

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
11 July 2022 / 10:00 AM – 11:00 AM (EDT)
WG Chair: Ehsan Danesh
WG Secretary: Cynthia Burham

1. Call to Order

The Chair called the meeting to order at (10:04) AM EDT. 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/d/1ydvTFKxRSYRpT1CX-22zaNkETV4_aqD2NDVSoxxfk8/edit?usp=sharing

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. The Chair advised participants that member status is contingent upon provision of all required information, any missing information having been highlighted (yellow) in the Google document for participant's convenience. 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 July 11th meeting agenda and the minutes for the WG Meeting held on June 13, 2022. Susan Schiffman moved to approve the July 11th meeting agenda and Troy Nagle seconded the motion. Troy Nagle moved for approval of the June 13th meeting minutes and Susan Schiffman seconded the motion. Both the agenda and minutes were approved without objection to unanimous consent. 16 voting members were required to be in attendance to achieve quorum. There were 16 voting members in attendance when approval was requested. A total of 21 voting members attended the meeting.

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. General Discussion

The Chair opened discussion with an update on the status of the WG's application to the Technical Activities Board Committee on Standards (TAB CoS) Standards Association Discretionary Fund. The application was not submitted for the present funding opportunity; however, it will be submitted for the next round of funding expected to be offered in the next 3 to 4 months. An application for the present TAB CoS funding opportunity has been submitted by the P2520.1 WG.

After the TAB CoS funding application update, the Chair opened discussion regarding the costs involved in and feasibility of making and testing reference odour mixtures and the steps necessary to successfully achieve WG goals. The discussion included comparisons between implementation of pressurized cylinders and permeation tubes as well as the use of the headspace above a liquid. Costs, benefits, and complications related to the various methods were addressed. The discussion provided areas in which clarification is necessary in defining WG goals.

The Chair began the discussion by providing a description of odour reconstitution in multiple phases:

Phase 1: Odour Reconstitution

- selecting odorous composition representative of applications for which WG wishes to develop standards
- perform analysis
- develop samples at certain OU/m³ (gas cylinder/permeation tubs/combination)

Phase 2: Calibration and Evaluation

- EUT trained against odour sample at various dilution ratios
- EUT tested against odour sample at other dilution ratios
- Performance parameter evaluation (DQO)

The EUT is represented as a black box, effective evaluation being the central goal.

A discussion of performance parameters was initiated which included an assessment of slope, intercept, linearity, error, and standard deviation. Questions arose regarding linearity and whether/how this may be achieved as relevant relationships tend to be algorithmic. Feasibility of development of a relevant algorithm and what that would entail was discussed. The relationship between perception and concentration and its relevance to the determination methodology to be used was a central point of discussion. Discrimination vs. detection was discussed with respect to its relationship to environmental safety.

Odour samples of interest were mentioned, including that representing a waste disposal plant (in China). The odorants comprising the sample, their concentrations and threshold values were provided.

An invited guest expert in odour development and analysis (perfume industry/research consultancy services in scent perception) provided insight into odour reconstitution, though the speaker was limited in the information provided as a result of concerns regarding protection of proprietary information and intellectual property. The guest indicated that developing a test methodology and reference mixture for e-nose calibration should be feasible at a lower price once a model is developed.

A comparison between production of the example (waste disposal) odour using cylinders (National Physical Laboratory - NPL) and using permeation tubes (KIN-TEK) followed. Issues such as the difficulty in obtaining very low concentrations using cylinders were mentioned. Other issues discussed included the need for stability over time and how that might best be achieved. Central to the discussion were the costs involved in developing relevant cylinders. In many cases costs related to research and development of an odour may be necessary and high, though these costs will apply only during development. There will also be a delay after initial order related to research and development. Again, later orders will not experience this delay.

Permeation tubes may be somewhat more flexible in design and implementation; however, there are also significant costs related to developing odour samples and purchasing relevant test equipment. The permeation tubes tend to have a relevant lifetime of 5 months under constant use; however, this term may be extended if kept at a cooler temperature.

In the case of permeation tubes, a discussion arose whether all members of the WG might conduct testing or whether testing might be conducted by members who have the relevant equipment. The latter is the more feasible option given the cost of the equipment involved. During the discussion, WG members already possessing permeation tube systems (3 and 4 channel systems) came forward. Permeation tubes were mentioned to be lower cost and a more viable option given that cylinder development costs are high and the cost for the odour combinations the WG samples may need may extend implementation 4 to 5 years into the future.

