



# **Tactile feedback enriched interaction through virtual reality and beyond**

***WP8 – Dissemination, exploitation &  
communication***

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## **D8.9 Open Research Data Management Plan 3**

Dissemination level: Public

GRANT NUMBER 856718



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<b>856718</b>	<b>D8.9 Open Research Data Management Plan 3</b>	<b>WP8</b>

### REVISION HISTORY

Modification Description	Author	Date
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Update in section 5	F. Argelaguet (INRIA)	21/09/2022
Update in section 7	M. Valle (UNIGE)	28/09/2022
Update of WP5 data	R. Baños (UVEG)	28/09/2022
Adding three extra data sets to WP3	S. Dosen, M. Garenfeld, M. Henrich (AAU)	30/09/2022

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## ACRONYMS

**AAU:** AALBORG UNIVERSITET

**AGA:** Annotated Model Grant Agreement

**CA:** Consortium Agreement

**DMP:** Data Management Plan

**DoA:** Description of the Action

**GA:** Grant Agreement

**GDPR:** General Data Protection Regulation

**IMM:** IMMERSION

**INRIA:** INSTITUT NATIONAL DE RECHERCHE EN INFORMATIQUE ET AUTOMATIQUE

**MVR:** MANUS MACHINAE BV

**ORDMP:** Open Research Data Management Plan

**ORDP:** Open Research Data Program

**ST:** SMARTEX S.R.L.

**TEC:** FUNDACION TECNALIA RESEARCH & INNOVATION

**TECSR:** TECNALIA SERBIA DOO BEOGRAD

**UNIGE:** UNIVERSITA DEGLI STUDI DI GENOVA

**UVEG:** UNIVERSITAT DE VALENCIA

**WP:** Work Package

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## EXECUTIVE SUMMARY

<p><b>Background</b></p> <p>This deliverable is an updated version of D8.7 and D8.8, which is the last version meant to describe strategies concerning the collection, correct processing, storage and protection of sensitive, confidential and personal data occurring during the project as well as after the end.</p>	<p><b>Aim</b></p> <p>The purpose of this DMP is to facilitate good data handling during and after the end of a project, indicating which data to collect / process / generate, the methodologies and standards followed, which data will be shared/made open access, and how data will be curated and preserved.</p>
<p><b>Approach</b></p> <p>Having a DMP is mandatory for projects participating in ORDP and is in the interest of society that is essential to determine the guidelines procedures and measures for data processing and sharing.</p>	
<p><b>Findings and results</b></p> <p>WP leaders, in collaboration with the rest of participants, have defined and described the most important datasets generated during the first 18 months of the project.</p>	
<p><b>Impact</b></p> <p>This deliverable facilitates good data handling during and after the end of a project.</p>	<p><b>Planned dissemination and/or exploitation</b></p> <p>Dissemination level of this deliverable D8.9 is public.</p>

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## 1 INTRODUCTION

### 1.1 Purpose of this document

One critical aspect in every research and innovation project is the collection as well as the production of several data sets containing both, non-sensitive public data and sensitive personal data, to cover the entire value chain. In order to ensure effective and correct treatment of the data during the entire course of the project and beyond, it is essential to determine the guidelines, procedures and measures for data processing and sharing in connection with TACTILITY project.

This Open Research Data Management Plan (ORDMP), deliverable D8.9 in the Dissemination and Exploitation Work Package 8 (WP8) aims to determine the type of data produced within the project, how the data will be used and collected, and how they will be processed and stored, not only during the course of the project, but after its end.

This was not a fixed document but a document that has been evolving and updated during the project execution until its end. The data sets that have been generated during the whole project have been included.

### 1.2 Structure

Details about datasets will be presented in sections 3 to 8 of this document in independent tables with the following information for each one.

#### 1.2.1 Dataset summary

Dataset name:	Type of access:	Format:
Creator:	Partner:	
Description:		
Restrictions on sharing:		
Ethical issue management (if any):		
Copyright (if any):		



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### 1.2.2 Additional information

Collecting/processing based on:
Quality assurance based on:
Not openly accessible because: (if applicable)
Archived on: (repository)
Will be archived for: (duration)

### 1.3 Related documents

There are two previous version of this document, in which preliminary information was included as the project was progressing:

- D8.7 Open Research Data Management Plan, M6
- D8.8 Open Research Data Management Plan 2, M19

The Guidelines on FAIR Data Management in Horizon 2020 as well as European law and national law will serve as the framework for the activities performed within TACTILITY.

The deliverable is subject to the conditions given in the GA number 856718, as well as the CA signed by all partners, where different aspects related to access rights are particularly governed.

