standards and metadata	4
2.3	Data sharing	4
2.4	Archiving and preservation (including storage and backup)	4
3	High-density Surface EMG	5
3.1	Data set description	5
3.2	Standards and metadata	5
3.3	Data sharing	5
3.4	Archiving and preservation (including storage and backup)	5
4	Long-term Extra-Muscular EMG	6
4.1	Data set description	6
4.2	Standards and metadata	6
4.3	Data sharing	6
4.4	Archiving and preservation (including storage and backup)	6
5	Microneurography	7
5.1	Data set description	7
5.2	Standards and metadata	7
5.3	Data sharing	7
5.4	Archiving and preservation (including storage and backup)	7

1 INTRODUCTION

The DeTOP project participates in the Open Research Data Pilot in Horizon 2020. The Open Research Data Pilot aims to make the research data generated by selected Horizon 2020 projects accessible with as few restrictions as possible, while at the same time protecting sensitive data from inappropriate access.

A first draft of the Data Management Plan (DMP) is provided in this Deliverable. This defines which and how data generated during the project will be made publicly available. Specifically, at the current status of the project, partners were able to identify four datasets:

- Intramuscular EMG
- High-density surface EMG
- Long-term extra-muscular EMG
- Microneurography

This DMP is not a fixed document; it will evolve and gain more precision and substance during the lifespan of the project. This first version will be updated during mid-term and final reviews to fine-tune it to the data generated and the uses identified by the project consortium.

2 INTRAMUSCULAR EMG

2.1 DATA SET DESCRIPTION

The data will consist of:

- intramuscular EMG signals from specific muscles;
- forces produced by the body parts (fingertips, or proximal phalanxes, or the hand) physiologically associated to the muscles.

The data could be useful to:

- scientists investigating various issues about human motor (voluntary) control;
- engineers investigating EMG as a control input for prosthetic/orthotic limbs (in particular arms/hands) and signal processing.

2.2 STANDARDS AND METADATA

The data will be collected following conventional scientific standards on EMG data acquisition. This means:

- Multiple EMG channels recorded simultaneously at a sampling frequency > 1000 Hz;
- Force sensor data acquired at the same frequency;
- Data stored in ASCII format;

A README file describing how the stored data is organized in the files will be created (model of the electromyographer, actual sampling frequency and amplification of the electromyographer, muscle being recorded, calibration matrices for the force sensors, etc.).

2.3 DATA SHARING

The data set and the associated document will be made available to any researcher interested in investigating the relationship between EMG and produced forces. The data set will be shared after a first publication will be secured by the Consortium. Tentatively this should happen within month 18. For obvious reasons, any researcher interested in pursuing this must consent to give acknowledgement to this effort by explicitly mentioning the DeTOP project (H2020, GA #687905).

2.4 ARCHIVING AND PRESERVATION (INCLUDING STORAGE AND BACKUP)

The data will be shared through a reputable and long lasting server, and linked by the DeTOP website. One possibility is the storage system offered by Nature Scientific Data (this would be free of charge); alternatively, the data could be stored in servers of University of Lund.

3 HIGH-DENSITY SURFACE EMG

3.1 DATA SET DESCRIPTION

The data will consist of:

- high density surface EMG signals (126 channels in a 9x14 electrode grid);
- surface EMG data from the antagonistic muscles;
- kinematic data from the hand, time-locked to the EMG signals;

The data could be useful to:

- scientists investigating various issues about human motor (voluntary) control;
- engineers investigating EMG as a control input for prosthetic/orthotic limbs (in particular arms/hands) and signal processing.

3.2 STANDARDS AND METADATA

The data will be collected following conventional scientific standards on EMG data acquisition. This means:

- multiple EMG channels recorded simultaneously at a sampling frequency > 1000 Hz;
- data stored in EDF format;

A README file describing how the stored data is organized in the files will be created (model of the electromyographer, actual sampling frequency and amplification of the electromyographer, muscle being recorded, calibration matrices for the force sensors, etc.).

