A diverse set of wearable technologies has become readily available to the community over the past few years. To current standards, wearable devices incorporate high-performance electronics that have been miniaturized so that they’re relatively unobtrusive when worn on the human body. Typical forms include wrist watches; headworn displays, and devices integrated into jewelry. In some cases, though, the electronics have been integrated directly into the fabric of clothing.

One exciting capability of these devices is the powerful set of miniaturized sensors that are able to capture information — through accelerometers, gyroscopes, magnetometers, and sounds — so that we can understand more about a user’s movements and his or her surrounding environment. The potential uses of this capability are great, but they come with ongoing research challenges that must be addressed to reveal the true possibilities. Understanding and characterizing the patterns has applications within the healthcare domain, particularly as more fine-grained activities can be reliably recognized and employed to support patient monitoring.

Advancing the algorithms to capture information from wearables’ sensing capabilities has been an ongoing theme among research communities, and the ability to recognize activities — although not a new concept — still requires effort to uncover its potential. This issue discusses activity recognition challenges and methods specific to the healthcare domain.

**Redefining Fashion-Forward**

The articles presented in this issue discuss developments in both the theory and applied methods for wearable computing technologies. We received eight submissions, of which three were selected for inclusion in this issue.

One of the remaining issues in this particular sector is that it can be a challenge to create something that feels truly wearable, yet this is crucial to encourage users’ adherence. *Energy harvesting* is a technique that’s likely to support further miniaturization of wearable technologies and improve acceptability among users.

With this in mind, investigations are required to better understand how energy harvesting can be incorporated directly into the wearable technologies. Benefits from exploring this space include the reduction or complete removal of traditional batteries. Thus, in the first article in this special issue, “Energy-Harvesting
Wearables for Activity-Aware Services,” Sara Khalifa and her colleagues discuss ways of using the small amount of energy generated by the sensors themselves to power the wearable processing units. Their vision is one of realizing self-powered devices for the Internet of Things.

This special issue also investigates policy design for wearable technologies and the need to consider collaborative aspects. Similar to the transition from desktop-based communication to pervasive mobile networking that happened a decade ago, the transition from mobile to the adoption of wearables needs to tackle new cultural and social implications, and consider relevant policies in such a context. Thus, in “Innovation and Wearable Computing: A Proposed Collaborative Policy Design Framework,” Paul Baker and his colleagues discuss the impact of policy on the development of wearables. They also examine the interplay of the design of wearables technology, identifying the major aspects of a collaborative policy design framework for the wide adoption of wearable computing devices.

Another major consideration in this sector is that the design of wearable devices and applications should account for potential societal challenges, including security guarantees and privacy (as well as societal barriers), but it should also leverage opportunities by creating new applications. One example of such explorations is Debraj De and his colleagues’ work in “Multimodal Wearable Sensing for Fine-Grained Activity Recognition in Healthcare.” The authors use wearable multimodal sensing with Bluetooth beacons to recognize fine-grained, complex in-home activities of people. Their work classifies 19 in-home activities with an accuracy of roughly 80 percent.

Looking forward, there’s great potential for wearable technologies to be a disruptive force within the industry and change the ways that we interact with computer systems. Currently, trending watch-form factors are only one of the many forms that body-worn computing can adopt. As the miniaturization of electronics and materials sciences advance the idea of seamless integration into clothing, the technology will support less-obtrusive designs. Sensing technologies and processing algorithms are also rapidly advancing to improve our knowledge of the information surrounding users.

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