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## 2 DATASET SUMMARY

The following summary table should be filled in by each dataset owner as tables are inserted in next sections. In TACTILITY project, the following tasks/activities will generate data that need to be handled:

WP	Task(s)	Title	Partner(s)
2 (4)	2.3 (4.4)	Control SW for Tactility stimulator	TECNALIA
3	3.1, 3.2	Spatial discrimination with full finger electrodes	AAU
4	4.4	Data from the evaluation of electrotactile feedback for contact rendering in VR	INRIA
4	4.4	Data from the evaluation of electrotactile feedback for augment VR interactions in VR	INRIA
4	4.4	Data from the assessment of action-specific perception & performance on a fitts' law task when using tactile feedback	INRIA
5	5.2, 5.3	Wp5_study 1_cockroaches	UVEG
5	5.1, 5.2, 5.3	Wp5_study 2_UVEG	INRIA, UVEG
5	5.2, 5.3	Wp5_study 3_UVEG	AAU, UVEG
5	5.2, 5.3	Wp5_study 4_cockroaches	UVEG
6	6.1, 6.2	Data from sensing patch mounted on the Baxter robot to classify three levels of stiffness	UNIGE
6	6.1, 6.2	Data from sensing patch mounted on the Baxter robot to classify five levels of stiffness on daily objects	UNIGE
7 (2, 3)	7.1 (2.3, 3.3)	C# middleware API for the stimulator	TECNALIA

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### 3 WORK PACKAGE 2 DATASETS

#### 3.1 Dataset: Control SW for Tactility stimulator

Dataset name: NeuroResearch-Tactility	Type of access: Tactility consortium and third parties	Format: .js files
Creator: G. Gaminde, J. Arcas, A. Garzo, E. Hernandez	Partner: TECNALIA	
Description: A version of TECNALIA's NeuroResearch SW platform adapted for Tactility stimulation configuration and control. It includes functionalities such as: <ul style="list-style-type: none"> <li>- Device connection</li> <li>- Virtual electrode definition</li> <li>- Stimulation pulse parameters setup</li> <li>- Pattern definition</li> <li>- Stimulation start and stop</li> <li>- ...</li> </ul> It is implemented in # as a standalone application for Windows systems.		
Restrictions on sharing: Available under request.		
Ethical issue management: Not applicable as it doesn't involve personal data		
Copyright: Registered with number TXu 2-294-191		

##### 3.1.1 Additional information

Collecting/processing based on: Not applicable
Quality assurance based on: Internal tests and laboratory evaluation of the system's behaviour
Not openly accessible because: It has been made openly accessible the middleware for controlling the stimulator (see section 8).
Archived on: TECNALIA Gitlab private repository
Will be archived for: >5 years

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## 4 WORK PACKAGE 3 DATASETS

### 4.1 Dataset: Spatial discrimination with full finger electrodes

#### 4.1.1 Dataset summary

Dataset name: Spatial discrimination	Type of access: Public	Format: Matlab and Excel file
Creator: Martin Alexander Garenfeld	Partner: AAU	
Description: This data set contains the results of a spatial discrimination test conducted in 13 healthy subjects. In this experiment, the individual pads of the Tactility matrix electrode placed on the subject's finger were activated and the subjects were asked to recognize the active pad. The dataset contains the subject responses including both activated and guessed pad. The files do not contain any personal information on the tested subjects, i.e., the data is fully anonymized. The dataset will be processed and the results (overall success rates) presented in the form of a scientific manuscript that will be submitted to a scientific journal.		
Restrictions on sharing: There are no restrictions on sharing		
Ethical issue management (if any): N.A.		
Copyright (if any): N.A.		

#### 4.1.2 Additional information

Collecting/processing based on: The subject reported identified pads verbally and the answer was registered electronically by the experimenter.
Quality assurance based on: The experiment itself is based on the ethical application submitted to the local ethics committee. The experiment, data collection and storage were performed according to the best practices in managing the research data defined by AAU.
Not openly accessible because (if applicable): N.A.
Archived on: Institutional repository
Will be archived for: At least 5 years

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## 4.2 Dataset: Amplitude calibration of full finger electrode

### 4.2.1 Dataset summary

Dataset name: Amplitude calibration	Type of access: Public	Format: Matlab and Excel files
Creator: Martin Alexander Garenfeld	Partner: AAU	
Description: The dataset contains the amplitude values obtained from the 13 subjects during stimulation calibration of the beta v2.1 electrode in the spatial discrimination experiment (see section 4.1) and was stored with the same discretion as for the dataset in section 4.1. The amplitude values dataset was used to train and evaluate prediction models for a faster calibration. The duration when using the updated calibration model was compared to the standard calibration routine in 8 healthy subjects. The validation (calibration duration) was stored in a dataset. The calibration models and validation will be included as an amendment to the scientific manuscript of the spatial discrimination study (section 4.1) following a revision.		
Restrictions on sharing: There are no restrictions on sharing.		
Ethical issue management (if any): N.A.		
Copyright (if any): N.A.		

