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## Plan Overview

A Data Management Plan created using DMPOnline

Title: M.Sc. Thesis Graduation Project: Tactile feedback by electrovibration technology (Investigating the effect of scanning speed and applied force as the users freely explore the electrovibration enabled touchscreen surface)

Creator: Abhishek Kumar Kejriwal

Principal Investigator: Abhishek Kumar Kejriwal

Affiliation: Delft University of Technology

Template: TU Delft Data Management Plan template (2021)

### Project abstract:

Touchscreens have become a necessary part of modern life. Although there is growing popularity of touch-enabled devices, the lack of dynamic tactile feedback reduces the users' immersion during the interaction. To combat this issue, surface haptics can be used to enhance user immersion and complement visual and auditory feedback. Electro vibration is one such surface haptic technique that can be used to create different tactile effects on touchscreen displays by modulating the input signal properties. The perceived stimulus also depends on the insulator properties, exploratory behaviour (force and scanning speed), and other external parameters. In prior works, these factors have been regularly controlled for studying their effects on human tactile perception and to provide users with consistent haptic feedback. However, problems arise when the users' exploratory behaviour is restricted, as real-life tactile exploration involves active and unconstrained engagement between the two surfaces. Moreover, consciously or unconsciously, users tend to adapt or optimise their exploratory behaviour to the perception, task, and surface textures. Different exploratory movements can change the fingertip contact area and the air gap between the skin and the touchscreen surface, which can alter the electrical impedance in the resulting electrical model between the two surfaces, leading to alteration in human perception. Hence, the optimal range of exploratory parameters remains unknown and needs further investigation. Ultimately, this study aims to find the optimal exploratory behaviour of the user as they are allowed to freely explore the electrovibration touch-enabled surface and provide a subjective sensational rating of the same.

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Start date: 29-05-2023

End date: 31-08-2023

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# M.Sc. Thesis Graduation Project: Tactile feedback by electrovibration technology (Investigating the effect of scanning speed and applied force as the users freely explore the electrovibration enabled touchscreen surface)

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## 0. Administrative questions

1. Name of data management support staff consulted during the preparation of this plan.

My faculty data steward, Bjorn Bartholdy, has reviewed this DMP on 22/05/2023.

2. Date of consultation with support staff.

2023-05-22

## I. Data description and collection or re-use of existing data

3. Provide a general description of the type of data you will be working with, including any re-used data:

| Type of data                                                 | File format(s) | How will data be collected (for re-used data: source and terms of use)? | Purpose of processing                                                                                                                                                                                                       | Storage location   | Who will have access to the data                                  |
|--------------------------------------------------------------|----------------|-------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------------------------------------------------------|
| Participant age and gender                                   | .csv files     | Online form                                                             | To know if there's an effect of age and gender on human sensitivity (Can be validated with the previous research data)                                                                                                      | TU Delft One Drive | The project investigator, Thesis supervisor: Prof. Yasemin Vardar |
| Participants finger scanning speed raw data                  | .csv files     | Using a touch module IR sensor                                          | To investigate the effect of scanning speed on tactile perception and find an optimal range of exploratory behaviour combinedly (applied force and scanning speed)                                                          | TU Delft One Drive | The project investigator, Thesis supervisor: Prof. Yasemin Vardar |
| Participants finger applied force raw data                   | .csv files     | Using a force sensor (ATI Nano Platinum17 sensor)                       | To investigate the effect of applied force on tactile perception and find an optimal range of exploratory behaviour combinedly (applied force and scanning speed)                                                           | TU Delft One Drive | The project investigator, Thesis supervisor: Prof. Yasemin Vardar |
| Participant's perception ratings on a adjective rating scale | .csv files     | Using MATLAB app designer                                               | To study how the generated signals (by modulating the frequency and amplitude) have an effect on human sensation. After every exploration users can input their subjective rating to a sensation on a Likert scale (1 to 5) | TU Delft One Drive | The project investigator, Thesis supervisor: Prof. Yasemin Vardar |
| Participants feedback                                        | Paper          | Manually over a paper                                                   | Participants will answer two questions which will work as a feedback for the experimental study and the explored technology                                                                                                 | TU Delft One drive | The project investigator, Thesis supervisor: Prof. Yasemin Vardar |

4. How much data storage will you require during the project lifetime?

- < 250 GB

## II. Documentation and data quality

5. What documentation will accompany data?

- Methodology of data collection
- README file or other documentation explaining how data is organised
- Data dictionary explaining the variables used
- Data will be deposited in a data repository at the end of the project (see section V) and data discoverability and re-usability will be ensured by adhering to the repository's metadata standards

### III. Storage and backup during research process

6. Where will the data (and code, if applicable) be stored and backed-up during the project lifetime?

- OneDrive

### IV. Legal and ethical requirements, codes of conduct

7. Does your research involve human subjects or 3rd party datasets collected from human participants?

- Yes

8A. Will you work with personal data? (information about an identified or identifiable natural person)

If you are not sure which option to select, first ask your [Faculty Data Steward](#) for advice. You can also check with the [privacy website](#). If you would like to contact the privacy team: [privacy-tud@tudelft.nl](mailto:privacy-tud@tudelft.nl), please bring your DMP.