Lower cost options such as using the headspace above a liquid to produce some odour elements were mentioned. Issues related to sticking (polar compounds) and condensation were mentioned, as were issues with maintaining a continuous, consistent flow as the gas in the headspace is depleted.

During the discussion it was clarified that the WG's goal is to create a standard which may be applied universally and as part of normal operations. Questions arose regarding humidity control and whether it is a limiting factor or an issue the WG must address directly in testing. Development in an accredited lab and the funding necessary for this development were mentioned.

The Chair mentioned that NPL may be able to collaborate with the WG/WG members and thereby assist in funding cylinder development. Cylinders might be used for most stable VOCs and permeation tubes used for more unstable components. Whatever methodology used; an effective process must be established. Government agencies were mentioned as possible funding sources.

Central differences between lab testing and field testing were mentioned and the issues in developing a baseline applicable in developing a pass/fail test useful in the field was discussed. More discussion is necessary regarding what the standard wishes to accomplish and how best to develop an effective test protocol. Another issue discussed was the relevance of human odor detection to e-nose performance and how to integrate that into the protocol. The question requires additional discussion given the lack of a linear relationship between the two. The black box description allows continued development while this issue is settled.

A link was provided by a WG member providing additional insights into monitoring techniques: <https://www.olores.org/en/techniques/instrumental-odour-monitoring-o-sensors/1144-ioms-for-the-real-time-monitoring-of-odour-concentration-at-a-msw-landfill>

Additional discussion may be pursued by email between the present meeting and the WG's next meeting in September 2022.

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 WG deadline of 7/8/2022 for initial standard draft v1.0 approval will not be met and an extension will be requested.

6. Approval of Agenda and Previous Meeting Minutes

The Chair received a motion from Susan Schiffman, seconded by Troy Nagle, to approve the meeting agenda. The motion passed without objection to unanimous consent. Troy Nagle motioned to approve the meeting minutes from June 13th 2022 which was seconded by Susan Schiffman. The motion also passed without objection to unanimous consent. The number of voting members in attendance required for quorum was 16. There were 21 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 is presently scheduled to occur at 10 AM EDT on September 12, 2022. The Chair will send out a request to reschedule the September meeting to September 19, 2022 at the same hour. The Chair will update WG members by email of any adjustment to the schedule once input from the members has been received regarding the most amenable date. A WG meeting will not be held during the month of August 2022.

10. Adjourn

The WG Chair adjourned the meeting at 11:13 AM ET.

Attachment A: Meeting Participants (30)

Last Name	First Name	Affiliation
Bernardini	Sandrine	Aix-Marseille University
Burham	Cynthia	University of Texas at Austin
Capelli	Laura Maria Teresa	politecnico di milano
Carneiro	Magnovaldo	Self
Chen	Allen C	Self
Covington	James	Professor, School of Engineering, University of Warwick
Danesh	Ehsan	Alphasense Ltd
De Vito	Saverio	ENEA - Agency for New Technology, Energy and Sustainable Economic Environment
Gami	Hirenkumar	Miami University – OH
Guillot	Jean-Michel	IMT Mines Ales
Herrier	Cyril	Aryballe
Isz	Sandrine	Alpha MOS
Izquierdo	Cyntia	Olores.org website - Ambiente et Odora
Kuna	Kishore	Honeywell Technology Solutions
Lozano	Jesus	Universidad de Extremadura
Majewski	Leszek	The University of Manchester
Manikandan	M Sabarimalai	Indian Institute of Technology Bhubaneswar
Mulla	Mohammad Yusuf	Research Institutes of Sweden (RISE)
Nagle	Troy	ECE, NC State University
Palma	Susana	NOVA university of Lisbon
Potyrailo	Radislav	GE Research
Reimringer	Wolfhard	3S - Sensors, Signal Processing, Systems GmbH
Saffell	John	NosmoTech Ltd.
Schiffman	Susan	North Carolina State University
Srinkath	Kavirayani	Gayatri Vidya Parishad College of Eng (Autonomous), Visakhapatnam
Suciu Jr.	George	Beia RO
Gafsou	Danyel	Self
Horn	William	Self
Loubet	Francois	Ellona
Rey	Mickaele	BEIA