### 4.2.2 Additional information

Collecting/processing based on: For each electrode pad, the amplitude was increased by the experimenter until the subject reported a pleasant/clear stimulation intensity. The experimenter then digitally stored the amplitude value. The time to calibrate the entire electrode was recorded with a timer and subsequently entered and stored digitally by the experimenter.
Quality assurance based on: The experiment itself is based on the ethical application submitted to the local ethics committee. The experiment, data collection and storage were performed according to the best practices in managing the research data defined by AAU.
Not openly accessible because (if applicable): N.A.
Archived on: Institutional repository
Will be archived for: At least 5 years

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### 4.3 Dataset: Discrimination of tactile icons on index finger

#### 4.3.1 Dataset summary

Dataset name: Tactile finger icons discrimination	Type of access: Public	Format: Matlab and Excel files
Creator: Martin Alexander Garenfeld	Partner: AAU	
Description: This dataset contains the results of tactile icon discrimination tests conducted in 6 healthy subjects. Tactile icons were designed for the full finger and fingertip using the beta v2.1 matrix electrode and the v2.3 circular electrode, respectively. Discrimination tests were performed for the two electrodes in separate sessions. A tactile icon was activated, and the subject was asked to recognize the icon. The dataset contains the subject response and the truly active icon for each session. The files do not contain any personal information on the tested subjects, i.e., the data is fully anonymized. The dataset will be processed, and the results (overall success rates) will be included as an amendment to the scientific manuscript of the spatial discrimination study (section 4.1) following a revision.		
Restrictions on sharing: There are no restrictions on sharing.		
Ethical issue management (if any): N.A.		
Copyright (if any): N.A.		

#### 4.3.2 Additional information

Collecting/processing based on: The subject placed his/her guess by selecting the tactile icon from a list in a graphical user interface and pressing a button to store the response and move to the next trial.
Quality assurance based on: The experiment itself is based on the ethical application submitted to the local ethics committee. The experiment, data collection and storage were performed according to the best practices in managing the research data defined by AAU.
Not openly accessible because (if applicable): N.A.
Archived on: Institutional repository
Will be archived for: At least 5 years

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#### 4.4 Dataset: Encoding of contact size

##### 4.4.1 Dataset summary

Dataset name: Encoding size	Type of access: Public	Format: Excel file
Creator: Mauricio Carlos Henrich	Partner: AAU	
Description: The dataset includes the results of an experimental study carried out in 11 healthy participants at AAU. In this experiment we investigated the capabilities of the high-resolution electrotactile stimulation delivered to the fingertip to convey the size of the contact. More specifically, we assessed performance in identifying the absolute size of the stimulus by recognizing the number of activated pads. Additionally, data regarding the subjective perception of the stimulus related to its spatial distribution will be made public. Data shared publicly is previously anonymized. This dataset will be part of a scientific publication that is soon to be submitted to a scientific journal.		
Restrictions on sharing: There are no restrictions on sharing		
Ethical issue management (if any): N.A.		
Copyright (if any): N.A.		

##### 4.4.2 Additional information

Collecting/processing based on: Individually reported perceived activated number of pads, and perceived stimulated area. The answer was registered electronically via a graphical user interface implemented in MATLAB.
Quality assurance based on: The experiment itself falls within an ethical protocol approved by the local ethics committee. The experimental protocol, data collection and storage were performed following data management practiced defined locally by AAU.
Not openly accessible because (if applicable): N.A.
Archived on: Institutional repository
Will be archived for: At least 5 years

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## 5 WORK PACKAGE 4 DATASETS

### 5.1 Dataset: Data from the evaluation of electrotactile feedback for contact rendering in VR

#### 5.1.1 Dataset summary

Dataset name: Contact	Type of access: Public	Format: Text
Creator: Sebastian Vizcay, Panagiotis Kourtesis, Ferran Argelaguet, Claudio Pacchierotti, Maud Marchal	Partner: Inria	
<p>Description:</p> <p>This dataset contains the data recorded during the evaluation of electrotactile feedback for contact rendering in virtual reality. The experiment consisted on a number of tasks in which the user had to touch a virtual cube using a virtual finger. The experiment followed a full within-factors design, interpenetration feedback (none, visual, electrotactile, both) × cube shading (solid, wireframe).</p> <p>For each trial the following data was recorded:</p> <ul style="list-style-type: none"> <li>• Finger position and speed for the entire each task.</li> <li>• Interpenetration between the virtual objects and the real user’s hand for the entire task.</li> <li>• Task completion and reaction times.</li> <li>• Experimental conditions (independent variables).</li> <li>• Results on subjective questionnaires.</li> </ul> <p>In addition, sensation and discomfort thresholds were also gathered at three different times during the experiment.</p> <p>The analysis of this dataset was used in the publication entitled “Evaluating Electrotactile Feedback for Contact Rendering of Virtual Surfaces” which was published and presented at the ICAT-EGVE 2021 conference.</p>		
<p>Restrictions on sharing:</p> <p>Only anonymized data is available to consortium due to ethical and privacy issues.</p>		
<p>Ethical issue management:</p> <p>ID codes assigned during data collection to preserve participants’ anonymity.</p>		
<p>Copyright:</p> <p>Not applicable</p>		