3.3 DATA SHARING

The data set and the associated document will be made available to any researcher interested in investigating the relationship between EMG and kinematics. The data set will be shared after a first publication will be secured by the Consortium. Tentatively this should happen within month 18. For obvious reasons, any researcher interested in pursuing this data set must consent to give acknowledgement to this effort by explicitly mentioning the DeTOP project (H2020, GA #687905).

3.4 ARCHIVING AND PRESERVATION (INCLUDING STORAGE AND BACKUP)

The data will be shared through a reputable and long lasting server, and linked by the DeTOP website. One possibility is the storage system offered by PhysioNet (<https://www.physionet.org/physiobank/>), which is characterised by good visibility, automatic backup and the possibility to upload the data in the standard European Data Format (EDF).

4 LONG-TERM EXTRA-MUSCULAR EMG

4.1 DATA SET DESCRIPTION

The data will consist of:

- long-term (over 6 months) extra-muscular (e.g. recorded with epymisial electrodes) EMG signals from 4 to 6 muscles in one to three patients;
- linked to the related movements.

The data could be useful to:

- scientists investigating various issues about human motor (voluntary) control;
- engineers investigating EMG as a control input for prosthetic/orthotic limbs (in particular arms/hands) and signal processing.

4.2 STANDARDS AND METADATA

The data will be collected the day after implantation and at follow-ups for at least 6 months. Data will include:

- Multiple EMG channels recorded simultaneously at a sampling frequency > 1000 Hz, > 24 bits ADC;
- Information on the implantation sites
- Information on the related movements
- Data stored in MATLAB format;

4.3 DATA SHARING

The data and associated documentation will be part of the EMG data repository of the open source platform: BioPatRec (Github). The data will be made publically available after publication of the findings in peer-review journals. For obvious reasons, any researcher interested in pursuing this data set must consent to give acknowledgement to this effort by explicitly mentioning the DeTOP project (H2020, GA #687905).

4.4 ARCHIVING AND PRESERVATION (INCLUDING STORAGE AND BACKUP)

The data will be shared through BioPatRec repository and tentatively in a journal repository where the findings will be published, e.g. Nature Scientific Data.

5 MICRONEUROGRAPHY

5.1 DATA SET DESCRIPTION

The data will consist of:

- intraneural nerve fibre signals from particular nerves and identified mechanoreceptor afferent units; signals are acquired using the microneurography technique in awake human volunteers;
- associated measures of the stimuli used to activate the peripheral mechanoreceptor in the skin of the hand (such as: timing, force, velocity, acceleration).

The data could be useful to:

- scientists investigating various issues of human tactile sensory physiology;
- engineers working the field of prosthetic touch, investigating the relationship between real-world neural signals and patterns of applied electrical nerve stimulation.

5.2 STANDARDS AND METADATA

The data will be collected following conventional scientific standards on acquisition of single unit nerve signals. This means:

- Neural signals recorded at a sampling frequency of 16000 Hz;
- Sensor data acquired at the same frequency, or downsampled and synchronized with the neural records;
- Data stored in MATLAB format.

A readme file describing how the stored data is organized in the files will be created (information about the nerve, localization and type of the sensory receptor, associated sensor signals, actual sampling frequencies, amplification, calibration matrices).

5.3 DATA SHARING

The data set and the associated document will be made available to any researcher interested in investigating human tactile nerve signals. The data set will be shared after a first publication and will be secured by the Consortium. Tentatively this should happen within month 18. For obvious reasons, any researcher interested in pursuing this must consent to give acknowledgement to this effort by explicitly mentioning DeTOP (H2020 #687905).

5.4 ARCHIVING AND PRESERVATION (INCLUDING STORAGE AND BACKUP)

The data will be shared through a reputable and long lasting server, and linked by the DeTOP website. One possibility is the storage system offered by Nature Scientific Data (this would be free of charge).