

3 Fully funded PhD studentships
Secure Patient-Centric Management of Health Data
CTIT & Philips Research

The Centre for Telematics and Information Technology (CTIT) is a multidisciplinary research institute of the University of Twente, Enschede, The Netherlands. CTIT coordinates the research activities in all the areas relevant to the development, the introduction and the usage of information technology systems. <http://www.ctit.utwente.nl/>
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CTIT and Philips Research collaborate in a 4 year research project aimed at developing methods and tools for:

Secure Patient-Centric Management of Health Data

- 3 PhD positions

Members of the project team will be stationed at CTIT (Enschede) and for at least one year at Philips Research (Eindhoven).

Project Description

There is trend in health care to move towards personalized treatment that stretches out from the hospital to the patient's home, as exemplified by ambient assisted living. Additionally, there is a growing emphasis on prevention by means of healthy lifestyles. As a result healthcare becomes more patients oriented, which will lead to increasing influence and responsibility of the patient. An ideal personal health record (PHR) would provide a complete and accurate summary of the health and medical history of an individual by gathering data from many sources and making this information accessible online to anyone who has the necessary electronic credentials to view the information. Since PHRs are sensitive personal data, illegitimate disclosure of such information may cause a negative influence of the patient's life. To a certain extent, the law gives patients control over who can access patient data so as to safeguard the privacy of the patient. However, the patient needs a mechanism to enforce privacy policies for her PHRs in a trustworthy manner.

On the other hand the healthcare information is sensitive data that needs to be shared amongst organizations with heterogeneous systems and different levels of trustworthiness. Main issues in securely sharing data are the lack of interoperable access control and policy management mechanisms, and methods to determine the trustworthiness of organizations, systems and users.

Research

The main challenge in the healthcare domain is how to give authorised health professionals immediate and full access to all relevant patient data, subject to informed consent being given by the patient. The research topics of the PhD students are:

- 1: Design system-centric authorisation, authentication, trust management, and audit techniques that allow patients to manage their own PHR.
- 2: Design user-centric protocols for policy enforcement of PHR based on encryption techniques, such as proxy encryption.

3: Design data-centric access control protocols for EHR by combining ideas from attribute-based encryption and sticky policies.

Selected References

- [1] R. Agrawal, T. Grandison, C., Johnson, J. Kiernan (2007). *Enabling the 21st Century Health Care Information Technology Revolution*. Communications of the ACM, vol. 50(2), pp. 35-42 <http://doi.acm.org/10.1145/1216018>
- [2] M. Petkovic, C. Conrado, M. Hammouténe (2006), *Cryptographically Enforced Personalized Role-Based Access Control*, in: IFIP Conf. on Security and Privacy in Dynamic Environments (SEC), pp. 364-376, Springer, USA http://dx.doi.org/10.1007/0-387-33406-8_31
- [3] L. Ibraimi, Q. Tang, Q. and P.H. Hartel and W. Jonker (2008). A Type-and-Identity-based Proxy Re-Encryption Scheme and its Application in Healthcare. In: *Proceedings of the 5th VLDB Workshop, SDM 2008*, August 24, 2008, Auckland, New Zealand. pp. 185-198. Lecture Notes in Computer Science 5159. Springer Verlag. ISBN 978-3-540-85258-2, http://dx.doi.org/10.1007/978-3-540-85259-9_12
- [4] A. Sahai and B. Waters (2005). Fuzzy identity based encryption. In *Advances in Cryptology - EUROCRYPT '05*, number 3494 in Lecture Notes in Computer Science, pages 457-473. Springer, http://dx.doi.org/10.1007/11426639_27
- [5] Q. Tang. Type-based proxy re-encryption and its construction. In D. R. Chowdhury and V. Rijmen, editors, *Proceeding of the 9th International Conference on Cryptology in India (INDOCRYPT 2008)*, volume 5365 of Lecture Notes in Computer Science, pages 130–144. Springer, 2008.

What we ask and what we offer

You have completed a university education or are about to graduate in an area that is relevant to our research, i.e. computer science, electrical engineering, or mathematics. You like working in a team and have knowledge of one or more of the following topics: data bases, networking, and security. Your main task will be to do research, but you will be given the opportunity to acquire some teaching experience. As PhD student you will be appointed for a period of four years, at the end of which you must have completed a PhD thesis. During this period you have the opportunity to broaden your knowledge by joining international exchange programs, to participate in national and international conferences and workshops, and to visit other research institutes and universities worldwide.

The PhD students will be appointed at CTIT. The monthly salary of a PhD student ranges from EURO 1956,- gross in the first year to EURO 2502,- gross in the fourth year.

Information and application

More information may be obtained from Dr. Svetla Nikova (s.i.nikova@utwente.nl) or Prof. Pieter Hartel (pieter.hartel@utwente.nl). You are invited to send your application together with curriculum vitae, marks transcripts and the names and addresses of two referees by email to jobs@ctit.utwente.nl.