



IEC/TC OR SC: TC 124	SECRETARIAT: Korea	DATE: 2018-05
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Please ensure this form is annexed to the Report to the Standardization Management Board if it has been prepared during a meeting, or sent to the Central Office promptly after its contents have been agreed by the committee.

A STATE TITLE AND SCOPE OF TC

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 ISO/IEC JTC 1.

Background

The world-wide market trends have led to a growing convergence and new industry including patchable, implantable, and ingestible materials and devices as well as e-textiles into the concept of wearable electronic devices and technologies. New types of standardization and collaboration works are needed to efficiently cope with the rapidly growing new industry.

There are several activities inside and outside IEC. However, their activities are considerably partial and limited to cover all of the standardization necessity in the current and future markets. In order to stabilize and accelerate industrialization of wearable electronic devices and technologies, the TC 124 may need strong liaisons and collaborations with other bodies for its future works.

IEC TC 124 has no intention to work on the areas covered by IEC TC 62.

B MANAGEMENT STRUCTURE OF THE TC

Since wearable electronic devices and technologies are still evolving and expanding vigorously, the structure of the TC is preferred to be flexible so as to effectively follow the rapid change but not constrain it. Tentative WG structure should cover the following essential areas: terminology, e-textiles, materials, devices, systems, and their reliabilities, etc.

- WG1 (Terminology)
To produce terminology definitions for wearable electronic devices and technologies
- WG2 (E-textiles)
To develop measuring and evaluating methods for textile materials, devices, and systems with electrotechnical functionality
- WG3 (Materials)
To define specific terms and to determine assessments, requirements, and specifications for materials of wearable electronic devices and packages, all excluding e-textiles
To analyze the effectiveness of the existing methods specific to the materials of wearable electronic devices and packages, all excluding e-textiles
To develop measuring and evaluating methods for materials for wearable electronic devices and packages, all excluding e-textiles
- WG4 (Devices and Systems)
To develop measuring and evaluating methods for devices and packages including

implantable, patchable, ingestible, excluding E-textile

To develop standards related with systems, applications, and services, all excluding e-textiles

To develop standards related with power sources, all excluding e-textiles

To develop standards related with interfaces and connectivity, all excluding e-textiles

- AG1 (Advisory Group on Strategy)

To update scope of TC124

To develop strategy and technical roadmap

To develop new technological areas

To update and manage the strategic business plan

To promote two-way communications between TC 124, liaised TC/SCs and other

international standardization organizations to facilitate cooperation and avoid duplication of work

C BUSINESS ENVIRONMENT

The business environment of wearable electronic devices and technologies is rapidly expanding on a global basis with new emerging markets and applications. Wearable electronic devices and technologies will be used in emerging applications sectors using various technologies that will include semiconductors, displays, sensors, textiles, IoT, etc.

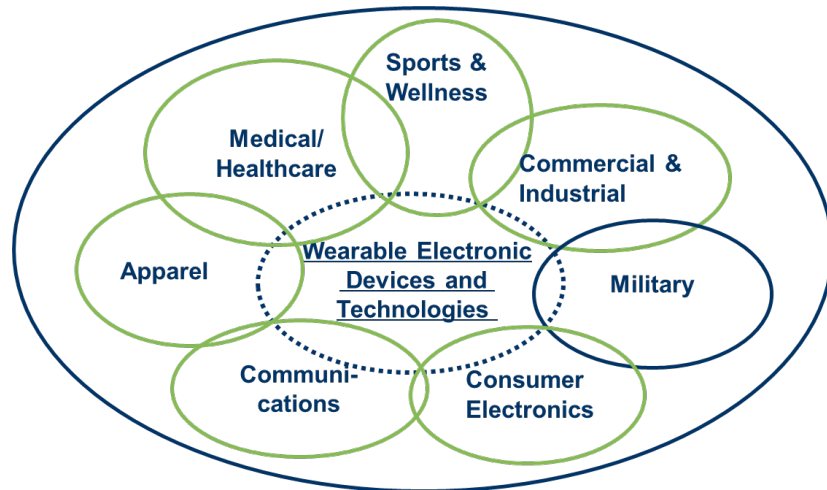


Figure 1 Business areas and applications of wearable electronic devices and technologies

D. MARKET DEMAND

More than four thousand companies including all major electronics multi-nationals are developing wearable electronic devices and technologies for the global market. The most promising areas of development are medical and infotainment applications followed by industrial, commercial, and military applications. According to the forecast from IDTechEx in 2014, global market value for wearable electronic devices and technologies is projected to exceed 70 billion US dollars by 2024. In the early stage, basic infotainment (not web connected or diagnostic) and passive medical, healthcare, and fitness devices will share the biggest market (around 50% of value). Based on IDTechEx expectation, new types of wearable electronic devices and technologies (patchable or implantable devices with web connection and diagnostic capability) will appear gradually and take over most of the market (90% of value) by 2024. In addition, the market share of the wearable electronic devices and technologies for industrial fields (commercial and military) will continuously rise, thus, the market value would reach around 10 billion US dollars at the year of 2024.

