**CES technology trends for 2018**

AI technologies drive innovation

By Natalie Mouyal

Early on each New Year, technology companies gather in Las Vegas for the annual CES show. The 2018 edition brought together 3900 exhibitors displaying their latest developments. Analysts from the show organizer, the Consumer Technology Association (CTA), provided an overview of the major trends to follow this year.

[](https://www.iecetech.org/var/etech/storage/images/media/images/2018-01/leka_robot/95482-1-eng-US/Leka_Robot_gallery.jpg)Leka robots are designed to help children with developmental disabilities (Photo: Leka)

Data will be used to fuel the next generation of products and services. From smart cities to self-driving cars, technology is needed that can allow devices and services to access great volumes of data. According to CTA market researchers Steve Koenig and Lesley Rohrbaugh, 5G wireless and artificial intelligence (AI) herald this new age of data.

Already, the proliferation of smart, connected devices has generated significant volumes of data. And these volumes will only increase. According to Intel chief executive officer (CEO) [Brian Krzanich](https://newsroom.intel.com/editorials/krzanich-the-future-of-automated-driving/), the average person will generate 1.5 GB of data each day by 2020 compared with 650 MB in 2016. Self-driving cars with their cameras and sensors will generate approximately 4 TB of data each day.

In their [presentation](https://www.cta.tech/cta/media/ResearchImages/CES-2018-Trends.pdf) to the media, Koenig and Rohrbaugh identified eight key trends for 2018 that will be fuelled by access to data.

5G – the 5th generation wireless system

Imagine loading the two-hour film *Guardians of the Galaxy* in 3.6 seconds compared with the 6 minutes required with the current fourth generation (4G) network  (at 100 Mb/s). This will be possible using the next generation wireless telecommunications system, 5G, which promises higher speeds, lower latency and greater capacity than the current mobile system.

Currently, 5G field tests are underway around the world and several operators have already announced plans for commercial rollout in 2019. According to Koenig and Rohrbaugh, 5G systems will be essential for wireless virtual reality, self-driving cars and smart cities.

Artificial Intelligence

In our homes, voice activated ‘assistants’ control connected devices such as lamps, door locks, thermostats, refrigerators and washing machines. They order our groceries online and play our favourite music. The popularity of these ‘assistants’ is growing, with one in six people owning a smart speaker in the United States, according to a report from [NPR and Edison Research](http://nationalpublicmedia.com/smart-audio-report-fall-winter-2017/). Recent improvements to the functionality of voice activated assistants have helped enhance their spread.

Businesses rely on AI applications to process data, detect and deter security intrusions, automate certain tasks, resolve customer service issues and personalize promotions. In a [survey](http://assets.teradata.com/resourceCenter/downloads/AnalystReports/Teradata_Report_AI.pdf) of 240 information technology (IT) and business decision makers, 80% reported that they are currently using AI technologies and 30% plan to increase spending on AI technologies over the next three years.

The Joint Technical Committee of IEC and ISO on information technology ([ISO/IEC JTC 1](http://www.iec.ch/dyn/www/f?p=103:7:0::::FSP_ORG_ID:3387)) and several of its subcommittees (SCs) prepare International Standards for artificial intelligence. Given the rapid developments in AI across many industries, a new subcommittee (SC) on artificial intelligence, [ISO/IEC JTC 1/SC 42](https://www.iso.org/fr/committee/6794475.html), was set up in 2017 with the mandate of providing standardization in the area of AI as well as guidance to other committees developing AI applications.

Robotics

This year at CES, exhibitors showcased a variety of robots targeting the consumer market. Known as smart tech, these robots provide a specialized set of skills. Examples include robots that can help you sleep by mimicking the rhythm of breathing and playing lullabies, can provide home surveillance by taking and sending videos when their motion sensors are activated or can vacuum the floor and put away clutter.

Increasingly, manufacturers are aspiring to design robots with more sympathetic characteristics that will allow them to become a family friend and respond to human touch and voice.