#### 5.1.2 Additional information

<p>Collecting/processing based on:</p> <p>The experimental design. Data collection was automatic.</p>
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Quality assurance based on: Quality tests in order to ensure that data recording was accurate.
Not openly accessible because (if applicable): NA
Archived on: Institutional repository
Will be archived for: Five years.

## 5.2 Dataset: Data from the evaluation of electrotactile feedback for augment VR interactions in VR

### 5.2.1 Dataset summary

Dataset name: Contact	Type of access: Public	Format: Text
Creator: Sebastian Vizcay, Panagiotis Kourtesis, Ferran Argelaguet, Claudio Pacchierotti, Maud Marchal	Partner: Inria	
Description: This dataset contains the data recorded during the evaluation of electrotactile feedback for rendering tactile interactions with virtual objects. The experiment consisted on three interaction tasks, in which the user had to either push a button, rub a surface or repeatedly tap a surface. Participants had to rank the coherency of the tactile sensations with respect to the interaction:  For each trial the following data was recorded: <ul style="list-style-type: none"> <li>• Finger position and speed for the entire each task.</li> <li>• Interpenetration between the virtual objects and the real user’s hand for the entire task.</li> <li>• Task completion and reaction times.</li> <li>• Experimental conditions (independent variables).</li> <li>• Results on subjective questionnaires.</li> </ul> In addition, sensation and discomfort thresholds were also gathered at three different times during the experiment.  The analysis of this dataset is provided in the publication entitled “Design and Evaluation of Electrotactile Rendering Effects for Finger-Based Interactions in Virtual Reality” which will be presented at ACM VRST 2022.		
Restrictions on sharing: Only anonymized data is available to consortium due to ethical and privacy issues.		
Ethical issue management:		

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ID codes assigned during data collection to preserve participants' anonymity.
Copyright: Not applicable

### 5.2.2 Additional information

Collecting/processing based on: The experimental design. Data collection was automatic.
Quality assurance based on: Quality tests in order to ensure that data recording was accurate.
Not openly accessible because (if applicable): NA
Archived on: Institutional repository
Will be archived for: Five years.

## 5.3 Dataset: Data from the assessment of action-specific perception & performance on a fitts' law task when using tactile feedback

### 5.3.1 Dataset summary

Dataset name: Contact	Type of access: Public	Format: Text
Creator: Panagiotis Kourtesis, Sebastian Vizcay, Ferran Argelaguet, Claudio Pacchierotti, Maud Marchal	Partner: Inria	
Description: This dataset was gathered in user study (N=24), in which participants had to perform a target acquisition task using a standardized Fitts' law task design using three feedback modalities: visual, visuo-electrotactile and visuo-vibrotactile. The users completed 3 Target Sizes X 2 Distances x 3 feedback modalities = 18 trials.  For each trial the following data was recorded: <ul style="list-style-type: none"> <li>• The size, distance, and movement time perception.</li> <li>• Task completion and reaction times.</li> <li>• Experimental conditions (independent variables).</li> <li>• Results on subjective questionnaires.</li> </ul> In addition, sensation and discomfort thresholds were also gathered at the beginning of the experiment.		

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<p>The analysis of this dataset has been used in the publication entitled “Action-Specific Perception &amp; Performance on a Fitts’ Law Task in Virtual Reality: The Role of Haptic Feedback” which will be presented at IEEE ISMAR 2022, and it will be published at the IEEE Transactions of Visualization and Computer Graphics journal.</p>
<p>Restrictions on sharing: Only anonymized data is available to consortium due to ethical and privacy issues.</p>
<p>Ethical issue management: ID codes assigned during data collection to preserve participants’ anonymity.</p>
<p>Copyright: Not applicable</p>

### 5.3.2 Additional information

<p>Collecting/processing based on: The experimental design. Data collection was automatic.</p>
<p>Quality assurance based on: Quality tests in order to ensure that data recording was accurate.</p>
<p>Not openly accessible because (if applicable):</p>
<p>Archived on: Institutional repository</p>
<p>Will be archived for: Five years.</p>

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## 6 WORK PACKAGE 5 DATASETS

