

Report

TC 124 Historical Background and WG Structure (Wearable Electronic Devices and Technologies)

2024-06-05

**Secretary: Mr Jaeyeong Park
Assistant Secretaries: Mr Jungchul Lee
Ms Hyunjin Koo**

Outline

❖ Overview and Prospects of WEDT

- ✓ Terms and definition
- ✓ Technology analysis
- ✓ Market analysis
- ✓ World wide players and products
- ✓ Recent Innovative Wearable Electronic Devices in CES

❖ History and Standardization Activities of IEC TC 124

- ✓ Title and scope
- ✓ Participating countries
- ✓ WG structures
- ✓ Liaison

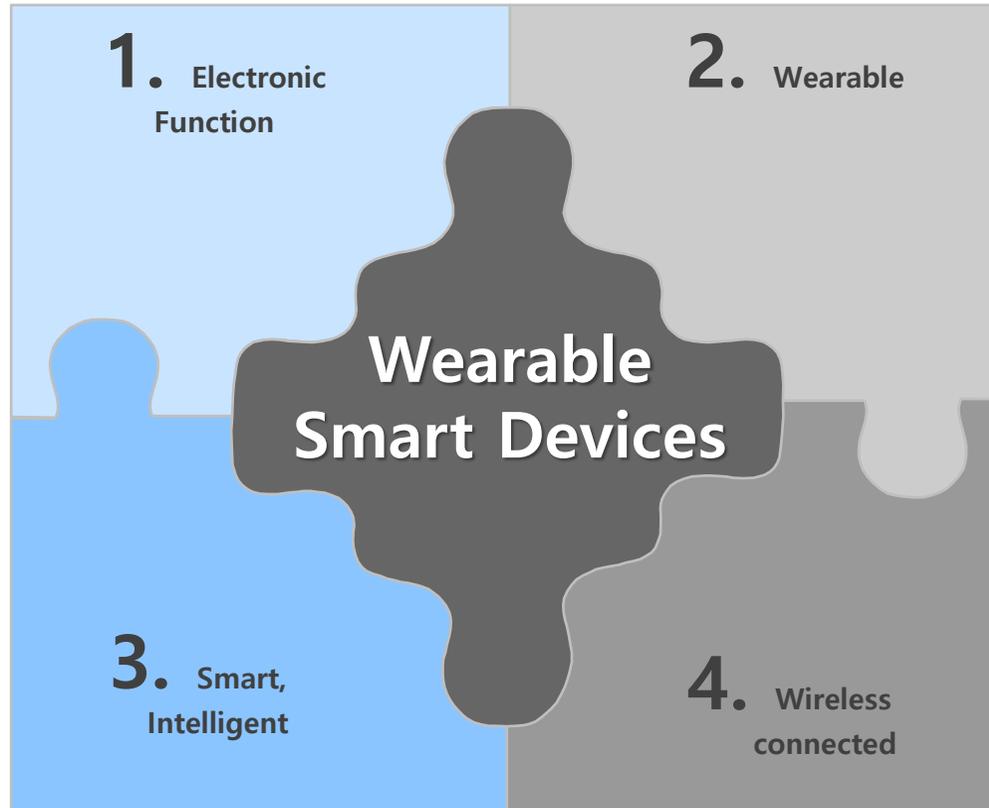
❖ Standardization Roadmap and Work Programme of IEC TC 124



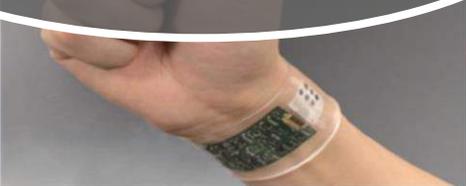
Overview and Prospects of Wearable Electronic Devices and Technologies

Terms and Definition

The “**Wearable Smart Devices**” can be given as, electronic devices which are wearable and intelligent