IEC produces International Standards for many of the advanced technologies that robots incorporate, such as voice recognition. IEC work also covers the internet of things (IoT), navigation and hardware products such as cameras, lights, speakers and microphones.

Biometrics

Body measurements and calculations – biometrics – can be used as a form of identification. Increasingly, these measurements are incorporated into the technology we use by providing enhanced authentication and access control. Facial recognition and iris scanning can provide access to your smartphone and start your car, thumbprints can open your padlock and voice recognition can protect your wallet.

Voice has quickly become a popular user interface. Not only are voice commands used to control various devices in the home but also to order products online through smart speakers. These applications rely upon Standards developed by [ISO/IEC JTC 1/SC 37](http://www.iec.ch/dyn/www/f?p=103:7:13133467586539::::FSP_ORG_ID,FSP_LANG_ID:5510,25) for generic biometric technologies including voice and facial recognition. Other IEC Standards that can be used for biometrics include electronic display devices ([IEC TC 110](http://www.iec.ch/tc110)) and sensors ([IEC TC 47](http://www.iec.ch/dyn/www/f?p=103:7:0::::FSP_ORG_ID,FSP_LANG_ID:1251,25)).

Biometric technologies raise concerns regarding privacy and data protection. Biometric data stored in a central database might be used for purposes other than the one originally intended. [ISO/IEC JTC 1/SC 27](http://www.iec.ch/dyn/www/f?p=103:7:15553528506382::::FSP_ORG_ID,FSP_LANG_ID:3401,25), IT security techniques, has developed the [ISO/IEC 27000](https://webstore.iec.ch/searchform&q=270*) family of International Standards for information security management systems (ISMS) to enable organizations to keep their data assets secure.

Virtual reality and augmented reality

The market for virtual reality (VR) has expanded from the consumer and gaming market to business applications. It can be used to model manufacturing prototypes, provide training for first aid responders or help customers make purchasing decisions by experiencing a product or service virtually. Similarly, AR is becoming an increasingly popular tool with consumers and businesses. It facilitates shopping by allowing customers to try on clothing virtually or ‘see’ furnishings inside their home.

According to analysts at [IDC](https://www.idc.com/getdoc.jsp?containerId=prUS43248817), worldwide spending on AR/VR is forecast to reach USD 17,8 billion in 2018, an increase of nearly 95% over the USD 9,1 billion expected for 2017.

At CES, exhibitors demonstrated that the VR ecosystem is expanding with new products such as VR-specific headphones, charging stations, and content subscription sites. One innovative service combined a VR headset with a specialized weight resistance machine, providing the user with a complete physical workout in a video game-like environment.

[ISO/IEC JTC 1/SC 24](http://www.iec.ch/dyn/www/f?p=103:7:0::::FSP_ORG_ID:3398) provides Standards on interfaces for information technology-based applications relating to computer graphics and virtual reality while [ISO/IEC JTC 1/SC 29](http://www.iec.ch/dyn/www/f?p=103:7:0::::FSP_ORG_ID:3403) covers the coding of audio, picture and multimedia information. IEC Standards for sensors ([IEC TC 47](http://www.iec.ch/tc47)) and electronic displays ([IEC TC 110](http://www.iec.ch/tc110)) can also be applicable.

Smart cities

With the [UN](http://www.un.org/en/development/desa/news/population/world-urbanization-prospects-2014.html) predicting that 66% of the world population will be living in urban areas by 2050, governments will need to find methods of optimizing public services and reducing traffic congestion. Recognizing the growing importance of smart cities, CES focused extensively on this topic for the first time this year, attracting representatives from around the world.

According to Koenig, global spending on smart cities will reach USD 34,35 billion by 2020. Examples of smart city solutions already in use include the measurement and analysis of air quality, the monitoring of pedestrian and car traffic and the automation of street lighting. An application in London allows users to locate available parking spots easily in real time, while in Paris users can measure their exposure to noise pollution.

IEC provides many of the Standards in this area. The integration of energy generation, buildings, transportation, lighting, healthcare, and safety/security can be tailored to the needs of individual cities using hundreds of IEC International Standards (see more on the [IEC Smart City page](http://www.iec.ch/smartcities/?ref=extfooter)).

