Plan Overview

A Data Management Plan created using HKUL DMPTool

Title: Advanced Fiber-Optic Acoustic Sensors

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Template: HKU Template

Project abstract:

As an advanced technology integrating precision optical detection with acoustic sensing capabilities, fiber-optic acoustic sensors exhibit immense potential across diverse fields owing to their exceptional sensitivity, wide frequency response, and inherent immunity to electromagnetic interference. Although conventional Fabry–Perot (F-P) structures have achieved considerable progress in precision detection, the performance of traditional single-material diaphragms often imposes limitations on the overall sensor capability, particularly in high-frequency ultrasonic detection or complex acoustic field environments. Inspired by recent advances in materials science and micro/nano fabrication—especially the emergence of novel functional materials (e.g., flexible media with unique acoustic impedance matching characteristics) and heterogeneous composite structures—We aim to explore novel diaphragm structures and the coupling mechanisms of functional materials, thereby opening new technological pathways for the development of next-generation fiber-optic acoustic sensors featuring superior sensitivity and broadband response.

Start date: 09-01-2025

End date: 10-31-2028

Last modified: 04-27-2026

Advanced Fiber-Optic Acoustic Sensors

Data Collection

What data will you collect or create?

4.Laboratory research data

This project primarily generates original experimental data, specifically focusing on optical signal power and sensor frequency response (ranging from Hz to kHz) captured during laboratory characterization. These data will be stored in CSV and .mat formats to ensure the long-term accessibility .Given the high sampling rates required for acoustic signal capture, the raw data volume is expected to be moderate.

How will the data be collected or created?

I will adhere to the FAIR (Findable, Accessible, Interoperable, and Reusable) data principles, employing a systematic approach to ensure data integrity and traceability. I will organize the data using a hierarchical folder structure categorized by [Date] and [Experimental Parameters], ensuring that every file follows a standardized naming convention.

To guarantee the reliability of the experimental results, I will implement rigorous standardized protocols and perform multiple replicated samplings to minimize random errors. Furthermore, I will document all metadata using domain-specific controlled vocabularies to facilitate future data integration and cross-validation.

Documentation and Metadata

What documentation and metadata will accompany the data?

My submitted data will be accompanied by core metadata—including authorship, title, date, access permissions, and file formats—alongside key experimental details such as instrument specifications, environmental temperature, and specific testbench settings. I will ensure all measurements strictly follow SI standards to maintain consistency and clarity.

Ethics and Legal Compliance

How will you manage any ethical issues?

I confirm that this research does not involve human subjects, live animals, or socially sensitive private data; all data generated during the research are physical experimental results obtained within a laboratory environment. Consequently, approval from relevant ethics committees is not required. As no personal privacy information is involved, data anonymization is unnecessary for this project. However, to protect the intellectual property (IP) of core research findings, I will employ encrypted storage and restricted access to ensure data security during transmission and storage, preventing any unauthorized disclosure prior to formal publication. Following publication, I will share non-sensitive data through open-access platforms as required by the respective journals.

How will you manage copyright and Intellectual Property Rights (IP/IPR) issues?

I confirm that the intellectual property rights (IPR) for all raw data, experimental records, and analytical results generated in this research reside with my home institution, The University of Hong Kong (HKU). As the lead researcher, I hold the copyright and authorship for these datasets. Throughout the project development, all data usage will strictly adhere to the relevant policies of both the funding agencies and the University. For any data derived from third-party simulation software or standard libraries, I will strictly comply with their specific licensing terms, ensuring appropriate attribution in the final outputs and sharing only within the authorized scope.

Storage and Backup

How will the data be stored and backed up during the research? i. e. until stored in the final location (e.g. on your password protected laptop)?

During the research process, my raw experimental data will be temporarily stored on dedicated workstations connected to the laboratory equipment. I will ensure in advance that these workstations have sufficient local storage capacity. To prevent single points of failure, data will not be retained solely on a single laptop for the long term. I will implement daily incremental backups and weekly full backups to minimize the risk of data loss.

How will you manage access and security?

I will strictly limit access to the research data. Raw experimental data will be stored exclusively on password-protected local workstations and within my HKU OneDrive personal account. When collaboration with my supervisor or team members is required, I will use HKU’s internal controlled sharing links with "read-only" permissions or expiration dates, avoiding the use of unsecure instant messaging tools for sending attachments.

Selection and Preservation

Which data are of long-term value and should be retained, shared, and/or preserved?

Data with long-term preservation value include:

Calibrated raw experimental records: These comprise the original response data of the sensors across various acoustic pressures and frequencies, serving as the sole evidence for verifying paper conclusions, such as sensitivity and linearity.
Final analytical results and metadata: These include processed frequency response curves, computational models, and relevant experimental configuration parameters, which provide essential reference value for future comparative studies.

What is the long-term preservation plan for the dataset?

I will conduct data organization and the compilation of comprehensive README files before the project concludes. Upon completion of the research, I will migrate the datasets of long-term value and their associated documentation to HKU DataHub for permanent preservation.

Data Sharing

How will you share the data?

As the raw datasets often contain extensive experimental environmental parameters and unpublished systemic details, I plan to treat the majority of the raw experimental data as internal assets and share them exclusively within the laboratory.However, the specific results and underlying data supporting published papers will be made available under a Creative Commons Attribution-NonCommercial (CC BY-NC 4.0) license.

Are any restrictions on data sharing? If yes, Why?

As the raw datasets often contain extensive experimental environmental parameters and unpublished systemic details, I plan to treat the majority of the raw experimental data as internal assets and share them exclusively within the laboratory.

Responsibilities and Resources

Who will be responsible for data management?

I will take primary responsibility for the implementation, review, and revision of this Data

Management Plan (DMP). I will ensure that all research activities strictly comply with the Research Data Management policy of HKU and the requirements of the funding agency.

What resources will you require to deliver your plan?

The implementation of this plan primarily relies on the well-established infrastructure provided by HKU. Regarding software, I will utilize the laboratory's existing data acquisition systems and employ open-source tools to convert data into universal formats. Therefore, no additional procurement of specialized software is required. The dedicated workstations and personal computers currently configured in the laboratory are sufficient to meet the data generation and preliminary storage requirements of this research.
