



Data Security and Privacy: What Role Does Signal Processing Play?

With the flow and exchange of data in today's era of information and communications technologies (ICT), it is now more important than ever to keep data secure from malicious external adversaries and to limit the leakage of personal data. The recent data leakages made public are a concern for everyone. While the need to keep data secure is about national security, the leaks of personal data violate citizens' rights to privacy. Even if data security and data privacy are related, they often are conflated; yet both have an indisputable societal impact.

The concern about keeping data safe from illegitimate users, or about inadvertent leakage of private information during lawful information transmission, is growing very fast. The public is very much concerned about the trends in technology that are perceived to lack sufficient security and privacy protection. Whether external experts review a grant application on ICT or a magazine or a newspaper reporter interviews a scientist, the question, "where do you address data security and privacy in your research?" inevitably pops up. Traditionally, data security and privacy have been a concern of other communities outside signal processing, such as cryptography for data security. More recently, there is an increasing effort to address protection techniques beyond traditional methods because emerging systems require security and privacy mechanisms at all levels of communication, i.e., from transmission to storage. What role does

signal processing play in data security and privacy?

Most recently, an extensive amount of research has gone into secure communications in signal processing, in particular, physical layer security. Herein, advanced signal processing concepts are applied to combat jamming and eavesdropping attacks at the physical layer of a wireless network and to improve the reliability of wireless transmission without data layer encryption.

This *IEEE Signal Processing Magazine* (SPM) issue's theme is "Signal Processing for Cybersecurity and Privacy." The special issue provides a selection of excellent survey articles regarding ongoing research on signal and information processing approaches to security and privacy problems, which complement traditional cryptographic services. The tutorial-style articles survey the challenges associated with achieving security and privacy in both communications networks as well as distributed systems and identify signal processing approaches to protect information.

In this issue of SPM, you will notice a "new" column that we call "Reflections." The idea behind this column is not totally original, because SPM published "Leadership Reflections" between March 2003 [1] and November 2006 [2]. The authors of the columns were leaders within the signal processing community, such as current or former deans of engineering colleges or managers in industry, who shared their experience, perspectives, and views on future developments and key elements of success.

Recently, it has become obvious through the nature of submissions we receive for columns and forum that there is a need for a column in which

one would present and discuss timely ideas of broader interest to readers of SPM. The objective is not to publish columns only written by leaders of the IEEE Signal Processing Society but to provide an opportunity for all to reflect on topics that are interesting to a wide range of, if not to all, readers of SPM. This issue's "Reflections" column features an article by Prof. D. Robert Iskander from Wroclaw University of Technology, Poland, "The EDU-Index: A Way to Objectively Quantify an Individual's University Teaching Output." I hope that you will enjoy reading the article as much as I did.

I hope that you will find this collection of articles stimulating. I would like to thank all the contributors for submitting high-quality articles for the special issue and the guest editors for their effort and timeliness in facilitating the peer review. We are always looking for themes for special issues. Should you have any ideas about topics that would be interesting, timely, and of a promising future for a special issue, do not hesitate to contact Andrea Cavallaro or Andres Kwasinski, area editors for columns and forum, or me. I thank Andres Kwasinski for the fruitful discussions on this "new" column and I would also like to thank IEEE Vice President for Publications Mari Ostendorf for supporting the idea.

REFERENCES

- [1] C. L. M. Nikias, "Elevating a school," *IEEE Signal Processing Mag.*, vol. 20, no. 2, pp. 12–14, 2003.
- [2] A. V. Oppenheim, "One plus one could equal three (and other favorite clichés)," *IEEE Signal Processing Mag.*, vol. 23, no. 6, pp. 10–12, 2006.