Key Trends



Miniaturization, and form factors moving from bulky/rigid to thin/**flexible**



Technology becoming more **fashionable** and/or **invisible**



Increasing prioritization of **user comfort** and **adaptability**



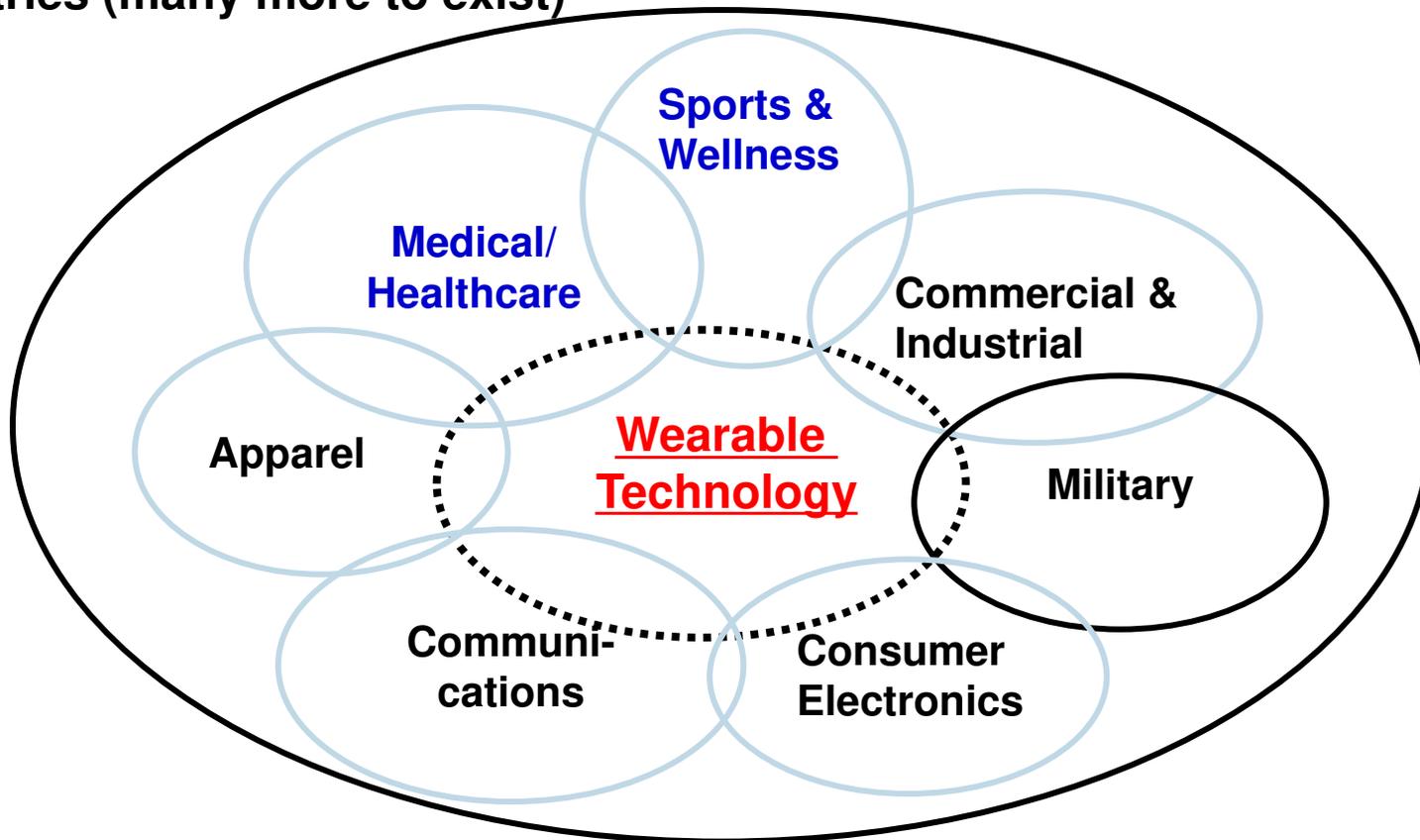
Improving **user interfaces** with IoT and outer devices



Increasingly **health, environment** and **adaptability**

Applications

- The “**Wearable Technology Industry**” is a convenient, newly-defined industrial sector derived (spin-off) from **various sectors across the industries**
- This definition emphasizes several key trends which existed across a diverse industries (many more to exist)



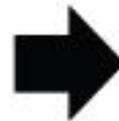
Medical/Healthcare

- The “**Wearable Technology**” is a promising and crucial technology for smart biomedical and health care systems

Current



- Rigid and bulky
- Electrical wires
- Needs for external instruments
- Hospital-centered