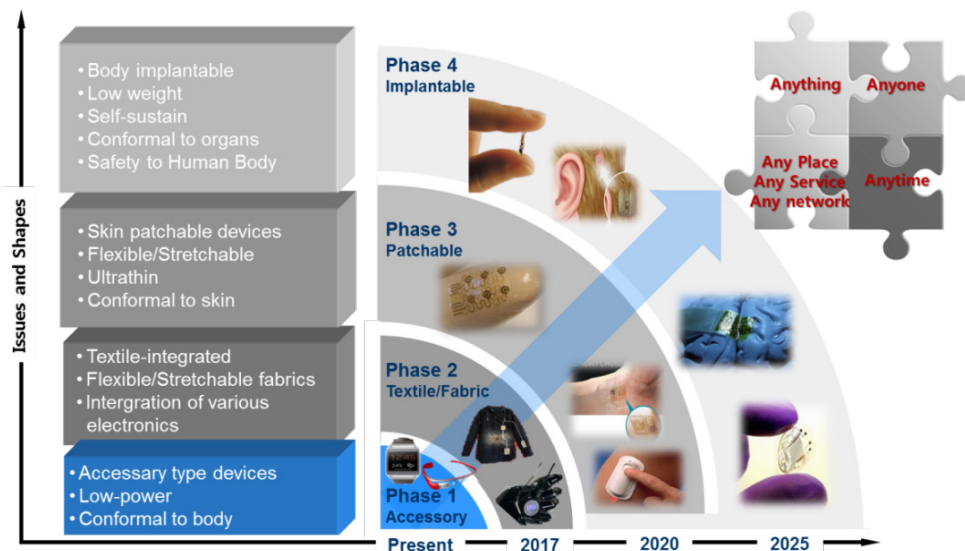


Figure 2 The evolution and roadmap of wearable electronic devices and technologies

Major current and upcoming wearable devices are categorized as accessories, electronic textiles, patchable devices, implantable devices. While wearable electronic devices and technologies are different in their types and shapes, they share common characteristics that they are always stay on, collecting data with the aim to improve how users interact and benefit from their environments.

Such many companies will become primary customers for the international standards which will be developed by TC 124. Related technologies are ready to industrialize and facilitate wearable electronics, there is a common agreement that only international standardization can reduce the cost and effort for the early industrialization and provide effective guidelines towards stabilization and expansion of the market. In particular, standardizations of the relevant materials, devices, systems, adaptability and reliability will be carried out by TC 124. TC 124 will also focus on supporting the strategy and road map reflecting wearable electronic device market demands, which will open the related market and industry.

E TRENDS IN TECHNOLOGY AND IN THE MARKET

Trends in wearable electronic devices and technologies require user comfort and adaptability. Miniaturization, form factor transition to flexible wearable electronic devices is under development to alleviate the inconvenience of users while carrying them. For future development, incorporation of wearable electronic devices with clothing and other products, and communication to improve user interface with IoT and outer devices need to be taken into account.



Figure 3 Trends in wearable electronic devices and technologies

Section D of this document lists medical and infotainment applications as the most promising areas of development. In terms of specific product types it is envisioned that these would consist of smart* eyewear, smart clothing, patchable devices, and wearable power sources. According to IDTechEx

2016, the total numbers of products in wearable applications are expected to increase rapidly.



Figure 4 Forecast of smart eyewares, smart clothings, and patchable devices in wearable applications (reproduced from IDTechEX 2016 data)

Implantable near skin and ingestible devices that are composed of biodegradable and biocompatible materials are at the edge of production. Bio-degradable batteries, dissolvable electronic devices and smart pills that can be implanted under skins and used to kill infections are expected to come in a near future.

F SYSTEMS APPROACH ASPECTS (REFERENCE - AC/33/2013)

The market size and needs for “Wearable Electronic Devices and Technologies (WEDTs)” with respect to various applications are rapidly growing. For these reasons, there are several activities inside and outside IEC to cope with these needs. However, their activities are considerably partial and limited to cover all of the WEDTs’ standardization necessity in the current and future markets. Identifying all potential areas that require collaboration and prepare a systematic approach plan (as shown below) that shows how each area of TC 124 needs joint activities or strong liaisons with other TC/SCs and WGs inside and outside IEC.

- Building a support network by establishing liaisons with other TC/SCs or conjunctions with other academic or industrial organizations.
 - Considering liaison with following TC/SCs :
 - Inside IEC: TC 21, TC 29, TC 47, TC 62, TC 78, TC 91, TC 100, TC 101, TC 106, TC 108, TC 110, TC 119, SyC AAL, and ISO/IEC JTC 1, ISO/IEC JTC 1/SC 41
 - Outside IEC: ISO/TC 38, ISO/TC 94, ISO/TC 150, ISO/TC 172, ISO/TC 194, ETSI SmartBAN, etc.
- Also considering Category C liaison with AATCC RA111, Electronically-Integrated Textiles Test Methods, ASTM D13.50, Smart Textiles, and IPC D-70 E-textiles.

G CONFORMITY ASSESSMENT

TC124 does not currently have any publications used for IEC conformity assessment system.

H HORIZONTAL ISSUES

TC124 does not currently have any horizontal issues.

I 3-5 YEAR PROJECTED STRATEGIC OBJECTIVES, ACTIONS, TARGET DATES

STRATEGIC OBJECTIVES 3-5 YEARS	ACTIONS TO SUPPORT THE STRATEGIC OBJECTIVES	TARGET DATE(S) TO COMPLETE THE ACTIONS
Produce a terminology standard for wearable electronic devices and technologies	A new work item proposal of terminology for wearable electronic devices and technologies is under	2020

	circulation (124/21/NP).	
Produce a standard for test and evaluation methods of wearable electronic devices	Two new work item proposals of wearable gesture recognition and activity tracker sensors are under circulation (124/17/NP and 124/19/NP).	2020
Produce a standard for reliability and washability issues of wearable electronic devices and technologies	A new work item proposal of environmental resistance for wearable devices is under circulation as 124/18/NP..	2021
Produce a standard for data management for wearable electronic devices and technologies	A work item of data processing for wearable devices is under preparation.	2021
Produce standards related with safety issues of wearable electronic devices and technologies	Three work items of EMC, low-temperature burns, and other human body safety issues are under discussion. One new work item proposal is under circulation as 124/20/NP	2022
Note: The progress on the actions should be reported in the RSMB.		