IEEE Sensors Council Standards Committee (SC-SC)
Meeting Minutes
20 November 2023
Chair: Troy Nagle
Secretary: Chris Schober

1. **Call to Order at 10:01 am EST**

2. **Roll Call and Affiliation**
   Affiliation FAQs: link
   Attendance Registration Form: link

3. **Attendees at meeting**
   Quorum was met.
   a. Troy Nagle
   b. Chris Schober
   c. Ehsan Danesh
   d. Gerard Hayes
   e. James Covington
   f. Peng Hu
   g. Saba Manikandan
   h. Susana Palma
   i. Houde Dai
   j. Sean Rocke
   k. Ravi Subramanian
   l. Sundaresan Poovalingam

4. **Introductions of attendees round table**
   a. **SC-SC website is** https://sagroups.ieee.org/sc-sc/

5. **Approval of Agenda**
   a. **Moved by Gerald Hayes, 2nd by James Covington, agenda unanimously approved by consent.**

6. **Approval of Previous Meeting Minutes**
   a. **Moved, 2 by Gerald Hayes, 2nd by Sean, minutes unanimously approved by consent.**

7. **Working Group Updates**
   a. Update on P2520 Odor Monitoring Guide (Troy Nagle)
      i. Decides guide need to be finished after the sub-standards are approved. So the plan is to let it expire in December 2023. Then later we will bring it back when other sub-standards are further along as determined by the SC-SC group.
   b. Update on P2520.1 Odor Monitor Baseline Performance (James Covington)
      i. Making progress, close to completing first draft standard. Currently going through creating some appendices (methods to complete standard, other on reporting which is pending IEEE response to questions on how reporting should be done)

ii. TSS technical specifications suite -   Estimate to complete draft as far as possible late 2023 or early 2024. Hoping some manufacturers will lend us equipment or other arrangements for pass/fail criteria development   Planning 2024, Q1-Q2 test with different instruments. Goal is to submit first draft of standard at end of Q2 2024

c. Update on P2520.2.1 General Outdoor Air Odor Monitoring (Ehsan Danesh)
    i. Held 21st working group meeting in Oct. Now split into 2 soft groups: SG1 and SG2. SG1 is quite active, SG2 is working on the test methods.
    ii. PAR review – it expires Dec 2024. This standard will utilize 2520.1 when it is published to accelerate this std's work.

d. Update on P1451.99 IoT Harmonization (Gopalakrishna Kuppa)
    i. Sensor Harmonization – Kuppa not in attendance. Troy has attended some of those meetings, they are progressing. Troy will ask for a report at our next meeting. Primary society is IMMS, IEL and SC are co-sponsors of this working group.

8. **Unfinished Business/Action Items**
  a. SC-SC Policies & Procedures Update (Troy Nagle)
    i. Updates submitted to loosen voting member requirements. Whereas voting members required IEEE-SA membership, SC member society member and attend 2 of past 4 SC-SC meetings. (see slide deck "SC-SC 2023-4 slides.pdf").
    ii. We need to redo the P&P submittal to follow the strict IEEE-SA submittal formatting of the changes.
    iii. Chris volunteered to help Troy re-format the P&P to match what was passed by SC AdCom and also meet IEEE-SA formatting.
    iv. Troy has been appointed by the Sensors Council as SC-SC chair for 2024.
    v. Troy then per the updated P&P will appoint the SC-SC Vice Chair & Secy. So if anyone wants to volunteer, contact Troy Nagle.
    vi. Chris stated she will be on the IEEE BOD so she is hoping someone can take over as Secy.
      1. James Covington offered to help next year as Secy after P2520 finishes.
  b. Update on Sensors Council Industry Liaison Committee (Gerry Hayes)
    i. ILS rep for 2024 will be Dan McGrath.
    ii. This will be the last time Gerry Hayes reports as ILC chair. Gerry Hayes is staying on SC-SC..
    iii. Action Chris/Troy to add Dan McGrath to SC-SC list/
    iv. Liaison on ILS from SC-SC and the reverse. Troy plans to have this be the same person.
  c. IEEESA ICAID on Enabling a Smart and Equitable Agriculture Ecosystem (Jack Marck)
    i. Jack was unable to attend, so Troy will ask for an update on this at the next meeting.

9. **New Business**
  a. New collaborations with Sensors Council Member Societies
    i. SC-SC would like more collaborations with the standards committees of our member societies. SC-SC is looking for suggestions such as the event at INERTIAL in 2023 (Contact Troy).
    ii. Saba Mylvaganam's students created a preliminary draft of sensors standards related to the areas in which they are interested (See Attachment A).

       iii. Troy, Saba, Saba students, Eshan and other volunteers could create new reports in other SC-SC areas.   Create a list of what other working groups are working on Sensors, with a plan to have a draft for Feb 2024 SC-SC meeting.

            1. Action (SC-SC members): send an email to Troy & Saba with the technical areas of sensors for these initial reports on status from the search/AI process.

            2. Ehsan Danesh – suggest adding to these reports, the date of standard, if active, renewal date, or if old standards could use a fresh look.

10. Future Meetings

      February, May, August, and November in 2024 (usually 3 or 4th week, Mondays in 2023)

        Preference question, what days should we avoid? Fridays were recommended to be avoided.