Sports Innovation

Highlighting how technology is disrupting sports, CES 2018 created a new exhibition space dedicated to products and services that support athletes and their fans.

Data-driven measurements, from activity tracking sensors that quantify physical activity to [concussion sensing mouth guards](https://www.engadget.com/2018/01/09/prevent-biometrics-concussion-mouthguard/), can help athletes and coaches improve performance and reduce injury. The data collected will provide information on athletic performance, sleep patterns and nutrition which can be aggregated to develop personalized training (see [*e-tech* article Sensors Everywhere](https://iecetech.org/issue/2016-02/Sensors-everywhere)).

Beyond the individual athlete, technology is reconfiguring sporting venues and serving as a precursor to test the technologies which are likely to be deployed for smart city solutions. By offering real-time data on parking availability and concession stand lines, for example, these smart sporting venues can be replicated in smart cities. They will rely on technologies such as the IoT for connectivity and cloud computing for the storage and retrieval of data. [ISO/IEC JTC 1](http://www.iec.ch/dyn/www/f?p=103:7:19415965958022::::FSP_ORG_ID,FSP_LANG_ID:20486,25)  has developed International Standards that for these technologies.

Digital health

Technology can be harnessed to affect health positively. It can be used to encourage behavioural change, enhance traditional medical practices such as connecting doctors and patients in rural areas and, in some cases, serve as a therapy for a health condition (see our *e-tech* [article](https://iecetech.org/issue/2016-02/Medical-equipment-in-the-digital-era) in issue 02/2016).

Smart medical devices and wearables continue to be developed (see our *e-tech*[article](https://iecetech.org/issue/2015-01/What-s-up) in issue 01/2015). Some new items showcased at CES included a ‘smart’ insulin pen that collects and transmits key diabetes data through a mobile application and a wearable device for improving sleep by reducing tension through the performance of personalized breathing exercises. Research is also underway at the University of Southern California to use VR to treat trauma.

CES blackout

With over 180,000 participants at CES this year and the largest exhibition spaces in its history, CES organizers declared the show a success. Yet, despite the showcase of cutting edge technologies and discussions about innovations for the future, the show highlighted our dependency on one basic technology – electricity.

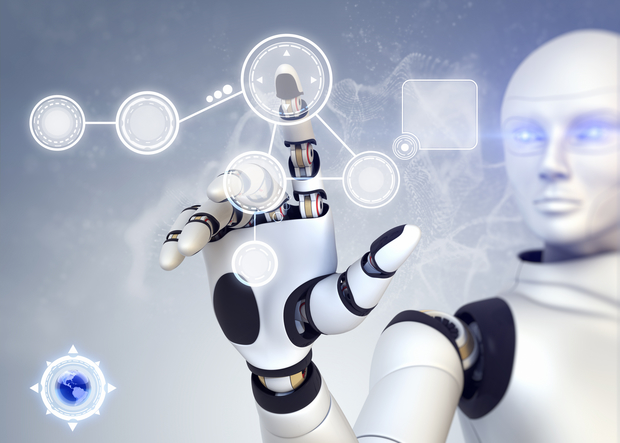
For two hours, the Las Vegas Convention Center, which hosted the CES, lost electricity due to a flashover at one of its transformers. While no one is immune from experiencing a natural disaster such as the heavy rainfall which caused the blackout in Las Vegas, the availability of electricity remains the bedrock that underpins technology and innovation.

**AI is listening to you**

Recent advances in voice recognition bring AI technologies to the home

By Natalie Mouyal

Artificial Intelligence (AI) was one of the big buzzwords at CES 2018. From home appliances to robots and self-driving cars, AI is able to help us with our everyday activities. While an interest in intelligent machines can be traced back to Greek mythology, recent advances in computing that enable us to collect large quantities of data and then process it using algorithms, have hastened the development of AI technologies.

