Smart device

A smart device, also known as an Internet of Things (IoT) device, is a physical object or gadget that is equipped with embedded sensors, software, and connectivity capabilities to connect to the internet or other devices. These devices can collect data, communicate with other smart devices, and often perform automated or remote-controlled tasks.

The primary goal of smart devices is to enhance convenience, efficiency, and functionality in various aspects of daily life. They can be found in homes, businesses, industries, healthcare, transportation, and more. Some common examples of smart devices include:

Smartphones: Mobile phones with advanced computing capabilities, internet connectivity, and various sensors.

Smart Home Devices: Devices such as smart speakers (e.g., Amazon Echo, Google Home), smart thermostats, smart lights, smart locks, and smart appliances that can be controlled and automated through voice commands or smartphone apps.

Wearable Devices: Smartwatches, fitness trackers, and health monitoring devices that track various health and fitness metrics.

Smart TVs: Televisions that can connect to the internet, stream content, and interact with other smart devices.

Smart Cameras: Security cameras with internet connectivity, allowing remote monitoring and control.

Smart Thermostats: Devices that can adjust the temperature of a home automatically based on preferences and usage patterns.

Smart Cars: Automobiles with advanced connectivity and autonomous features.

Smart Health Devices: Medical devices that can monitor vital signs and health conditions, such as smart glucose monitors, smart blood pressure monitors, etc.

Smart Appliances: Devices like refrigerators, washing machines, and ovens with internet connectivity and enhanced functionalities.

Smart Lighting Systems: Lighting systems that can be controlled remotely and programmed for specific scenarios.

These smart devices often communicate through Wi-Fi, Bluetooth, Zigbee, or other wireless protocols, allowing them to connect to a network and interact with each other or with cloud services. However, it is essential to consider security and privacy aspects while using smart devices, as their connectivity may introduce potential vulnerabilities if not properly protected.

In recent years, the majority of the population has become increasingly reliant on continuous and independent control of smart devices to conduct activities of daily living. Upper extremity movement is typically required to generate the motor outputs that control these interfaces, such as rapidly and accurately navigating and clicking a mouse, or activating a touch screen. For people living with tetraplegia, these abilities are lost, significantly compromising their ability to interact with their environment. Implantable brain computer interfaces (BCIs) hold promise for restoring lost neurologic function, including motor neuroprostheses (MNPs). An implantable MNP can directly infer motor intent by detecting brain signals and transmitting the motor signal out of the brain to generate a motor output and subsequently control computer actions. This physiological function is typically performed by the motor neurons in the human body. To evaluate the use of these implanted technologies, there is a need for an objective measurement of the effectiveness of MNPs in restoring motor outputs. Here, we propose the concept of digital motor outputs (DMOs) to address this: a motor output decoded directly from a neural recording during an attempted limb or orofacial movement is transformed into a command that controls an electronic device. Digital motor outputs are diverse and can be categorized as discrete or continuous representations of motor control, and the clinical utility of the control of a single, discrete DMO has been reported in multiple studies. This sets the stage for the DMO to emerge as a quantitative measure of MNP performance [1].

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Sawyer A, Cooke L, Ramsey NF, Putrino D. The digital motor output: a conceptual framework for a meaningful clinical performance metric for a motor neuroprosthesis. J Neurointerv Surg. 2023 Jul 31:jnis-2023-020316. doi: 10.1136/jnis-2023-020316. Epub ahead of print. PMID: 37524520.