
Understanding the Utility of Evoked Resonant Neural Activity from Deep Brain Stimulation in Parkinson's Disease - PhD Student Nathan Nhan Ai Trinh

A Data Management Plan created using DMPOnline

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Funder Body: DEEP BRAIN STIMULATION TECHNOLOGIES (DBS TECH) PTY LTD-STUDENT PROJECT AND PLACEMENT

Funder Code: 82799

Funder Code: STUDENT PROJECT AND PLACEMENT

Grant Type: FUNDING PROPOSAL

Start Date: 2024-02-01

End Date: 2028-02-28

Faculty: Faculty of Engineering

Faculty: Faculty of Engineering

School: Grad. School of Biomedical Eng

Status: Successful (RGC Release Pending)

InfoEd Id: RG241075

RDMP Id: D0426398

DMPOnline Id: 9389

What is the highest/most secure data classification level that applies to any component of the data?:

Sensitive

Project abstract:

The goal of this project is to develop a comprehensive understanding of evoked resonant neural activity (ERNA), from its dynamics in response to the breakdown of selective neurons, to its spatiotemporal dependencies. This enables the prospect of current steering to achieve optimised therapeutic charge delivery. This project aims

to bridge the gap in knowledge regarding the modulation of ERNA by exploring its underlying mechanisms and potential for therapeutic use in the treatment of Parkinson's Disease.

Last modified: 21-05-2024

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Data Collection

- High frequency electrophysiological readings - TDT format
 - All biometric and health status data as required by Animal Ethics on monitoring sheets - handwritten and scanned
 - Notes and observations during experimentation - LabArchives
 - All histological, light-sheet microscopy and immunofluorescence imaging data - TIFF
-
- SPSS - statistical package for social sciences (.sav)
 - Portable document format (.pdf)
 - Tagged image file format (.tiff)

Proprietary TDT file format for electrophysiological data will be used as it is the preferred output format for team.

- Yes

Handwritten notes detailing animal monitoring data will be held on Level 4 Samuels Animal facility or Level 5 Samuels student office.

Data will be digitised and transferred onto UNSW LabArchives. Exported copies will be pushed to read-only UNSW Data Archive at the end of each week.

File names will follow the convention outlined in the next section.

All primary data will be collected and uploaded to UNSW Data Archive for long-term storage. File naming conventions will be as follows:

YYMMDD-`{SUBJECT_ID}`_`{DESCRIPTOR}``{VERSION}`]

e.g. 250214-007A_RcvyTrackSheet[1]

Subject ID's will be structured by a 3-digit numbering system and accompanying alpha character as follows:

`###{A/B/C/...}`

Each animal will have a unique subject ID, but we anticipate multiple trials per animal may be within the scope of investigation.

Subject ID field will be tracked through a subject register with reference to ID's used on animal tracking sheets and softmouse. Subject register will be stored on LabArchives. Descriptors will include key information such as versioning (encased in square brackets), brief description (consistent, brief and in StartCase) and process ID (prefixed with "S" or "P" character). Procedural ID's will be prefixed with "P" character followed by a 4-digit number. Surgical ID's are prefixed with a "S" character followed by a 4-digit number independent of procedural ID's.

Descriptors will be a single string in StartCase with no space characters.

E.g.

- 250214-007A_EPhysRaw[1] : 14th February 2025, Raw electrophysiological data on subject 007 trial A version 1.
- 250214-001A_NRcvyTrackSheet_S0092[1] : 14th February 2025, Non-recovery surgical tracking sheet on subject 001 trial A. Surgery 0092 version 1.
- 006A_P1PeakLatency[2] : Subject 6 trial A. P1 peak latencies version 2

Files will be grouped in folders according to descriptors depending on data processing step and stage. Live working versions of data will be stored on OneDrive and once processed, will be pushed to UNSW Data Archive alongside a SHA-256 hash.

All primary data and images supplied from KGLMF will be stored alongside a SHA-256 hash file on UNSW Data Archive and set to read-only. A checksum redundancy will be stored on LabArchives.

All derivative data generated will be tracked in a changelog, tracked on the Primary Data & Derivatives Register. Key metadata includes primary data source, data dependencies, time modified and change author. All registers are stored on UNSW Lab Archives.

All surgical & procedural metadata will be logged in the Surgical and procedural register and accompanying auxiliary

Surgical and procedural Notes stored on UNSW LabArchives. Register and notes will correlate the process ID with the accompanying electrophysiological data and subject. Notes will contain batch and manufacturer metadata on key injectables, procedural dependencies and materials used.

