

**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  
10 May 2021 / 10:00 AM – 12:00 PM (ET)  
WG Chair: Ehsan Danesh  
WG Secretary: Cynthia Burham

**1. Call to Order**

The Chair called the meeting to order at 10:04 AM ET. He 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 announced the new WG Secretary, Cynthia Burham. She will transition into the role during this meeting. The Chair directed participants to a Google Docs link in the Chat window:

[https://docs.google.com/forms/d/e/1FAIpQLSc2k1Z4KVqzDz-ZqarCrH6VdLamscwFg6fYc40nSMlpbaOHcw/viewform?usp=sf\\_link](https://docs.google.com/forms/d/e/1FAIpQLSc2k1Z4KVqzDz-ZqarCrH6VdLamscwFg6fYc40nSMlpbaOHcw/viewform?usp=sf_link)

All participants were asked to sign-in via a Google form by inserting their names, affiliation, and WG membership request. A few minutes were allowed for participants to access and complete the sign-in process. Those participating in the meeting were displayed at this link:

[https://docs.google.com/spreadsheets/d/1IJNXzsmUIN5VxbBuXH2WGI\\_TzZqhZUCImpAGaQeGmNU/edit?usp=sharing](https://docs.google.com/spreadsheets/d/1IJNXzsmUIN5VxbBuXH2WGI_TzZqhZUCImpAGaQeGmNU/edit?usp=sharing)

and in the WebEx Participants List. A merger of these two sources can be found in **Attachment A**.

**3. Approval of Agenda**

The Chair displayed the announced agenda and delayed approval until later in the meeting once a quorum was confirmed.

**4. IEEE Patent & Copyright Policies**

**a. Call for Patents**

<https://development.standards.ieee.org/myproject/Public/mytools/mob/slide/set.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

### a. *Presentation by Laura Capelli:*

Laura Capelli is a professor of engineering at Polytecnico di Milano (POLIMI), Department of Chemistry, Materials and Chemical Engineering “Giulio Natta”. Prof. Capelli’s research includes study of the use of electronic noses (e-noses) in Instrumental Odour Monitoring Systems (IOMS) and development of analysis/characterization methods to establish IOMS efficacy. Prof. Capelli has authored numerous papers on e-nose technology and is a contributor to cutting edge research in the field. Prof. Capelli’s contact information is: [laura.capelli@polimi.it](mailto:laura.capelli@polimi.it).

Prof. Capelli’s presentation provided insight into testing and performance evaluation of IOMS applied in environmental monitoring and, in passing, the use of e-noses in medical diagnostics. During her presentation, Laura explained that e-noses are currently the only instruments capable of providing information about odour quality and class. E-noses allow continuous analysis of ambient air for medium to long periods, indicate the presence or absence of odours, provide odour classification and recognition of odour source, and measure odour concentration (quantification).

The presentation described the piecemeal supervision in Italy of odour pollution management through regional guidelines and regulations and the need for standardization of IOMS systems through national regulation. Various modelling and analysis methods were explained and their effectiveness analyzed.

Information was provided about the complexity of studying and analyzing IOMS effectiveness as a result of environmental conditions including relative humidity and temperature. Laura introduced the steps included in the POLIMI analysis approach and how they have evolved: Preliminary Laboratory Testing (enhancement),

Training (original), Performance Verification in the Field (enhancement), Monitoring (original), Data Processing (original), and Validation with Odour Observations (original). Studies applying the POLIMI approach were presented and results discussed showing that the method is mature and effective for additional studies.

The presentation explained the need for standardization and quality protocols to provide a structure both manufacturers and users may use to establish IOMS efficacy and compare performance between instruments for a given application. Monitoring air quality analysis is a delicate and complicated process; however, mature methods for analysis exist and may be applied to establish quality protocols which may be implemented to characterize and compare IOMS instruments.