[](https://www.iecetech.org/var/etech/storage/images/media/images/2018-01/ai_robot/95183-1-eng-US/AI_robot_gallery.jpg)Recent advances in computing have hastened the development of AI technologies

AI**technologies** rely**on IEC Standards**

The term artificial intelligence is generally understood to refer to a machine that can replicate cognitive functions such as learning and problem-solving. It is a broad concept that encapsulates ideas ranging from Frankenstein-like robots to voice assistants for smart phones and other devices.

The Joint Technical Committee of IEC and ISO on information technology ([ISO/IEC JTC 1](http://www.iec.ch/dyn/www/f?p=103:7:0::::FSP_ORG_ID:3387)) and several of its subcommittees (SCs) prepare International Standards which contribute towards artificial intelligence. Given the rapid developments in AI across many industries, a new SC on artificial intelligence, [ISO/IEC JTC 1/SC 42](https://www.iso.org/fr/committee/6794475.html), was set up in 2017 with the mandate of providing standardization in the area of AI as well as guidance to other committees developing AI applications.

AI depends on the gathering, analysis and sharing of great volumes of data which are exchanged between applications as well as with external service providers. This makes it equally possible for an assistant-enabled device to turn on the oven or for a manufacturer to improve the safety features on its cars. [ISO/IEC JTC 1/SC 41](http://www.iec.ch/dyn/www/f?p=103:7:19415965958022::::FSP_ORG_ID,FSP_LANG_ID:20486,25) develops International Standards for the internet of things (IoT), making connectivity possible, while [ISO/IEC JTC 1/SC 38](http://www.iec.ch/dyn/www/f?p=103:7:19415965958022::::FSP_ORG_ID,FSP_LANG_ID:7608,25) addresses the standardization of cloud computing for the storage and retrieval of data.

In addition, AI technologies rely upon IEC Standards for hardware components such as touchscreens ([IEC TC 110](http://www.iec.ch/tc110)) and audio, video and multimedia systems and equipment ([IEC TC 100](http://www.iec.ch/tc100)).

The latest AI technologies at CES

At CES this year, assistant-enabled devices using voice recognition were ubiquitous. Improved voice recognition functionality and integration into home appliances means you can now ask your refrigerator to pull up recipes and order groceries online or your television set to change channels.

Increasingly, car manufacturers are incorporating voice recognition into their models. Voice commands can be given to modify the interior temperature or play a certain song. In one model, the car adapts to passenger preferences by, for example, suggesting directions to a favourite restaurant at dinner time. These applications rely upon the work of [ISO/IEC JTC 1/SC 37](http://www.iec.ch/dyn/www/f?p=103:7:19415965958022::::FSP_ORG_ID,FSP_LANG_ID:5510,25), which develops International Standards for generic biometric technologies including voice recognition. In addition, Technical Area (TA) 16 of TC 100 ([IEC TC 100/TA 16](http://www.iec.ch/dyn/www/f?p=103:7:15553528506382::::FSP_ORG_ID,FSP_LANG_ID:11009,25)) addresses the issue of voice recognition within the context of active assisted living (AAL).

CES was also showcasing the latest AI technology being used to help self-driving cars understand their environment and react accordingly. Smart sensors are an essential component, allowing for the collection of the data required for vehicles to adjust their driving based on factors such as their location, the driving conditions or vehicles nearby. Other smart sensor features, such as lane-keeping, blind-spot monitoring and automatic braking systems, are already in use.

These technologies are aided by the work of [IEC TC 47](http://www.iec.ch/tc47), which develops International Standards for the design and use of semiconductor devices, including sensors. [IEC SC 47F](http://www.iec.ch/dyn/www/f?p=103:7:0::::FSP_ORG_ID:1447) specifically addresses microelectromechanical systems (MEMS) which are used for automotive applications, while [IEC SC 47E](http://www.iec.ch/dyn/www/f?p=103:7:0::::FSP_ORG_ID:1371) provides International Standards for sensors used for imaging, motion and distance detection.