Future

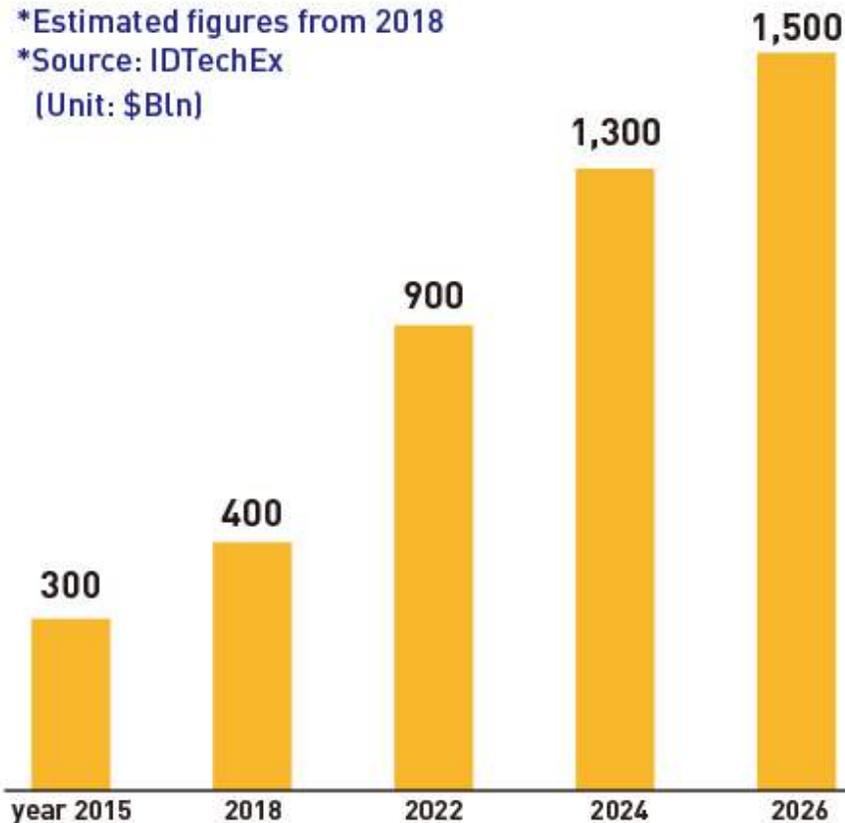


- Soft and thin
- Wireless
- Stand-alone
- Human-centered

Target goal: Soft, thin, wireless bio-electronic systems

Global wearable Smart Gadget Market Trends

- The market survey institution IDTechEx predicted that the wearable smart device market will surge from about \$30 billion in 2015 to about **\$150 billion in 2026**.



Players (> 4,000)



HeadWear

4 FORCE, EMOTIV, Thync, NeuroSky, Body and Mind. Quantified, interaxon, imec

EarWear

Jabra YOU'RE ON, SONY, BitBite, SENNHEISER, LG, BOSE, iriver, SMS AUDIO, plantronics, BRAGI

EyeWear

Google, atheer labs, SAMSUNG, intel, CHIPSIP, castAR, AVGANT, facebook, Microsoft, oculus

BodyWear

POLAR, LISTENS TO YOUR BODY, SQUARE TEXTILES LTD., adidas, HEXO SKIN, GARMIN, PYLE, AiQ, Abbott, Dexcom, SENSIMED, htc, VALVE, NOVARTIS, RX

WristWear

MISFIT, adidas, Apple, intel, RAZER, HUAWEI, runastic, SAMSUNG, SUNFRIEND CORPORATION, INTEX, SONY, ZTE中兴, Microsoft

LegWear

proteus DIGITAL HEALTH, NOVARTIS, JABIL, URight, LUMO, imec, CUTECIRCUIT, AMPSTRIP, biodevices, Medtronic

HandWear

ASUS, mi, SEIKO, Google, PEBBLE, GARMIN, kreyas, FiLIP, Withings, omate TrueSmart, swatch, JAWBONE, fitbit, MOTOROLA, ARCHOS Entertainment your way, TOMTOM

FootWear

LECHAL, DIGITSOLE FOOTWEAR. REINVENTED., sensoria, GIX.com With You

Products (1)



<Siren, Diabetic Socks>

virtually invisible 6 microsensors that monitor temperature changes in the bottom of feet



<ORBI Inc., ORBI Prime>



<Willow, Wearable Breast Pump>



<Samsung Electronics America, Samsung Gear Fit2 Pro>



<NUIVIZ, Integrated Head UP Display for Motorcyclists>



<Chero Tech Co., Cloud ECG Patch>



- 🎵 Listen to music
- 🏃 Track activity
- ☎ Make calls
- 📍 Find My Glasses
- 👋 Gesture control
- 🗺 Listen to navigation
- 🕒 Report time
- 🔊 Bone conduction audio
- 🔌 Wireless charging
- 👁 On detection
- 🔋 Up to 7 days standby
- 👓 Prescription lenses or sunglasses
- 🎨 Customizable styles

<Vigo Tech. Inc., Vue Smart Glasses>

Products (2)



<L'OREAL & Epicore Biosystems
My Skin Track pH Wearable Sensors>



<Owlet Baby Care,
Owlet Band Wearable Technology >



<Twinery, Innovations by MAS, I-
THERMIC - INTELLIGENT WARMING by
Odlo-MAS-Clim8>



<Carnival Corporation,
OceanMedallion>



<URGOnight by URGOTECH,
URGOnight, the brain training
solution for a better sleep>



<Wearable Technologies,
Withings BPM Core>



<OptiShokz ,
Xtrainerz>

Products (3)



<Charmcare Co. Ltd, H2-BP
(Wristband type blood
pressure monitor)>



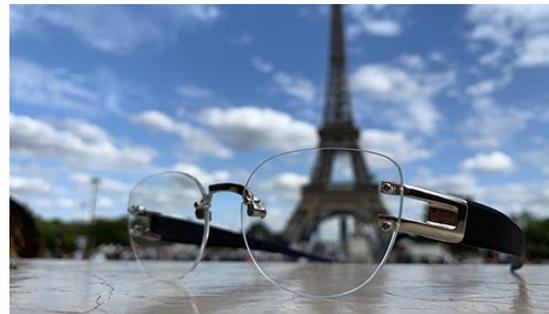
<Industrial Technology Research
Institute (ITRI), iStimUwear>