During the Q&A, Laura was asked if the results of her studies were shared with manufacturers. Jean-Christophe Mifsud works with Rubix (manufacturer) and is a recipient of Laura's results. He indicated satisfaction with the data received. Laura was also asked whether she uses cylinders or bags for sampling in her research. She mentioned that, in the case of liquids, she uses headspace for samples because it is relatively simple, accessible, inexpensive, and easily replicated in any lab. Laura stated that she uses a cylinder for gas. She also mentioned that there are issues when obtaining samples for mixtures starting from liquids which require additional study. She and her research group are developing solutions which she will share when they are more mature.

***b. General discussion:***

After the presentation, Troy announced that we had more than 26 voting members in attendance and thus a quorum was achieved. The meeting agenda and the minutes for the April meeting were approved per point 6, below.

Immediately after approval of the agenda and minutes, the group entered into a general discussion period. The topic of the Working Group (WG) goals was discussed. The Chair showed a slide of current odor-related standards and their status.

The Chair provided a summary of the IEEE standardization process and indicated that an important goal of the standard is to add value and not replicate existing standards.

The IEEE standard we are developing is intended to address application and how data will be analyzed. It is also intended to be generically applicable to any instrument and to provide guidance for baseline performance.

The Chair introduced a Google sheet to be distributed to working group (WG) members requesting comments and contributions regarding typical chemicals of interest for specific applications. The Google sheet is titled Odours in Outdoor Air and requests the following information:

- (1) What odorous chemicals are most prominent in outdoor air
- (2) Does presence of this odour correlate with a particular application
- (3) Typical concentration levels
- (4) Human odour threshold\*
- (5) Comments (reference papers/references/supporting information, for example)

\*Per suggestion from Laura, an additional element was added to address the human odour threshold.

A discussion ensued regarding what is meant by ambient. The point was made that outdoor ambient air changes dramatically in concentration levels based on location (at point of emission, downfield, for example) and environment (relative humidity, temperature, for example). Opinions were requested from attendees and it was pointed out that information might be collected to produce a shared list to serve as a baseline for additional discussion. The point was made that reclassification and enhancements may be made based on the initial information received. A point was made that there are working groups within this study working on specific topics such as landfill odours which will investigate issues such as downfield conditions related to the specific topics.

The Chair restated that the Google sheet should include comments and contributions regarding the types of chemicals to be tested for specific applications and the typical concentrations of interest so that instrument performance may be compared to human olfaction.

Laura volunteered to provide a table from her research relevant to the worksheet once it has been published in an upcoming article.

An issue arose regarding what is meant, from a chemical point of view, by human perception of odor within the worksheet. It was pointed out that the issue is relatively complex and many factors play a role in the determination. No substance is present in ambient in a pure state and mixtures are complex. Lab conditions also differ and should be taken into account. It was also noted that e-noses must be

trained to human sensing standards and choosing the best e-nose for an application requires a field approach and training of the selected instrument.

The Chair explained again that the worksheet is intended to provide a starting point from which to begin additional study on what substances to select for analysis. Additional columns may be added to the worksheet as needed. In response to a question regarding the aim of the study, the Chair indicated that a goal is to define a baseline and develop a test protocol. Concerns about more complex issues might be indicated in the comments or cross-referenced.

The NTA 9055 (Dutch Standard) was mentioned. The Chair asked for contact information for the Dutch study leads in order to schedule a talk for the WG at a future meeting. Anne-Claude indicated that the project lead was **Biance Milan**. Anne-Claude indicated Biance was retired. She provided the contact information for the group sponsoring the study: <https://www.comon-invent.com/>

A comment was made that the Dutch standard is very generic and a suggestion was made that a speaker discussing the German standard should be invited to speak to the WG. The Chair will look into locating and inviting a speaker to present information about the German standard.