11. Adjourn at 10:59 pm

    a. **Moved, 2 by Gerald Hayes, 2nd by James Covington, meeting adjourned**

Attachments:

    A. Draft AI-assisted survey on odor sensing standards

    B. Meeting slides

ATTACHMENT A:

<u>**Different types of odour sensing – Capabilities and Limitations**</u>

<u>**(Draft - Working Document -need updating with information on latest developmets)**</u>

<u>**Based on work by students with AI-support!**</u>

There are different types of sensors that can be used for odour sensing, each with their own working principles, capabilities, and limitations. The following table summarizes some of the most common sensors and their characteristics with some information on evolving E-nose technologies:

Sensor	Working principle	Capabilities	Limitations	Standards
Olfactometer	A device that dilutes an odour sample with odourless air and presents it to a panel of human assessors who rate the odour intensity, quality, and hedonic tone.	It can provide a direct measurement of the odour perception and the odour annoyance. It can also identify the main odour descriptors and sources.	It is time-consuming, costly, and subjective. It requires trained and motivated panellists. It may not be suitable for hazardous or toxic odours.	EN 13725, ASTM E679, VDI 3881, VDI 3882, VDI 3883, VDI 3884, VDI 3940, DIN ISO 16000-28, DIN ISO 16000-30, VDI 4302-1
Gas chromatograph (GC)	A device that separates a complex mixture of VOCs into its individual components and detects them using different detectors, such as flame ionization detector (FID), mass spectrometer (MS), or photoionization detector (PID).	It can provide a detailed chemical analysis of the odour sample and identify the key odorants. It can also quantify the concentration of each component.	It is expensive, complex, and requires skilled operators. It may not correlate well with the odour perception, as it does not account for the synergistic or antagonistic effects of the odorants.	ISO 17025, ASTM D6196, ASTM D5466, ASTM D6667, ASTM D5504, ASTM D1945, ASTM D1946
Gas chromatography-olfactometry (GC-O)	A device that combines a GC with an olfactometer, where the separated odorants are sniffed by a human assessor who rates their odor intensity and quality.	It can provide a comprehensive characterization of the odour sample, both in terms of chemical composition and sensory perception. It can also identify the most potent odorants and their odour thresholds.	It is very expensive, complex, and time-consuming. It requires trained and motivated panellists. It may not be suitable for hazardous or toxic odours.	ASTM E1870, ASTM E1958, ASTM E2414, ASTM E2600
Electronic nose (E-nose)	A device that mimics the human olfactory system by using an array of different sensors, such as metal oxide semiconductors (MOS), conducting polymers (CP), quartz crystal microbalances (QCM), or surface acoustic wave (SAW) sensors, that generate electrical signals in response to the odour sample. The signals are then processed by a pattern recognition system, such as artificial neural network (ANN), principal component analysis (PCA), or linear discriminant analysis (LDA), to classify or quantify the odour.	It can provide a rapid, simple, and objective measurement of the odour sample. It can also monitor the odour continuously and in real time. It can be used for various applications, such as odour fingerprinting, odour quality control, odour source identification, and odour nuisance assessment.	It is sensitive to environmental factors, such as humidity, temperature, and pressure (cross-sensitivity). It may suffer from sensor drift, cross-sensitivity, and interference. It requires frequent calibration and validation. It may not correlate well with the human olfactory perception, as it does not account for the hedonic tone or the adaptation effects.	ISO 13943, ISO 16000-29, ASTM E1982, ASTM E2534, ASTM E2665
Field olfactometer	A portable device that dilutes an ambient odour with odourless air and presents it to a human assessor who rates the odour intensity.	It can provide a direct measurement of the odour impact at the receptor site. It can also be used for odour mapping, odour source identification, and odour dispersion modeling.	It is subjective and depends on the assessor's sensitivity and motivation. It may not be suitable for hazardous or toxic odours. It may be influenced by the meteorological conditions and the background odours.	ASTM E544, ASTM E1432, ASTM E679, ASTM E2588, ASTM E1982

ATTACHMENT B

1

2

3

4

5

6

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  b. Update on P2520.1 Odor Monitor Baseline Performance (James Covington)
  c. Update on P2520.2.1 General Outdoor Air Odor Monitoring (Ehsan Danesh)
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  c. IEEE-SA ICAID on Enabling Smart Agriculture and Equitable Agriculture Ecosystem (Jack Marck)
- New Business
  a. New collaborations with Sensor Council Industry Liaison Committee
  b. Call for volunteers
- Future Meetings
  February, May, August, and November in 2024
- Adjourn

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7

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8

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9

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10

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11

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IEEE SA STANDARDS ASSOCIATION | IEEE Sensors Council | ◆IEEE 12

12

Slide 13

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13

Slide 14

SC-SC MEMBERSHIP OPTIONS (CURRENT)

SC-SC Requests	IEEE-SA Member	Technical Society Member	2-of-4 attendance	Membership Status
Observe				Observer
Participate	no	no	–	Non-Voting Member
Participate	no	yes	–	Non-Voting Member
Participate	yes	no	–	Non-Voting Member
Participate	yes	yes	no	Non-Voting Member
Participate	**yes**	**yes**	**yes**	**Voting Member**

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14

Slide 15

SC-SC MEMBERSHIP OPTIONS (DESIRED)

SC-SC Requests	IEEE-SA Member	Technical Society Member	2-of-4 attendance	Membership Status
Observe				Observer
Participate	no	no	no	Non-Voting Member
Participate	no	no	yes	Voting Member
Officer	**yes**	**yes**	**yes**	**Voting Member**

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15

Slide 16

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16

Slide 17

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17

Slide 18

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18