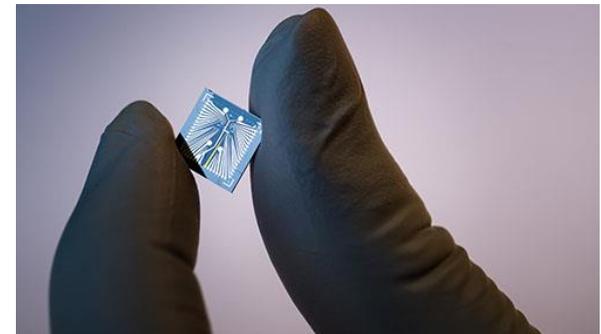
<RajMall Inventives LLC, Xenxo S-Ring>



<Samsung Electronics, Inc.,
Galaxy Watch Active2>



<5th Dimension, Sonic Frames:
1st Augmented Communication Experience >



<Xsensio, Lab-on-Skin>



Standardization Activities of IEC TC 124

- Wearable smart devices TC officially proposed at the IEC SMB held in Tokyo, Japan in November 2014.
- ad-hoc group 56 was established under IEC SMB.
- In June 2015, based on the review results of SMB adG 56, Strategic Group 10 (SG 10) was newly established to specify the feasibility of establishing TC.
- The first meeting was held in Seoul, Korea in 3 to 4 November 2015.
- The establishment of the IEC/TC 124 was approved in the 158th SMB meeting in Mexico in February 2017.

Name of Meetings	Place	Year
Inaugural Plenary Meeting	Seoul, Korea	2017. 09
Interim Meeting	Manchester, England	2018.05
Plenary Meeting, IEC GM	Busan, Korea	2018.10
Interim Meeting	San Francisco, CA, USA	2019.05
Plenary Meeting, IEC GM	Shanghai, China	2019. 10
On-line Meetings (Zoom)		2020, 2021
Plenary Meeting, IEC GM	San Francisco, CA, USA	2022. 11
Interim Meeting	Otsu, Japan	2023. 06
Plenary Meeting	Milan, Italy	2023. 10
Interim Meeting	Espoo, Finland	2024. 06



Title:

Wearable electronic devices and technologies

Scope:

Standardization in the field of wearable electronic devices and technologies which include patchable materials and devices, implantable materials and devices, ingestible materials and devices, and electronic textile materials and devices.

Excluded: Standardization for specific items in the field of the following IEC TCs:

TC 47, TC 62, TC 100, TC 108, TC 110, TC 119, SyC AAL and relevant areas of JTC 1

■ **TC 124 officers: 4, IEC Secretariat: 3**

Role	Name	Term Of Office	NC
Chair	Mr Shuji Hirakawa	2023 (3yrs)	JP
Secretary	Mr Jae Yeong Park		KR
Assistant Secretary	Mr Jungchul Lee		KR
Assistant Secretary	Ms Hyunjin Koo		KR
Technical Officer	Ms Suzanne Yap		IEC
Standards Project Administrator	Mrs Nor Shahidah Binte Jamal		IEC
Editor	Mrs Lucy Sonner		IEC

TC 124 Membership			
Country	Country Code	P/O Status	IEC Membership
Australia	AU	O-Member	Full Member
Belgium	BE	P-Member	Full Member
China	CN	P-Member	Full Member
Czech Republic	CZ	O-Member	Full Member
Denmark	DK	O-Member	Full Member
Finland	FI	P-Member	Full Member
France	FR	P-Member	Full Member
Germany	DE	P-Member	Full Member
India	IN	P-Member	Full Member
Ireland	IE	O-Member	Full Member
Italy	IT	P-Member	Full Member
Japan	JP	P-Member	Full Member
Korea, Republic of	KR	P-Member	Full Member
Malaysia	MY	P-Member	Full Member
Mexico	MX	O-Member	Full Member
Netherlands	NL	P-Member	Full Member
Norway	NO	O-Member	Full Member
Poland	PL	O-Member	Full Member
Romania	RO	O-Member	Full Member
Sweden	SE	O-Member	Full Member
Ukraine	UA	O-Member	Full Member
United Kingdom	GB	P-Member	Full Member
United States of America	US	P-Member	Full Member

Facts and figures

Secretariat Korea, Republic of

Participating countries 13

Observer Countries 12

■ P-member countries (13 -> 15 or 16)

- ✓ **Current:** Belgium, China, Finland, France, Germany, India, Italy, Japan, Korea, Malaysia, Netherlands, United Kingdom, USA
- ✓ **Candidate:** Sweden, Switzerland (O-member)
- ✓ **Australia, Canada, Spain, Singapore, Israel, Hungary, Brazil, Austria, Thailand, Turkey, Russian Federation (Non O-member)**

