# Wearable Technologies and the Internet of Things in Education and Training

Guest Editor:
Mark J. W. Lee, Senior Member IEEE

The Internet of Things (IoT) is being touted as "the next technological revolution" and one that will be "the most potentially disruptive" we will see in our lifetime, surpassed only by the World Wide Web and universal mobile connectivity [1, p. 24]. It involves real-world, physical objects with embedded computational and networking capabilities communicating and interacting with one another, with other computing devices, as well as with users on the global Internet. With the advent and growth of the IoT, homes, workplaces, and educational institutions – even entire cities and countries – are becoming increasingly "smart" and interconnected, which promises to substantially enhance or change the ways in which we live, play, work, and learn.

Amid the rise of the IoT, we have also been witnessing advances in wearable computing and electronic technologies that have made possible the creation of the "Internet of Me" [2]. Such technologies have now entered the mainstream [3] and products powered by them are becoming increasingly available on the mass market, with consumer-level devices like smart glasses (e.g., Google Glass, Microsoft HoloLens), smart watches (e.g., Apple Watch), smart clothes, fitness bands/activity trackers (e.g., Fitbit, Nike+ FuelBand), and head-mounted cameras (e.g., GoPro) regularly dominating the technology news headlines of late. These technologies and devices along with others still being developed are able to augment human cognition, behavior, and interactions in powerful ways that were previously inconceivable.

It is clear that wearable technologies and the IoT hold much potential for and have many possible applications in education and training [4], [5]. While they have garnered considerable attention and interest in this sector [6]–[9], however, there continues to be a dearth of real scholarship surrounding their use for learning, teaching, and assessment, the majority of published work to date consisting largely of anecdotal reports or being focused primarily on the technology. This themed special issue of *IEEE Transactions on Learning Technologies* will seek to address this gap by publishing a combination of theoretical/conceptual and empirical articles that contribute to the building of a rigorous evidence base aimed at guiding and supporting practice in addition to inspiring and informing future research and development in this rapidly emerging and evolving area. Submissions that go beyond technical descriptions or "show and tell" to engage deeply with pertinent questions and issues relating to pedagogical and learning design as well as those that systematically examine the efficacy of tools, methods, and approaches in improving learning are especially encouraged. Multidisciplinary studies are particularly welcome.

## Suggested Topics

The topics of interest for this special issue include, but are not limited to:

- Location/context-aware ubiquitous learning activities facilitated by wearable and IoT technologies;
- Mixed and augmented reality educational applications involving wearable and IoT technologies;
- Collaborative learning and student teamwork using wearable and IoT technologies;
- Tactile and kinesthetic learning through wearable and IoT technologies (including smart networked objects with tangible interfaces and the Tactile Internet);
- IoT and digital fabrication / Maker Movement in classrooms (with robotics kits, 3D printers, etc.);
- Authentic and work-based/work-integrated learning using wearable and IoT technologies;
- Student fieldwork and inquiry-based learning using wearable and IoT technologies;
- Wearable and IoT technologies for just-in-time learning and performance improvement;
- Informal and non-formal learning with wearable and IoT technologies;
- Game-based and gamified learning using wearable and IoT technologies;
- Next-generation wearable 3D holographic and telepresence interfaces;
- Integrating pedagogical agents and virtual assistants with wearable and IoT technologies;
- Educational applications of "quantified self" (e.g., through biosensing wearables);
- Multimodal learner and teacher interactions using wearable and IoT technologies;

- Wearable and IoT technologies for blended synchronous learning and teaching (involving both co-located and remote participants in real time);
- Educational data mining and learning analytics for wearable and IoT technologies;
- Uses and implications of wearable and IoT technologies for educational assessment;
- Cognitive load issues and considerations in the design of educational applications involving wearable and IoT technologies (e.g., designing for multitasking);
- The "Internet of Learning Things" and design of classrooms / learning spaces;
- Cloud computing and the IoT ("Cloud of Things") in education and training;
- Social and ethical implications of wearable and IoT technologies in education and training.