Other technologies used by autonomous cars are also addressed through the work of the IEC. TCs standardize on technologies such as dashboard touchscreens ([IEC TC 110](http://www.iec.ch/tc110)), cloud computing ([ISO/IEC JTC 1/SC 38](http://www.iec.ch/dyn/www/f?p=103:7:19415965958022::::FSP_ORG_ID,FSP_LANG_ID:7608,25)) for processing, analyzing and storing data, and near field communications ([ISO/IEC JTC 1/SC 6](http://www.iec.ch/dyn/www/f?p=103:7:15553528506382::::FSP_ORG_ID,FSP_LANG_ID:3411,25)). Work within [IEC TC 100/TA 17](http://www.iec.ch/dyn/www/f?p=103:7:9118655925340::::FSP_ORG_ID,FSP_LANG_ID:20051,25) covers the areas of multimedia systems and equipment for cars and recently resulted in the release of Technical Standard [IEC TS 63033](https://webstore.iec.ch/publication/32866), which enables drivers to spot obstacles using an intelligent wrap-around view monitor.

The market for AI technologies used in cars is on course for rapid growth. According to analysts at the research company [IHS](http://news.ihsmarkit.com/press-release/artificial-intelligence-systems-autonomous-driving-rise-ihs-says), unit shipments of AI systems are expected to rise from seven million units in 2015 to 122 million by 2025.

Keeping AI safe and secure

While the introduction of new AI technologies has generated much excitement, it also raises concerns over security and the protection of data.

The ubiquity of connected devices that are able to communicate with each other increases the number of gateways that can potentially be used to breach a system, whether at home or in a factory or car. Cyber attacks can have disastrous consequences, causing production in a factory to shut down or a home to be robbed.

Data protection is becoming increasingly important as connected devices collect vast amounts of information about their users on a daily basis. Within a home, these devices can store details such as favourite songs and television shows, but also the times of day when the home is empty. This raises considerable concerns regarding privacy that will need to be resolved.

International Standards are essential tools in the battle to provide information security and protect data against a cyber attack. [ISO/IEC JTC 1/SC 27](http://www.iec.ch/dyn/www/f?p=103:7:15553528506382::::FSP_ORG_ID,FSP_LANG_ID:3401,25), IT security techniques, has developed the [ISO/IEC 27000](https://webstore.iec.ch/searchform&q=270*) family of International Standards for information security management systems (ISMS) to enable organizations to keep their data assets secure. In addition, the IEC has developed industry-specific Standards to help secure critical data. For example, [IEC TC 62](http://www.iec.ch/tc62) provides Standards concerning the electrical equipment, electrical systems and software used in healthcare.

More industries are using AI

According to YouTube Chief Product Officer, [Neal Mohan](https://www.youtube.com/watch?v=jAbYMDjquk4), AI accounts for 70% of the content viewed on the platform. Machine learning algorithms enable huge amounts of data to be processed and interpreted to provide patterns on which to base a prediction. As a result, YouTube can make recommendations based on our previous selections. The same approach is employed by shopping sites as well as video and music streaming platforms like Netflix and Spotify.

Deep learning is the most recent AI technique to find real world applications. It mirrors the neural networks of the human brain to create transistor connections that can be strengthened or weakened depending on whether the data is interpreted correctly. As new data is received, the machine is trained automatically to perfect its predictions. As a result, machines are now able to recognize and respond to images and voices but can also beat human competitors in games such as Go and chess.

Algorithms are used extensively in the finance industry where it is estimated that high frequency AI trades account for more than half of equity share transactions on the US market. AI technology is also used to help detect fraud and communicate with customers via chatbots.

In the manufacturing sector, AI technology provides data intelligence and automation. Processes are automated to increase efficiency while data analytics and predictive algorithms enhance operations and strategy. Even cyber security benefits from AI technology in helping detect and defend against attacks.

Applications in the medical field using AI technology can detect anomalies in images and undertake semi-automatic tasks during minimally-invasive surgery. In the future, AI technology will mine through data to determine a patient’s risk for certain diseases or provide an initial diagnosis. AI will also enable the development of individualized therapy based on the genetic profile of the patient.