- **WG1 (Terminology)** (Convenor: Ms. Veronica Lancaster (US), Mr. Laurent Houillon (FR))
 - ✓ To produce terminology definitions for wearable electronic devices and technologies
- **WG2 (E-textiles)** (Convenor: Mr. Henry Yi Li (UK), Mr. Satoshi Maeda (JP))
 - ✓ To develop measuring and evaluating methods for textile materials, devices, and systems with electrotechnical functionality
- **WG3 (Materials)** (Convenor: Mr. Seong-Deok Ahn (KR))
 - ✓ To define specific terms and to determine assessments, requirements, and specifications for materials of wearable electronic devices and packages excluding E-textiles
 - ✓ To analyze the effectiveness of the existing methods specific to the materials of wearable electronic devices and packages excluding E-textiles
 - ✓ To develop measuring and evaluating methods for materials for wearable electronic devices and packages excluding E-textiles
- **WG4 (Devices and Systems)** (Convenor: Mr. Deok-kee Kim (KR))
 - ✓ To develop measuring and evaluating methods for devices and packages including implantable, patchable, ingestible, excluding E-textiles
 - ✓ To develop standards related with systems, applications, and services excluding E-textiles
 - ✓ To develop standards related with power sources excluding E-textiles
 - ✓ To develop standards related with interfaces and connectivity excluding E-textiles

- **WG8 (Wearable communications and interfaces technologies)** (Convenor: Mr Hirokazu TANAKA (JP))
 - ✓ To develop documents related to wearable communications and interfaces technologies

- **JWG6 (Test methods of wearable heating e-textile products)** (Convenor: Ms Youngmin Jun (KR), Ms Karin Rachel Eufinger (ISO))
 - ✓ To develop the joint project (IEC 63517 lead by IEC) between IEC TC 124 and ISO TC 38

- **ahG7 (Future use cases on wearables)** (Convenor: Mr Jong Hong Jeon (KR), Ms Veronica A. Lancaster (US))
 - ✓ To investigate, assess, and identify immediate standardization opportunities related to emerging wearable technologies, wearable-based applications, and future use cases for wearable technologies
 - ✓ To provide a report to the next plenary including recommending areas for further study, identifying existing work under the scope of other committees, and identifying potential NWIPs under the scope of TC 124 based on this study (**Tentative**)

- **AG1 (Advisory Group on Strategy and Coordination)**
 - ✓ To update and manage the scope and the strategic business plan of TC 124
 - ✓ To develop strategy for effective standards development and technical roadmap, including new electrotechnical areas
 - ✓ To organize, coordinate, and manage the work of TC 124
 - ✓ To prepare allocation of contested new work items of TC124
 - ✓ To prepare an improvement of TC124 structure
 - ✓ To promote two-way communications between TC 124, liaised TC/SCs and other international standardization organizations to facilitate cooperation and avoid duplication of work
 - ✓ To provide leadership to enable improved cooperation between industry and TC 124
 - ✓ To maintain membership participation
 - ✓ **Convenor: Secretary**
 - ✓ **Members: TC124 officers, WG convenors, 1 representative expert from each P-member country**

TC 124 Liaisons



Committee	Description	Incoming liaison representative(s)	Outgoing liaison representative(s)
Internal IEC Liaison			
TC 21	Secondary cells and batteries		Mr Felix Quintanar
TC 29	Electroacoustics	Mr Peter Hanes	
TC 47	Semiconductor devices	Mr Deok-kee Kim	Mr Deok-kee Kim
TC 62	Medical equipment, software, and systems	Mr Klaus Neuder	Mr Felix Quintanar
SC 62A	Common aspects of medical equipment, software, and systems	Ms Pamela Gwynn	Mr Jong Hong Jeon
SC 62D	Particular medical equipment, software, and systems	Mr Klaus Neuder	Mr Jong Hong Jeon
TC 78	Live working	Mr Bernard PIERRON	
TC 91	Electronics assembly technology		
TC 100	Audio, video and multimedia systems and equipment	Mrs Ulrike Haltrich	Mrs Ulrike Haltrich
TC 101	Electrostatics	Mr Paul Holdstock	Mr Sanjeev Singh

