

IEEE P2520.2.1
Machine Olfaction Devices and Systems used for General Outdoor Odor
Monitoring
(SEN/SC/TMODS/OOM/2520.2.1)

Working Group Meeting Minutes
14 March 2022 / 10:00 AM – 11:00 AM (ET)
WG Chair: Ehsan Danesh
WG Secretary: Cynthia Burham

1. Call to Order

The Chair called the meeting to order at (11:04) AM ET. The Chair also announced that the meeting was being recorded for the purpose of preparing minutes.

2. Roll Call and Disclosure of Affiliation

Affiliation FAQs: <http://standards.ieee.org/faqs/affiliation.html>

The Chair directed participants to a Google Docs link in the Chat window:

https://docs.google.com/spreadsheets/u/2/d/1ydvTFKxRSYRpT1CX-22zaNkETV4_aqD2NDVSoxxfk8/edit?oid=114048767493602967276&usp=sheets_home&ths=true

Participants were asked to register for the meeting by placing an X at the intersection between the row including their name and the column including the meeting date. First-time participants and individuals whose information was not already listed within the Google document were instructed to include their name, affiliation and status under the appropriate columns at the bottom of the Google form. Participants were also asked to include their affiliations in parentheses after their name in the Chat window, if using the chat area. A few minutes were allowed for participants to access and complete the sign-in process. The Secretary added the attendance status of participants who did not complete their attendance status directly.

At least two (2) of the most recent four (4) WG meetings must be attended in order to maintain voting rights.

The participant information from the chat window and from the participant registration document has been merged and may be found in **Attachment A**.

3. Approval of Agenda

The Chair displayed the announced agenda, confirmed with the Secretary that a quorum existed, and proceeded with approval of the March 14th meeting agenda and the minutes for the WG Meeting held on February 14, 2022. Cynthia Burham moved for approval of the February 14th WG Meeting minutes. Radislav Potyrailo seconded the motion. Cynthia Burham moved for approval of the March 14th meeting agenda. Susan Palma seconded approval of the meeting agenda in the Chat window. Both the agenda and minutes were approved without objection to unanimous consent. 14 voting members were required to be in attendance to achieve quorum. There were 18 voting members in attendance when approval was requested.

4. IEEE Patent & Copyright Policies

a. Call for Patents

<https://development.standards.ieee.org/myproject/Public/mytools/mob/sli/deset.pdf>

Per standard IEEE-SA WG meeting practice, the Chair reviewed the required policy regarding potentially essential patents. No one raised concerns for consideration.

b. Copyright Policy

<https://standards.ieee.org/ipr/copyright-materials.html>

Per standard IEEE-SA WG meeting practice, the Chair reviewed the required policy regarding copyrights. There were no questions or concerns.

5. Technical Presentation(s) and Discussion

The Chair indicated that the National Physical Laboratory (NPL), representatives of which presented at the WG meeting held on February 14th, 2022, had been approached to develop mixtures representative of odours produced by: (1) waste disposal plants and (2) swine facilities. Relevant analytes and concentrations were established based on articles discussed at previous WG meetings. NPL has experience creating mixtures using the materials requested and at the required concentrations; however, they have not included the materials in a single mixture and must conduct short-term stability testing.

The Chair proposed creating a stable mixture based on NPL's existing research and introducing more reactive materials such as ammonia (NH₃) and Hydrogen Sulfide (H₂S) from independent cylinders during test. Manufacturing a stable

mixture representative of the odour emanating from a swine facility is particularly challenging as some components of the mixture are new to NPL. NPL has proposed running their software to determine optimal conditions necessary to implement these materials. An investigation must also be conducted to determine how to best work with liquids which must be used in their gas phase. The Chair mentioned determining surrogate materials which might mimic the effect of materials that are more difficult to include in a stable mixture.

After the short discussion, the Chair introduced the presenter for the March 14th 2022 WG Meeting.

a. *Presentation by Kurt Haerens*

Kurt Haerens is an environmental consultant with OLFASCAN. OLFASCAN is a consulting company which investigates odours by characterizing emissions and analyzing their impact. OLFASCAN implements a flying lab, amongst its other analysis tools. The company customizes its analysis to meet client needs and provides feedback which the client may implement to address issues with the odours their industry produces. Kurt Haerens may be contacted at: kurt.haerens@olfascan.com.

During his discussion, Dr. Haerens discussed sampling techniques involving canisters, bottlevac, sample bags, and adsorption tubes. He also mentioned the various testing methodologies OLFASCAN uses such as GC sniffing and TD-GC-MS. The methodology implemented depends on the materials the detection of which is of interest. OLFASCAN does not produce their testing equipment, but work closely with their suppliers to fine tune the equipment they use.

Dr. Haerens mentioned the various systems used to monitor emission sources and the surrounding environs as well as the issues involved in this monitoring and the benefits of IOMS/e-noses for effective continuous monitoring over areas otherwise difficult to access or comprising a large area across diverse locations. Although Dr. Haerens commented that odour standardization is not central to his work and significant difference may exist between labs/tools regarding results without affecting a specific tool's accuracy and reliability, he acknowledged the usefulness of the standard, generally.

b. *General Discussion:*

During the Q&A session following the main presentation, Dr. Haerens addressed olfactometry and issues inherent to reliance on the human nose such as differences in results obtained from different labs. He provided examples of differences observed in results from different labs applying EN13725 and mentioned that his company is looking into it.

In response to a question regarding performance of VOC measurement, Dr. Haerens mentioned testing being done in OLFASCANs own labs for simple comparisons. GC testing, among others, is used to identify and quantify the different compounds present.