Voice-recognition assistants, relatively commonplace in smartphones, are increasingly found in homes as a hub through which to connect and control household appliances, order products online and stream music. Other examples include thermostats that regulate the temperature depending on whether anyone is home and security cameras that use facial recognition to decide whether to unlock the front door. These technologies rely on IEC Standards for sensors ([IEC TC 47](http://www.iec.ch/tc47)), cloud computing ([ISO/IEC JTC 1/SC 38](http://www.iec.ch/dyn/www/f?p=103:7:19415965958022::::FSP_ORG_ID,FSP_LANG_ID:7608,25)) and biometrics ([ISO/IEC JTC 1/SC 37](http://www.iec.ch/dyn/www/f?p=103:7:19415965958022::::FSP_ORG_ID,FSP_LANG_ID:5510,25)).

In the near future, cities will be using AI technology to improve safety, traffic management and infrastructure maintenance.

Looking ahead

It is not yet clear how profound an impact AI technology will have on our lives. While one Silicon Valley CEO has compared its importance to the discovery of electricity and fire, it is not clear if this is truth or hyperbole.

While we are still many years away from machines that are as smart as – or smarter than – the human mind, technical advances are progressing rapidly. The IEC continues to follow the latest advances closely and develop the relevant International Standards.

# Home smart home

## Smart homes drive Standards

By Catherine Bischofberger

The market for smart home devices and systems is booming. The IEC is helping the various industries involved by publishing a number of Standards in the relevant sectors.

[](https://www.iecetech.org/var/etech/storage/images/media/images/2017-08/site/93341-1-eng-US/Site_gallery.jpg)AI will help robots guess our moods (Photo: Kuri)

Increasingly, smart homes are adapting to our multiple needs, even using artificial intelligence to meet our requirements. According to management consultancy [McKinsey,](https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/a-smart-home-is-where-the-bot-is) in the next 10 years or so, "many of us will live in 'smart homes' that will feature an intelligent and coordinated ecosystem of software and devices, or "homebots," which will manage and perform household tasks and even establish emotional connections with us."

This description may still be in the realm of science fiction but it could fast become the norm. Already, fridges can tell us what is missing and order the food required while lighting systems can automatically adjust to the right setting as we walk through the door.

For the time being, most smart households conform to the definition supplied by technology news and review website [CNET](https://www.cnet.com/) in association with US-based real estate developer [Coldwell Banker](https://www.coldwellbanker.com/). According to their joint description, a smart home "is a home equipped with network-connected products for controlling, automating and optimizing functions such as temperature, lighting, security, safety or entertainment, either remotely by a phone, tablet, computer or a separate system within the home itself."

Many companies are now producing devices and systems for the smart home. The IEC has published several International Standards which help manufacturers succeed in this booming market. According to [statista.com](https://www.statista.com/), the online statistics, market research and business intelligence portal, the global smart home market is forecast to be worth more than USD 40 billion by 2020. The US has the highest percentage of smart homes, followed by Japan and Germany. According to Statista, 3,7% of US homes were smart in 2015.

### **Safety first**

Surveillance cameras have been around for decades, but initially only the very wealthy could afford them. New technology breakthroughs have made them much more accessible and user-friendly.

Advanced surveillance cameras can now include features such as 360° view, facial recognition and the ability to send high-resolution video signals that can be monitored via the web or mobile apps. They can have wide angle lenses, be weather resistant, and even include infrared detection features that can be used at night. Full 360° vision means that fewer cameras than before are required to monitor the same space.

Modern video surveillance solutions can also monitor light and heat, since the cameras are able to measure lux levels and variations in temperature. While these systems remain costly for individual users, they can be employed to detect heat wastage in public or private business buildings by using thermal imagery captured by a camera system linked to an alarm. These remote temperature alarm cameras can be key devices in helping buildings be more energy efficient as well as safer.