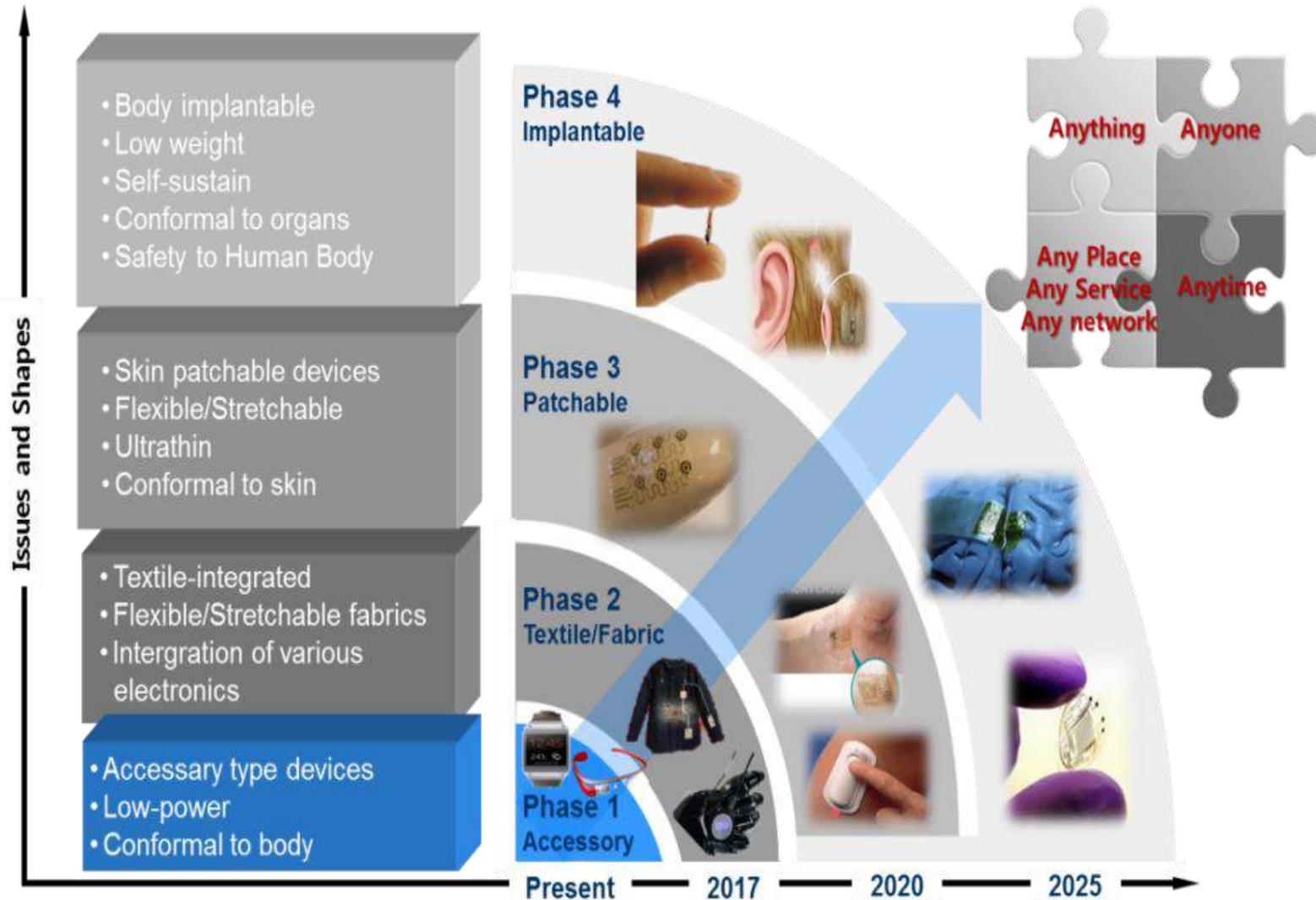
TC 106	Methods for the assessment of electric, magnetic and electromagnetic fields associated with human exposure		
TC 108	Safety of electronic equipment within the field of audio/video, information technology and communication technology	Mr Raju Desai	
TC 110	Electronic displays	Mr Kei Hyodo	Mr Kei Hyodo
TC 119	Printed Electronics	Mr Kyung-Tae Kang	Mr Kei Hyodo
SyC AAL	Active Assisted Living	Ms Pamela Gwynn Mr Hirokazu TANAKA	Mr Hirokazu TANAKA
ISO/IEC JTC 1	Information technology	Mrs Catherine Grant	Mrs Catherine Grant
ISO/IEC JTC 1/SC 6	Telecommunications and information exchange between systems	Mr Yun Jae Won	Mr Yun Jae Won
ISO/IEC JTC 1/SC 35	User interfaces		Mr Hongzhi Tao
ISO/IEC JTC 1/SC 41	Internet of Things and Digital Twin	Mrs Catherine Grant	Mr Jong Hong Jeon
ISO/IEC JTC 1/SC 43	Brain-computer Interfaces	Mr Jiangbo PU	Mr Jong Hong Jeon

Liaison ISO			
ISO/TC 38	Textiles	Ms Karin Eufinger Mr Laurent Houillon	Mr Laurent Houillon Mr Henry Yi Li
ISO/TC 94	Personal safety - Personal protective equipment		
ISO/TC 94/SC13	Personal safety - Protective clothing and equipment - Protective clothing	Ms Karin Eufinger	Mr Laurent Houillon
ISO/TC 150	Implants for surgery		Mr Felix Quintanar
ISO/TC 172	Optics and photonics	Mrs Clara Engesser	
ISO/TC 194	Biological and clinical evaluation of medical devices	Mr Karl Wenzelowski	Mr Henry Yi Li
Liaison A			
AATCC	American Association of Textile Chemists and Colorists	Ms Diana Wyman	Ms Diana Wyman
ETSI SmartBAN	ETSI SmartBAN	Mr Hirokazu TANAKA	Mr Hirokazu TANAKA