With regard to a question about comparison of e-nose testing results across labs, Dr. Haerens mentioned that e-noses were not implemented in the case in point and reiterated that standardization, while a good idea, was not as important to OLFASCANs goals as a useful system in itself. The point was raised that artificial olfaction, enhanced by odour standardization for training and development, as opposed to implementation of the human nose, removes subjectivity and provides repeatable and reproducible results between labs. The speaker indicated that results between labs are presently quite comparable and reemphasized the importance of quality of results over standardization of results for practical applications. The speaker also mentioned that IOMS are useful but not capable of replacing the sensitivity, differentiation capability, and range of the human nose for many applications. He also mentioned that their strength is in continuous monitoring and applicability at multiple locations for concurrent testing.

In response to questions submitted before the meeting, the speaker indicated that the type of odour detection equipment OLFASCAN uses include the human nose, olfactometry, VOC screening, and some IOMS, though these are not standard in the lab. Dr. Haerens also responded to questions regarding the flying lab, difficulties in benchmarking with respect to distance from a source, and the spatial resolution of odour localization. He indicated that spatial resolution is more complex than would be expected. Most locations have only about 5 sensors in a network, so spatial resolution is not very broad and only a rough idea may be gleaned.

Dr. Haerens also provide information about the Flying Lab which uses drones to analyze emissions in areas that are otherwise difficult to reach (including over water or across great distances/difficult terrain). The Flying Lab is used to get a rough idea of H₂S and NH₃. The speaker also responded to questions about

counteracting humidity. He indicated that it is a challenging issue necessary of further study.

The speaker mentioned that drones may interfere with measurement and tests must be conducted to ensure downdraft and other effects tied to drone use do not affect measurements. Flying lab results are compared to those assessed on the ground to determine how high the drone should fly (~8 meters) in order to counteract the effects of the aerodynamics on the results. In response to a question regarding publication of data regarding the Flying Lab, Dr. Haerens indicated that that information is not available on the OLFASCAN website as of yet. The speaker also indicated that OLFASCAN does not have a library of materials from which the company works.

A short discussion about training an e-nose ensued. Odour and concentration range are issues. Standardized mixtures are an excellent option for comparison between labs and to test device functionality or calibration.

The speaker mentioned that a mixture of odorous and non-odorous compounds is essential, as their interaction might have an effect. Hydrogen and oxygen were mentioned as important non-odorous compounds to include. Humidity and temperature were also mentioned as important factors influencing results which must be taken into consideration. This is covered in the baseline materials.

The Chair indicated that materials relevant to the WG, including presentations, links, and documents may be found at the WG website:

<https://sagroups.ieee.org/2520-2-1/>

The Chair mentioned that subgroups creating a list of relevant chemicals and concentrations will be the focus of the WG over the next few months. Subgroups may be created to continue discussion outside the regular WG meeting as deemed necessary.

The next WG deadline is 7/8/2022 for initial standard draft v1.0 approval.

6. Approval of Agenda and Previous Meeting Minutes

The Chair received a motion from Cynthia Burham, seconded by Susana Palma, to approve the agenda and the December WG meeting minutes. The motion passed without objection to unanimous consent. Cynthia Burham also motioned to approve the meeting minutes from February 14th 2022 which was seconded by Radislav Potyrailo. The motion also passed without objection to unanimous consent. The number of voting members in attendance required for quorum was 14. There were 18 voting members in attendance.

7. Unfinished Business/Action Item Review

There was no unfinished business.

8. New Business

There was no new business.

9. Future Meetings

The next meeting of the WG will take place at 10 AM EDT on April 11, 2022.

10. Adjourn

The WG Chair asked for a motion to adjourn. The motion to adjourn was made by Cynthia Burham and seconded by Susana Palma. Without objection to unanimous consent, the Chair adjourned the meeting at 10:56 AM ET.

Attachment A: Meeting Participants (28)

Last Name	First Name	Affiliation
Bernardini	Sandrine	Aix-Marseille University
Burham	Cynthia	University of Texas at Austin
Carneiro	Magnovaldo	Virtual University of Sao Paulo State – Univesp
Chen	Allen C	Self
Covington	James	Professor, School of Engineering, University of Warwick
Danesh	Ehsan	Alphasense Ltd
Harris	Louis_Ray	The University of the West Indies (Mona Campus)
Herrier	Cyril	Aryballe
Isz	Sandrine	Alpha MOS
Izquierdo	Cyntia	Olores.org website
Kuna	Kishore	Honeywell Technology Solutions
Lozano	Jesus	Universidad de Extremadura
Manikandan	M Sabarimalai	Indian Institute of Technology Bhubaneswar
Moraru	Camelia	BEIA Ro
Mulla	MohammadYusuf	Research Institutes of Sweden (RISE)
Palma	Susana	NOVA university of Lisbon
Peaslee	David	SPEC Sensors, LLC
Potyrailo	Radislav	GE Research
Reimringer	Wolfhard	3S - Sensors, Signal Processing, Systems GmbH
Roman-Gonzalez	Avid	Business on Engineering and Technology S.A.C. (BE Tech)
Saffell	John	Alphasense Ltd.
Sagar	A S M Sharifuzzaman	Sejong university, South Korea
Staerz	Anna	Massachusetts Institute of Technology
Suciu Jr.	George	Beia RO/AT/BE
Suciu Sr.	George	BEIA
Haerens	Kurt	OLFASCAN
Jilg	Klaus	UNITECHNICS
Kawirayani	Srikanth	Gayatri Vidya Parishad College of Eng (Autonomous), Visakhapatnam