Proprietary TDT software will be used to collect and preprocess raw data. Data will be stored in a network-connected data pool upon collection. Upon completion of experimentation, electrophysiological data will be hashed on the computer connected to the rig. The generated hash and stored data will then be logged into the Primary Data & Derivatives Register on UNSW LabArchives. Primary data and accompanying hash will then be pushed to UNSW Data Archive for read-only access. All derivative data will be downloaded to the project OneDrive in a working folder to be processed. Downloaded data will be checked for integrity via hash prior to commencement of work. All major revisions, processing outputs and further derivatives are logged on the Primary Data & Derivatives Register. TIFF image formats from KGLMF are open source and easily accessible.

Documentation and Metadata

SOP's and manuals will be stored on OneDrive in relevant folders.

Electrophysiological data in TDT format will preserve key metadata such as units of measurement and experimental setup. All generated procedural metadata will be stored on ledgers and changelogs as mentioned above.

Image metadata will be made available from KGLMF. Image metadata will be stored on OneDrive and backed up on UNSW Data Archives.

Physical filing systems - Animal tracking sheets will be grouped by subject in a ring binder folder. Sheets will clearly demark which stage of monitoring is being tracked.

Folder directory structures - UNSW Data Archive will contain the following data:

- All primary electrophysiological data with accompanying SHA-256 hash
- Derivative processed datasets with correlated changelogs in Primary Data & Derivatives Ledger stored on LabArchives
- Exported Surgical Ledger and Subject Ledger on LabArchives with accompanying notes auxiliary logs and notes
- Primary imaging data from KGLMF with accompanying SHA-256 hash

Each data category will be stored in an accompanying folder within the Data Archive and set to read-only. All primary data will also be tracked on derivatives ledger.

As described above.

Ethics and Legal Compliance

- UNSW
- Other

Deep Brain Stimulation Technologies Pty. Ltd.

- UNSW
- Other

Deep Brain Stimulation Technologies Pty. Ltd. 2024

Nathan Nhan Ai Trinh

1. All Project IP will vest in Deep Brain Stimulation Technologies Pty. Ltd., except that the Student owns copyright in their Student Thesis. UNSW assigns to Deep Brain Stimulation Technologies Pty. Ltd. all its right, title and interest in and to the Project IP and agrees to do all things reasonably necessary to give effect to such ownership and assignment (including ensuring its Personnel do the same).
2. Deep Brain Stimulation Technologies Pty. Ltd. grants to UNSW and the Student an irrevocable, perpetual, sub-licensable, non-transferable, non-exclusive, royalty and fee free licence to use the Project IP:
 - for the purposes of conducting the Project, for the duration of the Project;
 - to the extent necessary for the Student to complete the requirements of the examinable process in accordance with the relevant conditions of award of their HDR; and
 - for non-commercial research and education purposes.

All data is classified as private unless published.

Storage and Backup

Data will be stored in network-connected storage pool upon collection. All primary data will be pushed to UNSW Data Archive with accompanying hash file as soon as practicably possible. All primary data will be treated as read-only. All primary data on UNSW Data Archive and accompanying hashfile will be treated as the source of truth with hashfiles ensuring data integrity.

Derivative datasets when complete and created will be tracked on the applicable ledger and changelog, hashed for files larger than 5GB, and pushed to UNSW Data Archive alongside the hashfile (if applicable).

RPM will be responsible for maintaining data redundancy, ledgers, and changelogs to ensure procedures that generated derivative datasets are preserved and reproducible.

In the event of data loss, affected datasets will be pulled from UNSW Data Archive, checksummed, then subject to all applicable actions outlined in changelogs to recover lost derivative datasets.

Unlimited access and security rights will be given only to LCI and RPM. Should data be requested or be shared, a dedicated OneDrive external folder with reduced access controls will serve as a repository for requested files. Shared files will always be a read-only copy of original data. All data pushed to UNSW Data Archive will be treated as a read-only repository and cannot be edited.

- Institutional repository

All data will be held in UNSW Data Archive after project closure for a minimum of 7 years after project completion. A full copy will be made available to Deep Brain Stimulation Technologies.

Selection and Preservation

All data (inclusive of metadata) will have retention value for prospects of reproducibility and integration into future datasets. Data must be retained for a minimum of 7 years and is classified as private, hence, there is no expectation to destroy or retain data after this time period.

All data and metadata will be held in UNSW Data Archive in raw and processed formats.

Data Sharing

Data will be shared either through publication, sharing with Deep Brain Stimulation Technologies, or sharing with other research groups. All shared data will be sandboxed within a restricted permission folder on OneDrive and given as a copy of original data. Data can only be shared externally with permission from Deep Brain Stimulation Technologies.

Data will be exclusively used by project members and Deep Brain Stimulation Technologies. Data shared externally to Deep Brain Stimulation Technologies will be provided as a copy alongside accompanying metadata.

All project IP will be considered private and confidential until appropriate licensing and publication has been sought by either UNSW or Deep Brain Stimulation Technologies.

Upon completion of the project, all project IP inclusive of all generated data and metadata must be transferred to Deep Brain Stimulation Technologies.

Responsibilities and Resources

The research project manager

n/a