Standardization Roadmap and Work Programme of IEC TC 124

Technology Roadmap



Publications (2024-06-03): 15 IS, 1 TR

Preview	Reference, Edition, Date, Title	Language
	<p>IEC 63203-101-1:2021 Edition 1.0 (2021-06-29) Wearable electronic devices and technologies - Part 101-1: Terminology</p>	EN-FR
	<p>IEC 63203-201-1:2022 Edition 1.0 (2022-04-26) Wearable electronic devices and technologies - Part 201-1: Electronic textile - Measurement methods for basic properties of conductive yarns</p>	EN-FR
	<p>IEC 63203-201-2:2022 Edition 1.0 (2022-04-26) Wearable electronic devices and technologies - Part 201-2: Electronic textile - Measurement methods for basic properties of conductive fabrics and insulation materials</p>	EN-FR
No preview	<p>IEC 63203-201-2:2022/COR1:2023 Edition 1.0 (2023-10-20) Corrigendum 1 - Wearable electronic devices and technologies - Part 201-2: Electronic textile - Measurement methods for basic properties of conductive fabrics and insulation materials</p>	EN-FR
	<p>IEC 63203-201-3:2021 Edition 1.0 (2021-04-07) Wearable electronic devices and technologies - Part 201-3: Electronic textile - Determination of electrical resistance of conductive textiles under simulated microclimate</p>	EN-FR
	<p>IEC 63203-204-1:2023 RLV Edition 2.0 (2023-03-16) Wearable electronic devices and technologies - Part 204-1: Electronic textile - Test method for assessing washing durability of e-textile products</p>	EN



IEC 63203-204-1:2023

Edition 2.0 (2023-03-16)

Wearable electronic devices and technologies - Part 204-1: Electronic textile - Test method for assessing washing durability of e-textile products

EN-FR



IEC TR 63203-250-1:2021

Edition 1.0 (2021-06-22)

Wearable electronic devices and technologies - Part 250-1: Electronic textile - Snap fastener connectors between e-textiles and detachable electronic devices

EN



IEC 63203-301-1:2024

Edition 1.0 (2024-03-19)

Wearable electronic devices and technologies - Part 301-1: Test method of electrochromic films for wearable equipment

EN-FR



IEC 63203-401-1:2023

Edition 1.0 (2023-10-09)

Wearable electronic devices and technologies - Part 401-1: Devices and systems: functional elements - Evaluation method of the stretchable resistive strain sensor

EN-FR



IEC 63203-402-1:2022

Edition 1.0 (2022-11-04)

Wearable electronic devices and technologies - Part 402-1: Performance measurement of fitness wearables - Test methods of glove-type motion sensors for measuring finger movements

EN-FR



IEC 63203-402-2:2024

Edition 1.0 (2024-01-31)

Wearable electronic devices and technologies - Part 402-2: Performance measurement of fitness wearables - Step counting

EN-FR



IEC 63203-402-3:2024

Edition 1.0 (2024-01-09)

Wearable electronic devices and technologies - Part 402-3: Performance measurement of fitness wearables - Test methods for the determination of the accuracy of heart rate

EN-FR



IEC 63203-406-1:2021

Edition 1.0 (2021-12-16)

Wearable electronic devices and technologies - Part 406-1: Test method for measuring surface temperature of wrist-worn wearable electronic devices while in contact with human skin

EN-FR



IEC 63203-801-1:2022

Edition 1.0 (2022-11-04)

Wearable electronic devices and technologies - Part 801-1: Smart body area network (SmartBAN) - Enhanced ultra-low power physical layer

EN-FR



IEC 63203-801-2:2022

Edition 1.0 (2022-11-04)

Wearable electronic devices and technologies - Part 801-2: Smart body area network (SmartBAN) - Low complexity medium access control (MAC) for SmartBAN

EN-FR

Work Programmes (2024-06-02): 18 Working projects

TC 124 Work programme (18)



Project Reference	Document Reference	Init. Date	Current Stage	Next Stage	Working Group	Project Leader	Fcst. Publ. Date
PWI 124-9 Future IEC 63203-402-X: Wearable electronic devices and technologies - Part 402-X: Performance of stress measurements in wearables			PWI 2022-05	prePNW 2024-05	WG 4	Veronica Lancaster	
PWI 124-10 Future IEC 63203-20X-X: Wearable electronic devices and technologies - Part 20X-X: Standard Test Method for Measuring Resistance-based Textile Tensile Strain Sensors (RTTSS) in dry and wetted conditions			PWI 2022-06	prePNW 2024-09	WG 2	Henry Yi Li	
PWI 124-11 Future IEC 63203-402-X: Wearable electronic devices and technologies - Part 402-X: Performance Measurement of Fitness Wearables - Sleep Measurements			PWI 2023-08	prePNW 2024-07	WG 4	Veronica Lancaster	
PWI 124-12 Future IEC 63203-40X-X: Wearable electronic devices and technologies - Part 40X-X: Mobile wearable device data security			PWI 2023-08	prePNW 2024-07	WG 4	Sanjeev Singh	
PWI 124-13 Future IEC 63203-402-X: Wearable electronic devices and technologies - Part 402-X: Performance Measurement of Fitness Wearables - Test methods of glove-type motion sensing products			PWI 2023-08	prePNW 2024-07	WG 4	Yun Jae Won	

