

TC ANNUAL REPORTING FORM

IMS Technical Committee

TC-20 Measurement Techniques in Transportation Systems

Reporting period

Starting date (dd/mm/yy)	Ending date (dd/mm/yy)	Date of submission (dd/mm/yy)
01/01/2024	31/12/2024	02/03/2024

Website <https://ieee-ims.org/technical-committee/tc-20> **Last update (10/24)**

TC Chair or co-Chairs

First Name	Second Name	Family Name	Affiliation /Address	Membership number	Phone	e-mail address	Date of election
Daniel		Watzenig	Graz University of Technology Virtual Vehicle Research Austria			Daniel.watzenig@tugraz.at	11/22
Huilin		Yin	Tongji University Shanghai China			yinhuilin@tongji.edu.cn	05/24

Secretary (check the right box)

Present ☐

Not Present ☒

First Name	Second Name	Family Name	Affiliation /Address	Membership number	Phone	e-mail address	Date of election
------------	-------------	-------------	----------------------	-------------------	-------	----------------	------------------

TC Membership list^(*)

First Name	Second Name	Family Name	Affiliation /Address	Membership number	Phone	e-mail address	TC assignments (joining year)
------------	-------------	-------------	----------------------	-------------------	-------	----------------	-------------------------------

* Please add as many rows as needed

Georg	Brasseur	Graz University of Technology	Georg.brasseur@tugraz.at
Thomas	Bretterklierer	Graz University of Technology	Thomas.bretterklierer@tugraz.at
Anton	Fuchs	Virtual Vehicle Research GmbH	Anton.Fuchs@v2c2.at
Lee	Barford	Keysight Laboratories, Reno	lee_barford@ieee.org
Daniel	Watzenig	Graz University of Technology	Daniel.Watzenig@tugraz.at
Voicu	Groza	University of Ottawa	vgroza@uottawa.ca
David	Hastie	University of Wollongong	dhastie@uow.edu.au
Gert	Holler	NXP	Gert.holler@gmx.at
Olaf	Kanoun	Technische Universität Chemnitz	Olaf.kanoun@etit.tu-chemnitz.de
Abdulmoteleb	<i>El</i> Saddik	University of Ottawa	elsaddik@uottawa.ca
Christian	Schuss	Universität Oulu	Christian.schuss@ee.oulu.fi
Selim	Solmaz	Virtual Vehicle Research GmbH	Selim.Solmaz@v2c2.at
Joachim	Taiber	IAMTS	Joachim.Taiber@iamts.org
Huilin	Yin	Tongji University	yinhuilin@tongji.edu.cn

TC mission – field of expertise (max. 1000 char. Including spaces)

In TC-20, students regularly participate in scientific research and development (R&D) initiatives led by its members. This symbiotic relationship benefits all parties involved. Through their involvement, students receive an education in the TC field. Meanwhile, TC-20 members benefit from the contributions that students make to R&D projects. Additionally, this collaboration often leads to the discovery of new members for the I&M society. The work conducted by TC-20 involves a range of activities, including basic research, modeling, development, promotion, and application of energy and processing-constrained measuring systems for transportation systems that are used in challenging settings such as oil well exploration, heavy industries, and automobile industry.

- Measurement and instrumentation for autonomous road and offroad vehicles,
- Perception and planning of autonomous transportation systems,

* Please add as many rows as needed

- Measurement and instrumentation for autonomous ships and clinical robots,
- 2-D and 3-D tomographic flow measurement of transport processes,
- Measurement data analytics (using AI),
- Predictive maintenance of software-defined (autonomous) systems,
- Alternative energies vehicles and advanced driver assistance systems (ADAS),
- Power measurements for electrical drivetrains.
- Provides forums such as workshops and symposia where such technologies can be discussed
- Maintains liaison with other societies and organizations working in the same or related areas.
- Develops and promotes sensor data processing, interpretation and data fusion in

Transportation Systems in Measurements for

- Resource limited applications: energy and processing power
- Indirect measurements (state estimation, inverse problems)
- Harsh environments like automotive, maritime, military, logistics, rail, heavy industry and oil well exploration
- Incorporating TC-20 members know-how into university lectures and curricula
- Any related application of connected cooperative, autonomous mobility and transport

TC-20 runs since 2022 its own IEEE IMS conference. In 2024 it was held in Pittsburgh at the Carnegie Mellon University from October 21 to 23. It is the Int. Automated Vehicles Validation Conference (IAVVC). The next conference will be held in Karlsruhe, Germany, in October 2025. The TC-20 Logo is visible on the conference website: <https://2024.iavvc.org>.

TC meetings in the reporting period^(*)

Date (dd/mm/yy)	Online / Face2Face	Attendance (number)	TC Members	Information sent within 4 months to (Yes/No)		
				Chair of TSAC	IM Magazine	Other (specify)
21/10/2024	F2F	15	6			Visible on IMS Website During the IEEE IAVVC 2024 in Pittsburgh, US https://2024.iavvc.org

Minutes of the yearly meeting (separate file)¹:

Participation in Society sponsored Events (Conferences, Symposia, Workshops)^(*)

¹ Yes/No, date of the yearly meeting;

* Please add as many rows as needed

Name of the Event	Starting date (event) (dd/mm/yy)	Ending date (event) (dd/mm/yy)	Date Participation (dd/mm/yy)	Type of participation (Yes/No)			
				Sponsorship	Session	Tutorial	Other (specify) ²
IAVVC Pittsburgh, USA	21/10/2024	23/10/2024	TC-20 organized conference	Organized by IMS		x	
Graz Symposium on Virtual Vehicle Validation	25/09/2024	26/09/2024	Both days			x	

Involvement in standard development^(*)

Up until now, our involvement in IEEE standards development has been limited. However, we believe that transportation systems in measurements have the potential to standardize specific hardware setups coupled with measurement procedures and algorithms. Although this aim has not been a focus of TC-20, we acknowledge that it may be worth exploring in the future, even if it may require significant time and effort.

