C2 - POSITIONING A MASSIVE NUMBER OF DEVICES WITH HIGH PRECISION, OPERATING ON ENERGY NEUTRAL TAGS (POMPOEN)

A Data Management Plan created using DMPonline.be

Creators: Liesbet Van der Perre., Lieven De Strycker, Bert Cox.

Affiliation: KU Leuven (KUL)

Funder: KU Leuven (KUL)

Template: KU Leuven BOF-IOF

Principal Investigator: Liesbet Van der Perre., Lieven De Strycker, Bert Cox

Project Administrator: Liesbet Van der Perre., Lieven De Strycker

Grant number / URL: C2E/23/020

ID: 205974

Start date: 30-09-2023

End date: 30-09-2027

Project abstract:

The C2 POMPOEN project pursues a disruptive approach to perform positioning operations in combination with charging of nodes adopting non-conventional hybrid RF-acoustic signaling, taking energy-neutrality at the mobile node side as a prerequisite. The project's hypothesis is that through hyper-diverse architectures, novel hybrid acoustic-RF signaling, and innovative algorithmic and learning approaches, we can (i) achieve High Precision High Reliability (HPHR) 3D positioning of a very large number of energy-neutral nodes in indoor environments, and (ii) acquire and update the required information on the indoor environment efficiently.

Last modified: 27-03-2024

C2 - POSITIONING A MASSIVE NUMBER OF DEVICES WITH HIGH PRECISION, OPERATING ON ENERGY NEUTRAL TAGS (POMPOEN)

RESEARCH DATA SUMMARY

List and describe all datasets or research materials that you plan to generate/collect or reuse during your research project. For each dataset or data type (observational, experimental etc.), provide a short name & description (sufficient for yourself to know what data it is about), indicate whether the data are newly generated/collected or reused, digital or physical, also indicate the type of the data (the kind of content), its technical format (file extension), and an estimate of the upper limit of the volume of the data.

Dataset name / ID	Description	New or reuse	Digital or Physical data	Data Type	File format	Data volume	Physical volume
		Indicate: N(ew data) or E(xisting data)	Indicate: D(igital) or P(hysical)	Indicate: Audiovisual Images Sound Numerical Textual Model SOftware Other (specify)		Indicate: <1GB <100GB <1TB <5TB >5TB NA	
T1.1_LoS_simulations	Simulation data of reflections and reverberation coming from physical propagation models in LOS.	N	D	SO, N	.py .csv	<100GB	Y
T1.1_NLoS_simulations	Simulation data of reflections and reverberation coming from physical propagation models when local scatterers are introduced for NLOS scenarios.	N	D	SO, N	.py .csv	<100GB	Y
T1.1_NLoS_model	Physics informed learning model for indoor positioning in LoS and NLOS cases.	N	D	SO	.py	<100 GB	Y
T1.2_multiple_Access_simulations	Scheduled wake-up approaches and successive interference cancellation algorithms for non-orthogonal multiplexing	N	D	SO, N	.py .csv	<100GB	Y
T1.3_LoS_NLOS_measurements	Localization data coming from measurements with the proof-of-concept.	N	D	N	.csv	<100GB	Y
T1.3_Acoustic_Chirp_measurements	Reverberate Testbed measurement data of ultrasound chirps for both LoS and NLoS scenarios	N	D	N	.csv	<100GB	Y
T2.1_SLAM_simulations	3D room estimation with existing acoustic SLAM methods and with RF-acoustic	N	D	N, SO	.py .csv	<100 GB	Y

	signal-fusing processing for spatial embedded devices						
T2.2_SLAM_adapting_simulations	SLAM techniques to track changes in the environment.	N	D	SO	.py	<100GB	Y
T2.3_SLAM_experiments	SLAM measurement data coming from the proof-of-concept.	N	D	N	.csv	<100GB	Y
T3.1_Design_Data	Design files typically related to hardware projects such as circuit schematics, printed circuit board (PCB) layouts, 3D designs used in finite element method (FEM) simulations, 3D data of physical designs, visualizations of physical designs.	N	D	M	.stl .brd .model	<1GB	Y

If you reuse existing data, please specify the source, preferably by using a persistent identifier (e.g. DOI, Handle, URL etc.) per dataset or data type:

Initially, we do not intend to reuse numerical data or datasets. Sporadic usage of open source, modelling data, such as circuit schematics, PCB layouts, 3D designs is possible. However, it is plausible that during the execution of the project, data will be reused from interesting projects that, by the time of reading we do not know exist.