### 6.1 Dataset: Wp5\_study 1\_cockroaches

#### 6.1.1 Dataset summary

Dataset name: Wp5_study 1_cockroaches.sav	Type of access: Private	Format: *.SAV
Creator: Rosa Baños	Partner: UVEG	
Description: Database of study 1 about the comparison between tactile and non-tactile conditions using alpha prototype		
Restrictions on sharing: Yes. Until paper publication		
Ethical issue management (if any): Participant's data was deleted and replaced by codes		
Copyright (if any): No		

#### 6.1.2 Additional information

Collecting/processing based on: Responses of participants during the study
Quality assurance based on: Comparison between tactile and non-tactile condition
Not openly accessible because: It will be released once the article is published
Archived on: osf.io ( <a href="https://osf.io/x2t5b">https://osf.io/x2t5b</a> )
Will be archived for: Five years

### 6.2 Dataset: Wp5\_study 2\_UVEG INRIA

#### 6.2.1 Dataset summary

Dataset name: Wp5_study 2_UVEG INRIA.sav	Type of access: Private	Format: *.SAV
Creator: Rosa Baños	Partner: UVEG - INRIA	

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<p>Description: Database of study 2 about the comparison between tactile and non-tactile conditions using alpha prototype and comparing positive and negative models</p>
<p>Restrictions on sharing: Yes. Until paper publication</p>
<p>Ethical issue management (if any): Participant's data was deleted and replaced by codes</p>
<p>Copyright (if any): No</p>

### 6.2.2 Additional information

<p>Collecting/processing based on: Responses of participants during the study</p>
<p>Quality assurance based on: Comparison between tactile and non-tactile condition</p>
<p>Not openly accessible because: It will be released once the article is published</p>
<p>Archived on: osf.io (<a href="https://osf.io/qky4t">https://osf.io/qky4t</a>)</p>
<p>Will be archived for: Five years</p>

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### 6.3 Dataset: Wp5\_study 3\_UVEG AAU

#### 6.3.1 Dataset summary

Dataset name: Wp5_study 3_ruberhand.sav	Type of access: Private	Format: *.SAV
Creator: Rosa Baños	Partner: UVEG AAU	
Description: Database of study 3 about the comparison between tactile and non-tactile conditions using GAMMA prototype for passive touch		
Restrictions on sharing: Yes. Until paper publication		
Ethical issue management (if any): Participant's data was deleted and replaced by codes		
Copyright (if any): No		

#### 6.3.2 Additional information

Collecting/processing based on: Responses of participants during the study
Quality assurance based on: Comparison between tactile and non-tactile condition
Not openly accessible because: It will be released once the article is published
Archived on: osf.io <a href="https://mfr.de-1.osf.io/render?url=https://osf.io/download/x2t5b/?direct%26mode=render">https://mfr.de-1.osf.io/render?url=https://osf.io/download/x2t5b/?direct%26mode=render</a>
Will be archived for: Five years

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## 6.4 Dataset: Wp5\_study 4\_cockroaches

### 6.4.1 Dataset summary

Dataset name: Wp5_study 4_cockroaches.sav	Type of access: Private	Format: *.SAV
Creator: Rosa Baños	Partner: UVEG	
Description: Database of study 4 about the comparison between tactile and non-tactile conditions using gamma prototype		
Restrictions on sharing: Yes. Until paper publication		
Ethical issue management (if any): Participant's data was deleted and replaced by codes		
Copyright (if any): No		

### 6.4.2 Additional information

Collecting/processing based on: Responses of participants during the study
Quality assurance based on: Comparison between tactile and non-tactile condition
Not openly accessible because: It will be released once the article is published
Archived on: osf.io ( <a href="https://osf.io/rfvc5">https://osf.io/rfvc5</a> )
Will be archived for: Five years

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## 7 WORK PACKAGE 6 DATASETS

### 7.1 Dataset: Data from sensing patch mounted on the Baxter robot to classify three levels of stiffness

#### 7.1.1 Dataset summary

Dataset name: Three levels of Stiffness	Type of access: Public	Format: .npy (numpy format)
Creator: Christian Gianoglio	Partner: UNIGE	
<p>Description:</p> <p>Tactile data collected by using P(VDF-TrFE) piezoelectric sensor patch on the gripper of the Baxter robot made of 8 sensors. The data have been collected performing grasp actions on three objects to classify their stiffness. We collected data by performing 20 grasp/release sequential trials on each object 12 times, modifying the position of Baxter arm each time, paying attention that at least one sensor out of the eight was in contact with the manipulated object. Eventually, we obtained 240 grasping operations on each object. Each trial takes 3 seconds: 1 second of grasping and 2 seconds of release.</p> <p>The analysis of the dataset is provided in two publications:</p> <ol style="list-style-type: none"> <li>1. Amin, Y., Gianoglio, C., &amp; Valle, M. (2021). Computationally Light Algorithms for Tactile Sensing Signals Elaboration and Classification. In 2021 28th IEEE International Conference on Electronics, Circuits, and Systems (ICECS) (pp. 1-6). IEEE. DOI: 10.1109/ICECS53924.2021.9665554.</li> <li>2. Amin, Y., Gianoglio, C., &amp; Valle, M. (2023). A novel tactile sensing system for robotic tactile perception of object properties. In AISEM Annual Conference on Sensors and Microsystems (pp. 182-187). Springer, Cham. DOI: 10.1007/978-3-031-08136-1_28.</li> </ol>		
Restrictions on sharing: No Restrictions		
Ethical issue management: Not applicable		
Copyright: Not at the moment		