The Chair mentioned that the next meeting time (June 14, 2021) will be used to kick-off the WG for Machine Olfaction Devices and Systems Used for General Indoor Odor Monitoring and there will be no meeting for the Outdoor Monitoring WG until July. Two independent meetings will be held on July 12<sup>th</sup>, 2021 for the Indoor WG and the Outdoor WG. Interested individuals may sign up for membership in the Indoor WG through iMeet Central. Registration information regarding the Indoor WG should have been received by members of the Outdoor WG.

The Chair reminded the WG members in attendance that we have as a milestone the creation of a draft outline of the table of contents for our standard. The milestone should be completed by August 7<sup>th</sup>, 2021. The WG is on target to meet the completion date. The draft may be adjusted as the WG continues to make progress on developing the standard.

## **6. Approval of Agenda and Previous Meeting Minutes**

The Chair received a motion from Troy Nagle, second by Laura Capelli, to approve the Agenda. Without objection to unanimous consent, the motion passed.

The Chair next received a motion to approve the Minutes of the last meeting from Cynthia Burham and a second from Troy Nagle. Without objection to unanimous consent, the motion passed.

#### **7. Unfinished Business/Action Item Review**

The Chair reviewed his plans for coordinating the activities between this WG and the new P25220.3.1 WG. The Call for Participation in P2520.3.1 (General Indoor Odor Monitoring) has been distributed. The new WG will have many common interests with P2520.2.1. Many of the members of this WG will also want to join that one. Our regular meeting time on June 14 will be preempted by the P2520.3.1 kickoff meeting. Everyone will require a separate registration (as did our P2520.2.1 kickoff in February).

#### **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 July 12. Both P2520.2.1 and P2520.3.1 will meet on July 12 at separate coordinated times.

#### **10. Adjourn**

The WG Chair asked for a motion to adjourn. Susan Schiffman made the motion, Susana Palma seconded. Without objection to unanimous consent, the Chair adjourned the meeting at 11:48 AM.

## Attachment A: Meeting Participants

Last Name	First Name	Affiliation
Romain	Anne-Claude	University of Liege
Peaslee	David	SPEC Sensors, LLC
Sagar	A S M Sharifuzzaman	Sejong university, South Korea
Sabry	Yasser	Faculty of Engineering, Ain Shams University
Danesh	Ehsan	Alphasense Ltd
Schiffman	Susan	North Carolina State University
Nagle	Troy	ECE, NC State University
Chen	Allen C	Self
Staerz	Anna	Massachusetts Institute of Technology
Mantey	Christian	3S GmbH
Burham	Cynthia	University of Texas at Austin
Izquierdo	Cyntia	Olores.org website
Herrier	Cyril	Aryballe
Cipriano	Domenico	Ricerca sul Sistema Energetico (RSE)
Bultel	Etienne	Aryballe
Leccese	Fabio	Science Department - Università degli Studi "Roma Tre"
Suciu Sr	George	BEIA
Gami	Hirenkumar	Miami University - OH
Li	Hua-Yao	Huazhong University of Science and Technology
Covington	James	Professor, School of Engineering, University of Warwick
MIFSUD	Jean-Christophe	RUBIX SI
Saffell	John	Alphasense Ltd.
Kuna	Kishore	Honeywell Technology Solutions
WONG	KO CHUNG	Oxford Technology
capelli	laura	politecnico di milano
Majewski	Leszek	The University of Manchester
Harris	Louis-Ray	The University of the West Indies (Mona Campus)
Carneiro	Magnovaldo	Self
Potyrailo	Radislav	GE Research
Chakravarthy	Sameer	Raghu Institute of Technology
Isz	Sandrine	Alpha MOS
Reimringer	Wolfhard	3S - Sensors, Signal Processing, Systems GmbH
Alam	Md Faizul	?
Suciu Jr.	George	Beia-Ro
?	Geanina	Beia-Ro
Singh	V R	?
Lalitte	Vanessa	IEEE (Program Manager)
Lozano	Jesus	