- Yes

8B. Will you work with any other types of confidential or classified data or code as listed below? (tick all that apply)

If you are not sure which option to select, ask your [Faculty Data Steward](#) for advice.

- No, I will not work with any confidential or classified data/code

9. How will ownership of the data and intellectual property rights to the data be managed?

For projects involving commercially-sensitive research or research involving third parties, seek advice of your [Faculty Contract Manager](#) when answering this question. If this is not the case, you can use the example below.

The datasets underlying the published papers will be publicly released following the TU Delft Research Data Framework Policy. During the active phase of research, the project leader from TU Delft will oversee the access rights to data (and other outputs), as well as any requests for access from external parties. They will be released publicly no later than at the time of publication of corresponding research papers.

10. Which personal data will you process? Tick all that apply

- Gender, date of birth and/or age
- Data collected in Informed Consent form (names and email addresses)

- Signed consent forms

11. Please list the categories of data subjects

General public

12. Will you be sharing personal data with individuals/organisations outside of the EEA (European Economic Area)?

- No

13. To which countries will you be transferring personal data:

14. Please contact the privacy team ([privacy-tud@tudelft.nl](mailto:privacy-tud@tudelft.nl)) for advice on data transfer. Please also bring your draft DMP when contacting the privacy team.

Please record below their advice, the data transfer mechanism used and agreed security measures:

15. What is the legal ground for personal data processing?

- Informed consent

16. Please describe the informed consent procedure you will follow:

All study participants will be asked for their written consent for taking part in the study and for data processing before the start of the experiment.

17. Where will you store the signed consent forms?

- Same storage solutions as explained in question 6

18. Does the processing of the personal data result in a high risk to the data subjects?

If the processing of the personal data results in a high risk to the data subjects, it is required to perform a [Data Protection Impact Assessment \(DPIA\)](#). In order to determine if there is a high risk for the data subjects, please check if any of the options below that are applicable to the processing of the personal data during your research (check all that apply).

If two or more of the options listed below apply, you will have to [complete the DPIA](#). Please get in touch with the privacy team: [privacy-tud@tudelft.nl](mailto:privacy-tud@tudelft.nl) to receive support with DPIA.

If only one of the options listed below applies, your project might need a DPIA. Please get in touch with the privacy team: [privacy-tud@tudelft.nl](mailto:privacy-tud@tudelft.nl) to get advice as to whether DPIA is necessary.

If you have any additional comments, please add them in the box below.

- None of the above applies

22. What will happen with personal research data after the end of the research project?

- Personal research data will be destroyed after the end of the research project
- Anonymised or aggregated data will be shared with others

## V. Data sharing and long-term preservation

26. What data will be publicly shared?

- All data (and code) underlying published articles / reports / theses

27. Apart from personal data mentioned in question 22, will any other data be publicly shared?

- All other non-personal data (and code) underlying published articles / reports / theses

28. How will you share your research data (and code)?

- All data will be uploaded to 4TU.ResearchData

29. How will you share research data (and code), including the one mentioned in question 22?

- All anonymised or aggregated data, and/or all other non-personal data will be uploaded to 4TU.ResearchData with public access

30. How much of your data will be shared in a research data repository?

- < 100 GB

31. When will the data (or code) be shared?

- As soon as corresponding results (papers, theses, reports) are published

32. Under what licence will be the data/code released?

- CC BY

## VI. Data management responsibilities and resources

33. Is TU Delft the lead institution for this project?

- Yes, the only institution involved

34. If you leave TU Delft (or are unavailable), who is going to be responsible for the data resulting from this project?

Yasemin Vardar (Y.Vardar@tudelft.nl)

35. What resources (for example financial and time) will be dedicated to data management and ensuring that data will be FAIR (Findable, Accessible, Interoperable, Re-usable)?

4TU.ResearchData is able to archive 1TB of data per researcher per year free of charge for all TU Delft researchers. We do not expect to exceed this and therefore there are no additional costs for long-term preservation.