#### 7.1.2 Additional information

Collecting/processing based on: The Baxter robot was programmed to automatically perform the grasp actions on the objects, having at least one sensor in contact with the object
Quality assurance based on: Analysis made by the experts and the results published in the two papers



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Not openly accessible because: Not applicable
Archived on: <a href="https://github.com/cosmiclabunige/3ClassStiffness">https://github.com/cosmiclabunige/3ClassStiffness</a>
Will be archived for: >5 years

## 7.2 Dataset: Data from sensing patch mounted on the Baxter robot to classify five levels of stiffness on daily objects

### 7.2.1 Dataset summary

Dataset name: Five levels of Stiffness	Type of access: Public	Format: .npy (numpy format)
Creator: Christian Gianoglio	Partner: UNIGE	
<p>Description:</p> <p>Tactile data collected by using P(VDF-TrFE) piezoelectric sensor patch on the gripper of the Baxter robot made of 8 sensors. The data have been collected performing grasp actions on five daily objects to classify their stiffness. Data were collected by grasping each of the five objects 400 times. Before the experiments, we determine the closure position of the gripper for each object, which corresponds to the gripper position when the touch occurs. During each trial, the gripper closes –at a constant velocity and force– to the predefined position, and remains closed for 1.2 seconds; then, it opens for two seconds.</p> <p>The analysis of the dataset is provided in a publication:</p> <ol style="list-style-type: none"> <li>1. Amin, Y., Gianoglio, C., &amp; Valle, M. (2023). Towards a Trade-off Between Accuracy and Computational Cost for Embedded Systems: A Tactile Sensing System for Object Classification. In International Conference on System-Integrated Intelligence (pp. 148-159). Springer, Cham. DOI: 10.1007/978-3-031-16281-7_15.</li> </ol>		
Restrictions on sharing: No Restrictions		
Ethical issue management (if any): Not applicable		
Copyright (if any): Not at the moment		

### 7.2.2 Additional information

Collecting/processing based on: The Baxter robot was programmed to automatically perform the grasp actions on the objects, having at least four sensors in contact with the object
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Quality assurance based on: Analysis made by the experts and the results published in the paper
Not openly accessible because: Not applicable
Archived on: <a href="https://github.com/cosmiclabunige/5ClassStiffness-daily-objects-">https://github.com/cosmiclabunige/5ClassStiffness-daily-objects-</a>
Will be archived for: >5 years

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## 8 WORK PACKAGE 7 DATASETS

### 8.1 Dataset: C# middleware API for the stimulator

Dataset name: TactilityAPIC++	Type of access: Publicly available	Format: .cpp/.hpp files
Creator: A. Dominguez, L. Querejeta, J. Arcas, A. Garzo	Partner: TECNALIA	
Description: Middleware API written in C++ for the control and configuration of the stimulator. All stimulation pulse parameters (amplitude, pulse width, frequency, compensation, synchrony,...) can be controlled with simple functions inside the safety ranges. See more information on <a href="https://git.code.tecnalia.com/class_api/open_class_api">https://git.code.tecnalia.com/class_api/open_class_api</a>		
Restrictions on sharing: GNU PL3 license		
Ethical issue management: Not applicable as it doesn't involve personal data		
Copyright: Not at the moment		

#### 8.1.1 Additional information

Collecting/processing based on: Not applicable
Quality assurance based on: Internal tests and laboratory evaluation of the system's behaviour
Not openly accessible because: Not applicable
Archived on: TECNALIA Gitlab public repository
Will be archived for: >5 years

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## 9 FAIR DATA

The scientific research data generated in Tactility project should be findable, accessible, interoperable and re-usable (FAIR<sup>1</sup>):

### 9.1 Making data findable, including provisions for metadata

Making data findable involves that the (meta)data generated in the project are identifiable and locatable. TACTILITY project will make its data produced available on Zenodo repository (<https://zenodo.org>). The project will follow the platform's guideline to optimize the possibilities for findability<sup>2</sup>, as using a Digital Object Identifier. Additionally, all data will follow a clear version number structure, if needed. For all quantitative and qualitative research in the project, non-identifiable metadata will be produced and made available on the aforementioned platform. Metadata will describe instruments used, methodologies employed and goals and target groups of the research. Metadata will be collected and appropriately stored by the researchers. All data will be anonymized.