<p>PWI 124-13 Future IEC 63203-402-X: Wearable electronic devices and technologies - Part 402-X: Performance Measurement of Fitness Wearables - Test methods of glove-type motion sensing products</p>		<p>PWI 2023-08</p>	<p>prePNW 2024-07</p>	<p>WG 4</p>	<p>Yun Jae Won</p>
<p>PWI 124-14 Future IEC 63203-2XX-X: Wearable electronic devices and technologies - Part 2XX-X: Test method to characterize inductance of e-textiles under deformation</p>		<p>PWI 2023-12</p>	<p>prePNW 2024-12</p>	<p>WG 2</p>	<p>Hyun-jin Koo</p>
<p>PWI 124-15 Future IEC 63203-3XX-X: Wearable electronic devices and technologies - Part 3XX-X: Test method for torsion of conductive flexible films</p>		<p>PWI 2023-12</p>	<p>prePNW 2024-12</p>	<p>WG 3</p>	<p>Hyun Min Cho</p>
<p>PWI 124-16 Future IEC 63203-3XX-X: Wearable electronic devices and technologies - Part 3XX-X: Test method for UV transmittance and bistability of electrochromic films</p>		<p>PWI 2023-12</p>	<p>prePNW 2024-12</p>	<p>WG 3</p>	<p>Hojun Ryu</p>
<p>PWI 124-17 Future IEC 63203-2XX-X: Wearable electronic devices and technologies - Part 2XX-X: Measurement method for impedance of E-textile</p>		<p>PWI 2024-03</p>	<p>prePNW 2025-03</p>		<p>Sangmo Jeon</p>
<p>IEC 63203-101-1 ED2 Wearable electronic devices and technologies - Part 101-1: Terminology</p>	<p>124/272/RR  93 kB</p>	<p>2024-02</p>	<p>ACD 2024-02</p>	<p>CD 2024-12</p>	<p>WG 1 Laurent Houillon 2026-12</p>

<p>IEC 63203-201-4 ED1</p> <p>Wearable electronic devices and technologies - Part 201-4: Electronic textile - Test method for determining sheet resistance of conductive fabrics after abrasion</p>	<p>124/246/CDV</p> <p> 332 kB</p> <p> 342 kB</p>	2022-02	<p>PRVC</p> <p>2024-02</p>	2024-04	WG 2	Hyun-jin Koo	2025-03
<p>IEC 63203-203-1 ED1</p> <p>IEC 63203-203-1: Wearable electronic devices and technologies - Part 203-1: Test method for measuring performance of fabric-based triboelectric nanogenerator</p>	<p>124/224/NP</p> <p> 1190 kB</p>	2023-11	<p>ACD</p> <p>2023-11</p>	<p>CD</p> <p>2024-08</p>	WG 2	Bipin Kumar	2026-08
<p>IEC 63203-203-2 ED1</p> <p>IEC 63203-203-2: Wearable electronic devices and technologies - Part 203-2: Test method for measuring performance of fabric-based piezoelectric nanogenerator</p>	<p>124/225/NP</p> <p> 2073 kB</p>	2023-11	<p>ACD</p> <p>2023-11</p>	<p>CD</p> <p>2024-08</p>	WG 2	Wazed Ali	2026-08
<p>IEC 63203-204-2 ED1</p> <p>Wearable electronic devices and technologies - Part 204-2: Electronic textile - Test method to characterize electrical resistance change in knee and elbow bending test of e-textiles</p>	<p>124/233/CDV</p> <p> 1064 kB</p> <p> 1081 kB</p>	2021-01	<p>PRVC</p> <p>2023-12</p>	2024-03	WG 2	Mijung Lee	2025-02
<p>IEC 63203-401-1 ED2</p> <p>Wearable electronic devices and technologies - Part 401-1: Devices and systems: functional elements - Evaluation method of the stretchable resistive strain sensor</p>	<p>124/256A/RR</p> <p> 95 kB</p>	2023-11	<p>ACDV</p> <p>2023-11</p>	<p>TCDV</p> <p>2024-04</p>	WG 4	Veronica Lancaster	2025-09

IEC 63203-403-1 ED1

Wearable electronic devices and technologies - Part 403-1: Test methods of surface electromyography sensors for wearable applications

124/258/CD

 723 kB

2022-08

PCC
2024-02

2024-03

WG 4

yin kuiying

2025-09

IEC 63203-801-2 ED2

Wearable electronic devices and technologies - Part 801-2: Smart body area network (SmartBAN) - Low complexity medium access control (MAC) for SmartBAN

124/267/RR

 97 kB

2024-01

ACDV
2024-01

TCDV
2024-10

WG 8

Hirokazu
TANAKA

2025-10

IEC 63517 ED1

Wearable electronic textiles - Test methods for performance of heating products - Heating temperature and power consumption

124/275/CD

 424 kB

2023-09

CD
2024-03

PCC
2024-06

JWG 6

Youngmin Jun

2026-04



Thank you very much!