Are there any ethical issues concerning the creation and/or use of the data (e.g. experiments on humans or animals, dual use)? If so, refer to specific datasets or data types when appropriate and provide the relevant ethical approval number.

- No

/

Will you process personal data? If so, please refer to specific datasets or data types when appropriate and provide the KU Leuven or UZ Leuven privacy register number (G or S number).

- No

/

Does your work have potential for commercial valorization (e.g. tech transfer, for example spin-offs, commercial exploitation, …)? If so, please comment per dataset or data type where appropriate.

- Yes

The C2 project research solely carried out by KU Leuven employees can create an interesting opportunity to patent results without any restrictions on co-owners or licenses to be granted based on a cooperation agreement. Valorization is planned primarily via European projects and transfer or licensing to or bilateral collaborations with industry, potentially supported by VLAIO O&O and TETRA projects or SME innovation funding.
Patentable and valorizable results could occur from T1.1_NLoS_simulations, T2.1_SLAM_simulations, T2.2_SLAM_adapting_simulations.
The team will consult the IP department of LRD when potential opportunities occur.

Do existing 3rd party agreements restrict exploitation or dissemination of the data you (re)use (e.g. Material or Data transfer agreements, Research collaboration agreements)? If so, please explain in the comment section to what data they relate and what restrictions are in place.

- No

/

Are there any other legal issues, such as intellectual property rights and ownership, to be managed related to the data you (re)use? If so, please explain in the comment section to what data they relate and which restrictions will be asserted.

- No

/

DOCUMENTATION AND METADATA

Clearly describe what approach will be followed to capture the accompanying information necessary to keep data understandable and usable, for yourself and others, now and in the future (e.g. in terms of documentation levels and types required, procedures used, Electronic Lab Notebooks, README.txt files, codebook.tsv etc. where this information is recorded).

Input and output simulation and measurement data will be accompanied with corresponding .txt or markup readme files consisting of contextual information on the data (when, how, where) and technical information on how the data was obtained and processed (e.g. software version, measurement equipment, configurations, etc.). Code will sufficiently be extended with comments and procedures and results will be documented in publications.

Will a metadata standard be used to make it easier to find and reuse the data?
If so, please specify which metadata standard will be used.

If not, please specify which metadata will be created to make the data easier to find and reuse.

- No

The accompanying readme file will provide the necessary information to find and reuse the data. This will be combined with the procedures and results documented in publications.
As most data will be uploaded to KU Leuven's RDR platform, most data will have to comply with the FAIR principles.

DATA STORAGE & BACK-UP DURING THE RESEARCH PROJECT

Where will the data be stored?

- Shared network drive (J-drive)

- OneDrive (KU Leuven)

- Sharepoint online

- Large Volume Storage

As the intended measurements will be performed in Techtile, our personal testbed, most data will be stored on a large volume storage/shared network drive. This makes the data accessible for the different researchers working on this project. Researcher can, temporarily store processed data on their personal OneDrive. Within KU Leuven, the data shared in our Teams folder is managed by SharePoint online. The research data will be uploaded to KU Leuven's RDR platform.

How will the data be backed up?

- Other (specify below)

Back-ups will be performed to the cloud and KU Leuven's RDR platform. Finished datasets will be publicly available (and thus stored) on GitHub.

Is there currently sufficient storage & backup capacity during the project?

If no or insufficient storage or backup capacities are available, explain how this will be taken care of.

