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Editorial for Special Issue:

## Special Issue on Omnipresent Intelligent Computing – New Developments and Societal Impact



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When the computer revolution began in the second half of the 20th century, few could have foreseen the pervasiveness that intelligent devices would have only half a century later. Today, consumers deal with numerous computing devices providing increasingly sophisticated services. Arguably, no other invention has so profoundly impacted on daily home and work lives as the computer. The downside, however, holds the worrying realization that many artifacts of modern technology now touch on the human sphere to the point of risking an individual's privacy, security, and well-being.

The new millennium carries the computer revolution to unprecedented levels where new computing paradigms excite researchers beyond the limits of science fiction. The burgeoning field of synthetic biology, for example, has given rise to novel computing approaches based on biomolecular materials. Indeed, silicon is no longer the only substrate for intelligent information processing. Other unconventional approaches such as computing with slime molds, for example, now embrace even living organisms. Information processing and problem solving strategies observed in nature have inspired the design of novel machine learning algorithms. Seemingly unlimited computer power now enables the *in silico* simulation of living organisms and the study of evolutionary processes with enormous efficiency. Although many of these novel, nature-inspired approaches are still in their infancy, they might bring a paradigm shift in computational science. How such a technology-driven paradigm shift may affect the “soft” components of our modern complex society is a many-faceted issue that deserves our consideration and exploration.

This special issue focuses on new developments in intelligent computing. A. Schuster and D. Berrar analyze the potentials and risks of current and emerging intelligent computing paradigms. Their article focuses on the interface between humans and intelligent systems and explores potentials and risks emerging for individuals and for the information society at large.

L. Palafox and H. Hashimoto propose a new human activity recognition system that relies on the analysis of five key variables to categorize human activities. A prototypical implementation of the system demonstrates promising results for applications in intelligent room settings.

M. Kimura and M. Sugiyama propose a novel approach to unsupervised clustering, which is based on least squares mutual information. The advantage of this approach is that hyperparameters of clustering algorithms such as kernel parameters no longer need to be manually calibrated, but they can be automatically optimized.

D. Ricinschi and E. Tokumitsu explore new ways of exploiting physical properties of ferroelectric materials. They investigate how the amount of polarization generated by two electrical pulses can be modeled and explained in the framework of game theory.

This special issue informs the research community about exciting new developments in intelligent computing, with an outlook on their societal impacts.

