Validatie van een bewegingssensor voor stress-diagnostiek bij planten als eennieuwe ontwikkeling voor smart farming toepassingen in de tuinbouw

A Data Management Plan created using DMPonline.be

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Template: KU Leuven BOF-IOF

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Project abstract:

Planten kunnen zicht niet verplaatsen, en kunnen dus ook niet weglopen wanneer ze in ongunstige omstandigheden groeien zoals o.a. droogte, hitte of overstromingen. Planten moeten daarom ter plaatse omgaan met deze stresssituaties. Ondanks deze immobiliteit, zijn planten wel steeds in beweging. We hebben nu een nieuwe elektronische sensor ontwikkeld, waardoor we deze subtiele bewegingen in real-time en 3D kunnen opmeten (patent in nationale fase). We hebben ook ontdekt dat specifieke stresscondities specifieke bladbewegingen (of veranderingen daarvan) kunnen uitlokken. In dit vervolgtraject willen we dit “sprekende plant” concept valideren door deze nieuwe sensor door te ontwikkeling voor stress diagnostiek bij planten, die nieuwe smart farming toepassingen in de tuinbouw mogelijk maken. We hebben gekozen om het TRL-niveau van de sensor te verhogen, aan de hand van een iteratief en geïntegreerd sensor design- en ontwikkelingsproces, inclusief veldtesten. Deze aanpak moet leiden tot een autonome, lichtgewicht, draadloze en gebruiksvriendelijke sensor. We zullen ook nieuwe elektronica integreren om de omgevingscondities (temperatuur en relatieve vochtigheid) op te meten, alsook locatiebepaling te integreren zodat deze sensoren kunnen uitgerold worden in een groter sensornetwerk. Deze nieuwe sensor zal het mogelijk maken voor tuinders om in de toekomst het stressniveau van hun gewas te kunnen opmeten, waardoor de fysiologie van de plant beter begrepen wordt, en waardoor er aan precisie tuinbouw kan gedaan worden, om zo de opbrengsten veilig te stellen of te verhogen.

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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: **A**udiovisual **I**mages **S**ound **N**umerical **T**extual **M**odel **SO**ftware Other (specify)		Indicate: <1GB <100GB <1TB <5TB >5TB NA	
PLT Crop log	Trial logbook of interventions, interactions and all crop management	N	D	N,T	XLSX, CSV,DOCX,ONE	<1GB	N.A.
PLT Sensor data	Raw data from sensors	N	D	N,T	CSV, TT	<100GB	NA
statistics and modelsF	Data processing and algorithms	N	D	T, M, SO	TXT, CSV, all R related formats. All matlab related formats, all C compiler related formats	<100GB	NA
Trial audio	dictraphone recordings during trial	N	D	A	mp3;mp4,wav	<100GB	NA
Trial layouts	maps and vector drawings of field layout	N	D	I	SVG,JPG,DWG	<1GB	NA
images	crop trial photographs	N	D	I	JPG,RAW	<100GB	NA
meeting minutes	meeting minutes	N	D	T	XLSX, CSV,DOCX,ONE	<1GB	NA
legal	NDA/MTA agreements between parties for use or transfer of sensors	N	D,P	T	DocX,PDF	1GB	paper folder
CAD	Any file related to computer aided design	N	D	SO	any format related to KiCad, Fusion360, SolidWorks, AutoCad, SketchUp etc.	<100gb	NA
Software	Embedded code	N	D	SO	hex files, C-CPP files	<100gb	NA
Design files	PCB Design	N	D	M	Gerber files, design files	<100gb	NA

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:

N.A.

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

N.A.

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

N.A.

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

Patent has been granted
https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2021165476

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

N.A.

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

N.A.

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).

Primarily, metadata will be collected in physical lab notebooks or README.txt files.
Digital data will be held on the KU leuven OneDrive folder for the project or archived on the KU Leuven "J drive", and shared among researchers involved.

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

Data Storage & Back-up during the Research Project

Where will the data be stored?

- Shared network drive (J-drive)
- OneDrive (KU Leuven)

How will the data be backed up?

- Standard back-up provided by KU Leuven ICTS for my storage solution
- Personal back-ups I make (specify below)

dedicated NAS drive backup at home office (PLT)

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

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

J-Drive or OneDrive permissions. off-line NAS

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

Cost unknown
C3 funding, use of KU Leuven storage

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

data will be transfered to an Archive drive at end of project (K: drive)

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

- Shared network drive (J-drive)
- Large Volume Storage (longterm for large volumes)

during project on J-Drive, beyond project on large volume storage (Archive drive)

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

Cost unknown
C3 funding, use of KU Leuven storage

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.

- No (closed access)
- Other (specify below)

Any data published will be provided following the requirements of the journal in the KU leuven data repository.

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

Any researcher for non-commercial use after prior written permission from KU Leuven ZAP or higher.

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)

When will the data be made available?

- Upon publication of research results
- Other (specify below)

only data processed for scientific publications will be made available.

Which data usage licenses are you going to provide?

If none, please explain why.

- Other (specify below)
- Data Transfer Agreement (restricted data)

TBD on a per-case basis

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

DOI for preprints and sci publications. N.A. for other.

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

Cost unknown
C3 funding.

Responsibilities

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

Researchers and supervisors involved

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

Researchers and supervisors involved

Who will manage data preservation and sharing?

Researchers and supervisors involved

Who will update and implement this DMP?

Researchers and supervisors involved