- Yes

The current server set up consists of 20 TB of memory, with the possibility to extend this memory. The personal OneDrive cloud storage consists of 2 TB of memory. For shared files in the Teams folder, SharePoint has a limit of 5 TB.

How will you ensure that the data are securely stored and not accessed or modified by unauthorized persons?

The OneDrive, SharePoint and RDR platform are protected by multifactor authentication. The personal network drive runs on a managed PC, where the devices are up-to-date on security updates, managed by the local IT administrator and is encrypted with Bitlocker. Access outside the KU Leuven network is only possible with a secured double VPN with network address translation. The Techtile testbed has a private network and on the RAID, locking specific data folders with passwords is possible.

What are the expected costs for data storage and backup during the research project? How will these costs be covered?

These costs are expected to be low. If necessary, extra hardware for local storage or extra cloud space can be covered by the budget of this project, where we anticipated on such IT costs.

DATA PRESERVATION AFTER THE END OF THE RESEARCH PROJECT

Which data will be retained for 10 years (or longer, in agreement with other retention policies that are applicable) after the end of the project?

In case some data cannot be preserved, clearly state the reasons for this (e.g. legal or contractual restrictions, storage/budget issues, institutional policies...).

- All data will be preserved for 10 years according to KU Leuven RDM policy

/

Where will these data be archived (stored and curated for the long-term)?

- Large Volume Storage (longterm for large volumes)
- KU Leuven RDR
- Other (specify below)

Data sets will be archived on the local network drive, the RDR platform and GitHub for at least 10 years after the end of the project.

What are the expected costs for data preservation during the expected retention period? How will these costs be covered?

These costs are expected to be low. If necessary, costs can be covered by future projects, whether or not they make use of the generated data.

DATA SHARING AND REUSE

Will the data (or part of the data) be made available for reuse after/during the project?
Please explain per dataset or data type which data will be made available.

- Yes, as open data

All serviceable and processed data, whether it is code, simulation or measurement data, will be made publicly available as open data .

If access is restricted, please specify who will be able to access the data and under what conditions.

/

Are there any factors that restrict or prevent the sharing of (some of) the data (e.g. as defined in an agreement with a 3rd party, legal restrictions)?

Please explain per dataset or data type where appropriate.

- No

/

Where will the data be made available?

If already known, please provide a repository per dataset or data type.

- KU Leuven RDR (Research Data Repository)
- Other data repository (specify below)

GitHub

When will the data be made available?

- Upon publication of research results

/

Which data usage licenses are you going to provide?

If none, please explain why.

- CC-BY 4.0 (data)
- MIT licence (code)
- GNU GPL-3.0 (code)

The choice between the MIT and GNU license will be made based on the valorization potential of the written code.

Do you intend to add a persistent identifier (PID) to your dataset(s), e.g. a DOI or accession number? If already available, please provide it here.

- Yes, a PID will be added upon deposit in a data repository

When uploading datasets to the RDR platform, a PID in the form of a DOI will be assigned to this dataset.

What are the expected costs for data sharing? How will these costs be covered?

These costs are expected to be low. If necessary, additional costs can be covered by the consumables budget of this project, where we anticipated on such IT costs.

RESPONSIBILITIES

Who will manage data documentation and metadata during the research project?

Project responsibles and PI: prof. L. De Strycker and prof. L. Van der Perre.
Responsible for day-to-day coordination, storing, and managing the data over the 4-year project duration: dr. Bert Cox, postdoctoral researcher

Who will manage data storage and backup during the research project?

Responsible for day-to-day coordination, storing, and managing the data over the 4-year project duration: dr. Bert Cox, postdoctoral researcher

Who will manage data preservation and sharing?

Project responsibles and PI: prof. L. De Strycker and prof. L. Van der Perre

Who will update and implement this DMP?

Project responsibles and PI: prof. L. De Strycker and prof. L. Van der Perre.
Responsible for day-to-day coordination, storing, and managing the data over the 4-year project duration: dr. Bert Cox, postdoctoral researcher