[IEC Technical Committee (TC) 100](http://www.iec.ch/tc100): Audio, video and multimedia systems and equipment, publishes International Standards relating to digital cameras, for instance on colour measurement and management. Standardization relating to TV, tablet, mobile or computer screens, comes under the aegis of[IEC TC 110](http://www.iec.ch/tc110): Electronic display devices.

[ISO/IEC JTC 1/SC 37](http://www.iec.ch/dyn/www/f?p=103:7:0::::FSP_ORG_ID:5510): Biometrics, a Subcommittee (SC) of ISO/IEC JTC 1, the Joint Technical Committee formed by the IEC and [ISO](https://www.iso.org/home.html), develops Standards for generic biometric technologies as they relate to human beings, including facial recognition. One of these is the [ISO/IEC 19794](https://webstore.iec.ch/searchform&q=ISO%2FIEC%2019794)series of Standards on biometric data interchange formats.

Alarm systems can be linked to cameras but also to sensors for monitoring temperature and light, detecting smoke or water leakages as well as trespassers, for instance. Some sensors can fix the problem themselves, by automatically lowering the heating or turning on the light, for example. Others signal the problem, by sending alerts and starting off sirens.

[IEC TC 79](http://www.iec.ch/tc79): Alarm and electronic security systems, prepares Standards for a wide range of applications which comprise access control, video surveillance, fire detection and fire alarm systems, as well as intruder, hold-up and social alarms. Remote receiving and surveillance centres are also included in the TC scope. Social alarm systems are on the rise as a growing number of elderly people live alone and require monitoring. The devices that help the elderly to continue living in their own homes can also be features of the smart home.

[IEC TC 47](http://www.iec.ch/tc47): Semiconductor devices, issues Standards that relate to sensors. It is blazing a trail in new technology areas such as human body communication (HBC) and the internet of things (IoT). The IEC Systems Committee on Active Assisted Living ([SyC AAL](http://www.iec.ch/dyn/www/f?p=103:186:6314403392181::::FSP_ORG_ID:11827" \t "_blank)) brings together technology experts from different fields, such as medical or consumer electronics, who work to address transversal Standardization issues across the various sectors affecting the life of people with disabilities. The focus is to develop Standards which help products, services and systems become reliable and trusted solutions that are able to function across all parts of the elderly or disabled person's life, whether in the home or at work.

### **Oh you clever thing!**

The internet of things or even of everything, as some people are now starting to describe it, relates to the ability of every electronic device in the home to be controlled from afar and be connected to other objects such as a smartphone or a computer system, via the internet.

This is where the smart fridge or other smart home appliances come into the picture. Devices are becoming increasingly sophisticated. A Korean manufacturer has commercialized a refrigerator which it claims can be “the hub” of the smart home. A connected touch screen allows families to check what is in the fridge from anywhere, get notifications about the expiry date of foods and order groceries. The fridge can also play music and stream it into speakers in every room.

[IEC TC 61](http://www.iec.ch/tc61): Safety of household and similar electrical appliances, publishes Standards on the safety aspects relating to most electronic appliances used in the home, such as fridges, vacuum cleaners, toasters or washing machines. The TC is also paving the way for the safety of connected and smart devices. The IEC and ISO prepare Standards that relate specifically to IoT. [ISO/IEC JTC 1/SC 41](http://www.iec.ch/dyn/www/f?p=103:7:0::::FSP_ORG_ID:20486): Internet of things and related technologies, has issued [ISO/IEC 19637](https://webstore.iec.ch/publication/59623) on the framework for testing the sensor network, for instance.

Sensor manufacturers can ensure their products meet the strictest requirements through [IECQ](http://www.iecq.org/index.htm) testing and certification. IECQ is the IEC Quality Assessment System for Electronic Components.

Sensors, cameras, software and smartphones in the smart home do use up a fair amount of energy. There are a number of smart ways for harvesting energy to power all these new devices. High efficiency solar cells can harvest energy from indoor lighting, for instance. [IEC TC 82](http://www.iec.ch/tc82): Solar photovoltaic energy systems, prepares International Standards which make way for the conversion of solar into electrical energy.