## Key Dates

| | |
|---|---|
| Extended abstracts due: | June 15, 2015 |
| Shortlisting of abstracts complete: | July 6, 2015 |
| Full manuscripts due: | September 28, 2015 |
| Completion of first review round: | November 23, 2015 |
| Revised manuscripts due: | January 4, 2016 |
| Final decision notification: | February 29, 2016 |
| Publication materials due: | March 28, 2016 |
| Publication of special issue: | Mid 2016 (possibly the July–September issue, i.e., vol. 9, no. 3) |

## Submission and Review Process

Prospective authors are to supply a 500-word extended abstract outlining the content and aims of the proposed article, plus a list of 8 to 10 key references, in IEEE format, that the article will be informed by and/or draw/build upon. This is to be done by completing the online form at http://goo.gl/forms/ehnRBsYi0f. The abstracts will be reviewed by the guest editor and 12 to 15 will be shortlisted to proceed to the full-manuscript stage.

Full manuscripts should be prepared in accordance with the *IEEE Transactions on Learning Technologies* guidelines (http://www.computer.org/portal/web/tlt/author) and submitted via the journal's ScholarOne portal (https://mc.manuscriptcentral.com/tlt-cs), being sure to select the relevant special issue name. *Manuscripts should not be published or currently submitted for publication elsewhere.* Only full papers intended for review, not abstracts, should be submitted via the ScholarOne portal.

Each full manuscript will be subjected to double-blind peer review. It is anticipated that 7 or 8 articles (plus a guest editorial) will ultimately be published in the special issue.

## Guest Editor's Details

Mark J. W. Lee SMIEEE, SMACM(Life), MACS(Snr), AFAIM
Adjunct Senior Lecturer in Educational Technology, Charles Sturt University
Honorary Senior Research Fellow in Engineering and IT, Federation University Australia
Visiting Faculty, Entertainment Technology Center, Carnegie Mellon University
Email: tlt.wearablesiot@gmail.com

## References

[1] M. A. Feki, F. Kawsar, M. Boussard, and L. Trappeniers, "The Internet of Things: The next technological revolution," *Computer*, vol. 46, no. 2, pp. 24–25, Feb. 2013.

[2] A. Spicer and C. Cederström, "You've heard of the Internet of Things, now behold the Internet of Me," *The Conversation*, Jan. 2015. Available: http://theconversation.com/youve-heard-of-the-internet-of-things-now-behold-the-internet-of-me-36379

[3] T. Starner, "How wearables worked their way into the mainstream," *Pervasive Comput.*, vol. 13, no. 4, pp. 10–15, Oct.–Dec. 2014.

[4] V. R. Lee, Ed., *Learning Technologies and the Body: Integration and Implementation in Formal and Informal Learning Environments*. New York, NY: Routledge, 2015.

[5] M. Selinger, A. Sepulveda, and J. Buchan, "Education and the Internet of Everything: How ubiquitous connectedness can help transform pedagogy," White Paper, Cisco, San Jose, CA, Oct. 2013. Available: http://www.cisco.com/web/strategy/docs/education/education_internet.pdf

[6] L. Johnson, S. Adams, and M. Cummings, *NMC Horizon Report: 2012 Higher Education Edition*. Austin, TX: The New Media Consortium, 2012. Available: http://www.nmc.org/publication/nmc-horizon-report-2012-higher-ed-edition/

[7] L. Johnson, S. Adams Becker, M. Cummings, V. Estrada, A. Freeman, and H. Ludgate, *NMC Horizon Report: 2013 Higher Education Edition*. Austin, TX: The New Media Consortium, 2013. Available: http://www.nmc.org/publication/nmc-horizon-report-2013-higher-education-edition/

[8] L. Johnson, S. Adams Becker, V. Estrada, and A. Freeman, *NMC Horizon Report: 2014 K–12 Edition*. Austin, TX: The New Media Consortium, 2014. Available: http://www.nmc.org/publication/nmc-horizon-report-2014-k-12-edition/

[9] L. Johnson, S. Adams Becker, V. Estrada, and A. Freeman, *NMC Horizon Report: 2015 Higher Education Edition*. Austin, TX: The New Media Consortium, 2015. Available: http://www.nmc.org/publication/nmc-horizon-report-2015-higher-education-edition/