

IEEE P2520.1 Working Group #11

Meeting Minutes

28 February 2022

WG Chair: James Covington

WG Secretary: H. Troy Nagle (Interim)

1. Call to Order

Chair called meeting to order at 10:04 AM EST. He 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 asked the Secretary to check for a quorum. No new members were participating. The List of Participants is shown in **Attachment A**. A quorum was achieved (15 of the 19 voting members were present).

3. Approval of Agenda

The Chair asked for approval of the agenda. Troy Nagle made the motion; Saverio De Vito seconded. Without objection to unanimous consent, the motion was adopted.

4. Approval of Previous Meeting Minutes

The Chair asked for approval of the October 25th Meeting Minutes as circulated. Susan Schiffman made the motion; Troy Nagle seconded. Without objection to unanimous consent, the motion was adopted.

5. IEEE-SA Patent & Copyright Policies

a. Call for Patents

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

6. Technical Presentation:

The major focus for this meeting was a presentation from Aryballe (France). Four representatives from Aryballe participated (Etienne Bultel, Cyril Herrier, Yanis Caritu, and Pierre Maho). The topic was “Clustering metrics for e-nose benchmark.” The presentation covered:

- Problem statement
- Metrics definition
- Application areas (manufacturing, competition benchmark, and use cases)
- Advantages and drawbacks
- Conclusions

Problem: The problem is finding metrics for quantifying digital olfaction. How can we assess the performance of an eNose? Can the device discriminate odors and recognize interference between odors? Is the device under test deliver

repeatable/reproducible results. What metric data should be collected? Will the metrics improve technical developments? Can the metrics be used to compare different technologies? Can the metrics help us match an eNose to targeted application use cases? What can be provided to customers/users to help understand the data for their application?

Metrics: Aryballe have developed a metric called the Clustering Quality Score (CQS). CQS is the generic internal name for their “Silhouette” score method. CQS determines the quality of how the sensor can separate multiple odors (resolving power and odor spectrum range). The presentation gave nice examples of clustering results. They also use a Partition Quality Score that assesses the system’s ability to isolate clusters.

Pros: One metric value is generated to explain a global phenomenon. The data is normalized and bounded in the range [-1,+1] based on the CQS algorithm. The method is good for multivariate-based testing and is independent from the instrument under test.

Cons: Not an absolute metric as the results are dependent on the number of replicates of the measurement points. Ranking of instruments can only be done with strictly similar sampling datasets. It is the wrong metric for non-convex clusters (non-linear separation).

Conclusions: Aryballe developed this clustering score in response to industry needs. The Partition score is an at-a-glance metric for

- (a) Evaluation of sensor performance and repeatability
- (b) Sorting their production
- (c) Comparison between sensors (different technologies and different units of same technology}
- (d) A tool for their customers to evaluate their odors partition

After the presentation, a lively Q&A session followed. The speakers will consider letting the WG keep the recording of their presentation (after review and approval by the company). The full hour of the session was devoted to the presentation and questions that followed.

7. New Business/Activities for the Next Meeting

There was no New Business.

8. Future Meetings

The Chair announced the next meeting of the WG will take place on March 28.

9. Adjourn

The meeting time-period having expired, Troy Nagle made a motion to adjourn; Radislav Potyrailo seconded. Without objection to unanimous consent, the Chair adjourned the meeting at 11:11 AM.

Attachment A: Participants (19)

NAME	AFFILIATION
Carlos Diaz	Ambiente et Odora
Cyril Herrier	Aryballe
Domenico Cipriano	Ricerca Sistema Energetico, Milan
Duke Oeba	Self, Oregon State University
Ehsan Danesh	Alphasense Ltd
Etienne Bultel	Aryballe
Fengchun Tian	Chongqing University
Hua-Yao Li	Huazhong University of Science and Technology
James Covington	Professor, School of Engineering, University of Warwick
Katayoun Emadzadeh	Self
Paul Kagan	AWLDM Systems
Pierre Maho	Aryballe
Radislav Potyrailo	GE Research
Sandrine Isz	Alpha-MOS
Saverio De Vito	ENEA
Susan Schiffman	NC State University
Susana Palma	NOVA University of Lisbon
Troy Nagle	NC State University
Yanis Caritu	Aryballe