Data concerning project progress and documentation as well as the deliverables defined in the GA will be made available to the European Commission via Funding & Tenders portal.

Within the Consortium, a SharePoint space has been associated to the Tactility Team, to have the centralized and always accessible repository of information where all partners will have access granted. Here all the relevant files needed to be shared and all the relevant information should be stored. Files are stored safely so that confidential information (at consortium level) could be stored.

### 9.2 Making data openly accessible

Open accessibility is related to the (meta)data and software generated in the project, and how to make them accessible and what kind of accessibility is given (licensing). TACTILITY will publish all its scientific publications by means of TECNALIA Publications, a tool based on RECOLECTA "Recolector de Ciencia Abierta" (Open Science Harvester) which is a platform that gathers all the Spanish scientific repositories together in one place and provides services to repository managers, researchers and decision-makers, and contributes to the creation of a nationwide infrastructure of Open Access scientific repositories. The RECOLECTA project follows the 'green' open access model.

TECNALIA has developed their own repository following RECOLECTA and OpenAire directions and facilities in order to fulfil international interoperability standards and protocols and gain long-term

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<sup>1</sup> M.D. Wilkinson, et al (2016), The FAIR Guiding Principles for scientific data management and stewardship, Sci. Data 3:160018

<sup>2</sup> To be Findable, section in <https://about.zenodo.org/principles/>. Last accessed 28/11/2019.

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sustainability. Moreover, the OpenAire repository will be also used by the consortium, by means of the OpenAire platform Zenodo, which is an open dependable home for the long-tail of science, enabling researchers to share and preserve any research outputs in any size, any format and from any science. The consortium will follow the repository’s principles for accessibility<sup>3</sup>. The TACTILITY consortium will decide, based on the nature of the generated data (and the level of confidentiality), the access permissions and licensing.

TACTILITY project has its own public website, available at <https://tactility-h2020.eu> based on WordPress, TLS, and hosted in Germany that informs about the project in general, its objectives, the consortium and that will link to public deliverables and other outcomes.

### 9.3 Making data interoperable

To allow (meta)data exchange and re-use between researcher, institutions, organisations, countries, etc. TACTILITY will assure the use of standard and interoperable formats. Moreover, standard vocabularies for all data types will be used to allow inter-disciplinary interoperability. When using Zenodo repository, the consortium will follow the repository’s principles for interoperability<sup>4</sup>, such as using JSON schema for data representation.

### 9.4 Increase data re-use (through clarifying licences)

According to the Guidelines to the Rules on Open Access to Scientific Publications and Open Access to Research Data in Horizon 2020, intention of TACTILITY partners is enabling maximum possible re-use of research data by third parties, whenever possible due to complying ethics restrictions of studies with volunteers and always re-using only anonymized data. The decision to allow the re-use of data will be taken by the person(s) responsible for the data, and might be dependent on different scenarios, i.e. if there is a journal’s embargo period associated to a publication.

When using Zenodo repository to make data being reusable, the consortium will follow the repository’s principles for reusability<sup>5</sup>. Duration of dataset storage (in particular after the end of the project) will be variable, highly dependent of the type of data stored and it will be decided by the person(s) responsible for the data.

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<sup>3</sup> To be Accessible, section in <https://about.zenodo.org/principles/>. Last accessed 28/11/2019.

<sup>4</sup> To be Interoperable, section in <https://about.zenodo.org/principles/>. Last accessed 28/11/2019.

<sup>5</sup> To be Reusable, section in <https://about.zenodo.org/principles/>. Last accessed 28/11/2019.

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## 10 DATA PROTECTION AND SECURITY

As already stated in section 5.1 of the DoA and in deliverable D9.3, confidentiality of participants in the TACTILITY experiments will be ensured and the according measures will be taken, as described in the overall approach (Section 1.3.1 of DoA). In particular, Regulation 2016/697 on the protection, management and processing of personal data will be complied. Unless required by other laws, only the researchers involved in the experiments, including the principal investigator, the members of the corresponding ethics committee and/or the competent authorities (if needed) will have access to participant personal data.

The beneficiary involved in the field of study (experiments participants) that include any collection and processing of personal data, including health data, will check if special derogations pertaining to the rights of data subjects have been established under the national legislation of the country where the research takes place.

For beneficiaries not required to appoint a Data Protection Officer (DPO) under the General Data Protection Regulation (GDPR 2016/679), a detailed data protection policy for the project is provided as part of D9.3. The beneficiary will explain how the data they intend to process is relevant and limited according to the purposes of this project (in accordance with the “data minimisation” principle). Other beneficiaries will appoint a DPO whom his/her contact details will be available to the participants involved in the experiments (and be a part of D9.3).