Currently, TC-20 members are actively involved in two emerging standards related to the reliability and fault-tolerance of autonomous products. These standards cover both instrumentation hardware and embedded software. The first is the ISO PAS 21448, which focuses on the safety of intended functionality (SOTIF). The second is the UL4600, which was initiated by Carnegie Mellon and Edge Case Research and aims to develop safe autonomous products across all kinds of vehicles and transport systems.

Standard	Working Group	Revision	Activity in the reporting period, including dates	Notes, attendance

Participation in the development of Society Educational Programs^(*)

Program name	Involvement of chapters and sections	Activity in the reporting period, including dates	Notes, attendance

Other Activities (tutorials, teaching, career, cooperation, publications, joint activity with chapters or sections) ^(*)

Interaction with other societies in IEEE: Sensors Council, Vehicular Technology (VTS), Intelligent Transport Systems (ITSS), Robotics and Automation Systems (RAS)

Existing support being provided by the committee to conferences:

Committee members write and review papers for IEEE IMS conferences, in October 2024 the Int. Conf. on Automated Vehicles Validation (IAVVC'23 in Pittsburgh) was held for the fourth time with IMS as financial sponsor (TC-20 as technical sponsor). Members from IEEE Austria and TC-20 did initiate this conference back in 2019 which will be continued by IMS every second year. The conference attracted a lot of patrons and speakers from the industry as well as public authorities and legal affairs. Keynotes

² For example, Involvement in reviewing papers (and indicate approximate number of paper reviews for the listed event)

* Please add as many rows as needed

were given by experts from Stanford University, UC Berkeley, University of Michigan, Bosch GmbH and Aurora.

Existing support being provided by the committee to publications (IMS Magazine and TIM):

No article published in IMS Magazine within the last period but authors being member of TC-20 publish in TIM.

Industry links:

Numerous companies (OEMs, Tier 1 suppliers, I&M companies and semiconductor companies)

TC-20 Industrial and Academic Collaborations

- Collaboration with IAMTS (Int. Alliance on Mobility and Transport Solutions), Dr. Joachim Taiber.
- Grazer Symposium on Virtual Vehicle Research (GSVF), September 2024
- Collaboration with the Stanford University (autonomous systems including vehicles and drones), Florida State University (Battery modeling, thermal dynamics), UC Berkeley (intelligent transport systems)
- Collaboration with the Tongji University in Shanghai, China
- TC-20 members also contributed to the new European framework starting by 2021 ('Horizon Europe').

Two strategic research agendas have been influenced (both have been updated in 2023 and will be publishes in 2024): European Green Deal "2Zero" and the Electronic Components and Systems (CHIPS) Innovation Plan

A book series "CCAM" is currently in development (Industry + Academia). The first two books are expected to be published in late 2024 (AV technology and AV Validation). The first book will be published under Springer International in mid-2025 (Editor: Dr. Michael Stolz).

Recommended candidates^(*)

Type (ADCOM, Fellow, Award –specify-)	First Name	Second Name	Family Name	Affiliation /Address	Motivation

TC operating Plan: near-term plans for the upcoming year, including scheduled meetings, activities, and so on (max. 1000 char. Including spaces)

TC-20 Knowledge Transfer & Teaching

- Dedicated academic lectures and lab course program on measurement and measurement signal processing for transport systems in measurement
- Regular talks of IMS DL Daniel Watzenig on autonomous vehicles
- Several papers have been submitted to the "IEEE IAAVC 2025" conference in Baden-Baden, Germany.
- The second book "AV technology" should be published end of 2025.
- Link to PAVE (Partners for automated vehicles education, <https://pavecampaign.org>) has been established and a fist online webinar has been completed (January 2025) on AI in AV validation together with the company AVL.

* Please add as many rows as needed

-
- Next TC-20 meeting will happen during the IAVVC 2025.

Development of initiatives

- Development of a lectures at Graz University of Technology in the TC-20 field.
- Frequent webinars together with PAVE.
- ICCVE 2019+ (now IAVVC) is the new application-oriented conference of IMS (initiated by TC-20) to be held every two years. Focus: Instrumentation, measurement, and processing topics of electric, connected, automated future transport

TC operating plan:

TC-20 is a committee that focuses on transportation systems research and its applications in industrial environments and different domains. Their research activities include developing, promoting, and supporting transportation technologies and user applications, as well as reviewing emerging technologies and their applications in the user community, government, and industry. Additionally, TC-20 develops new methods to meet industry's need for cost-efficient, robust, reliable, and accurate transportation systems. They also provide forums such as workshops and symposia where such technologies can be discussed and maintain liaison with other societies and organizations working in the same or related areas.

TC-20 also engages in industrial and academic collaborations, including introducing autonomous systems to industrial applications and expanding the global academic partner network, with new partners found at institutions such as the Stanford Cars, Berkeley Deep Drive or Clemson University. Furthermore, they provide knowledge transfer for (autonomous) transportation systems through guest lectures on sensor in several master programs and tutorials at relevant conferences, such as IAVVC.

TC convergence, synergy, cooperation with other TC, from I&M or other societies (max. 1000 char. Including spaces)

To encourage collaboration and student exchange, research topics are being selected at the intersection of two or more IMS TCs. This initiative involves close cooperation between members of TC-20 "Transportation Systems in Measurements" and TC-9 SCS.

Comments/Suggestions (max. 1000 char. Including spaces)

* Please add as many rows as needed