Deliverable D9.3 also includes the following items:

- description of the technical and organisational measures that will be implemented to safeguard the rights and freedoms of the data subjects/research participants;
- description of the security measures that will be implemented to prevent unauthorised access to personal data or the equipment used for processing;
- in case personal data are transferred from the EU to a non- EU country or international organisation, confirmation that such transfers are in accordance with Chapter V of the GDPR;
- in case that the personal data are transferred from a non-EU country to the EU (or another third country), confirmation that such transfers comply with the GDPR and the laws of the country in which the data were collected;
- detailed information on the informed consent procedures regarding data processing;

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- an explicit confirmation that the beneficiary has lawful basis for the data processing and that the appropriate technical and organisational measures are in place to safeguard the rights of the data subjects, in case of further processing of previously collected personal data.

Results of this field trial may be used for teaching, research, publications, or presentations at scientific meetings. If participants' individual results will need to be discussed, their identity will be protected by using a study code number or similar pseudo-anonymization. This will be explained to potential participants during the informed consent process. However, due to the nature of the experiments planned, it is not foreseen that any critical personal data will be required (e.g. detailed health records).

If necessary, participants will be asked to give their explicit consent to take photographs and/or make audio or video recordings, which may be used in scientific publications and presentations. This digital material will be anonymized (e.g. not recording or taking video of faces, using blur, etc.) No personal information about individual participants will be included in any presentations. All video records will be destroyed at the end of the analysis, unless an explicit consent has been obtained by the participant to use them for dissemination or training purposes. Research data will be retained for 5 years after the end of the project in line with national research data preservation requirements, and participants will be informed about the proposed period.

The procedure used for protecting the confidentiality of such personal data, including the security measures for storage and handling, will agree to Good Clinical Practice guidelines, in general, and to national legislation in each case. Participants' personal data will never be used for commercial purposes.

All the procedures and templates will be described in D9.3 and D9.1 and submitted to the Commission and the corresponding Ethical Committees and competent authorities when apply. Before any personal data recording and treatment, D9.3 must be accepted.

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## 11 ETHICAL CONSIDERATIONS IN DATA MANAGEMENT

The project includes an experimental component, which consists of different tests with human beings' participation with the aim of analysing the benefits of technological developments.

The subjects recruited for the experiments will be healthy people able of giving their own consent. Protected collectives as children, pregnant women, or people with cognitive impairments will be out of the scope. Data collected from participants will be treated according to the EU current standards, including GDPR.

Experiments will be conducted guaranteeing high-level ethical standards and clinical good practices, including the Declaration of Helsinki as reference, and, in particular, the following requirements will be met:

1. The participants must be adequately informed of:
  - I. the research's goals, including potential and direct benefits and risks;
  - II. the nature, extent and duration of the procedures;
  - III. arrangements to ensure respect for private life and confidentiality of the individual data;
  - IV. arrangements for access to participant-relevant information produced by the study;
  - V. the participants rights including that he/she is voluntary and can refuse or withdraw from the trial at any time without having to provide a reason for their decision.
2. The study protocol must be accepted by the corresponding ethical committee before enrolment.
3. The ethical questions potentially arising during the project will be addressed with transparency.
4. Anonymised data will be collected, unless personal data is required. In case that personal data is needed for the research, the minimum data will be collected (minimization principle of GDPR).
5. All data are processed fairly, confidentially and lawfully.
6. All European and international ethical/legal requirements are met.

Participants that fulfil the selection criteria and accept to participate in the experiments will be asked to give informed consent before their participation.

More details can be found in deliverables D9.1 to D9.6.



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## 12 SUPPORTING DOCUMENTS

AGA – Annotated Model Grant Agreement H2020, 2019, version 2019

[https://ec.europa.eu/research/participants/data/ref/h2020/grants\\_manual/amga/h2020-amga\\_en.pdf](https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/amga/h2020-amga_en.pdf)

General Data Protection Regulation, 2016

<https://gdpr-info.eu/>

Guidelines on FAIR Data Management in Horizon 2020, 2016, version 3.0

[https://ec.europa.eu/research/participants/data/ref/h2020/grants\\_manual/hi/oa\\_pilot/h2020-hi-oa-data-mgt\\_en.pdf](https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-data-mgt_en.pdf)

Guidelines to the Rules on Open Access to Scientific Publications and Open Access to Research Data in Horizon 2020, 2017, version 3.2

[https://ec.europa.eu/research/participants/data/ref/h2020/grants\\_manual/hi/oa\\_pilot/h2020-hi-oa-pilot-guide\\_en.pdf](https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-pilot-guide_en.pdf)