

Proposal for Master's Degree Project

Title: A System for The Promotion of Traceability and Ownership of Health Data Using Blockchain

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Summary

With the advent of Bitcoin and blockchain, the growth and adaptation of cryptography features and capabilities has quickly extended to new and under-explored areas, such as healthcare. Health data has strong ties with both security and privacy, as patient healthcare data presents serious issues when misappropriated.

New studies have shown that this technology shows promise in empowering patient ownership of their own health data, as well as enabling a fool-proof health data history and promoting medical responsibility. With the advent of mobile health (m-Health) sustained on service-oriented architectures, the adaptation of blockchain mechanisms into health applications might facilitate decentralized and available healthcare [2,3]. In this context however, four main problematic points are data ownership, data access, interoperability between the systems of different health service providers and integration with existing systems. Furthermore, usage of blockchain technology might represent several issues regarding the implementation process, such as scalability, privacy, traceability, link-ability and performance.

As such, the main research challenges are in the way how decentralized health systems should operate, methods of promoting health data ownership by patients utilizing blockchain, how the issues that arise from the implementation of blockchain could be mitigated and measuring costs of implementation of blockchain solutions onto existing systems and architectures.

Expected outputs (mandatory/minimum):

- Proposal of novel methods of promoting health data ownership by patients utilizing blockchain
- Test of the proposed methods through an already built prototype of a health system using blockchain technology;
- 1 article in indexed journal;
- 1 MSc dissertation.

Main Goals / tasks:

- **Task 1:** Review of the state of the art on digital health systems and blockchain; comparison of existing applications of the technology in the field;
- **Task 2:** Specification and conceptual design of novel methods and mechanisms for promoting health data ownership by patients utilizing blockchain
- **Task 3:** Implementation of the proposed methods and mechanisms on an already built prototype of a blockchain based solution for health data;
- **Task 4:** Test and Evaluation of the proposed methods and mechanisms for of promoting health data ownership by patients utilizing blockchain an real prototype (mentioned on task 3);
- **Task 5:** Writing of the master's dissertation, technical documentation and a journal paper.

Timeline:

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
Task 1: Review of the state of the art on digital health systems and blockchain; comparison of existing applications of the technology in the field;												
Task 2: Specification and conceptual design of novel methods and mechanisms for promoting health data ownership by patients utilizing blockchain;												
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Task 5: Writing of the master's dissertation, technical documentation and a journal paper.												

References:

- [1] Bruno M. C. Silva, Joel J. P. C. Rodrigues, Isabel de la Torre Díez, Miguel López- Coronado, and Kashif Saleem, "Mobile-health: A review of current state in 2015", in Journal of Biomedical Informatics, Vol. 56, pp. 265-272, 2015.
- [2] X. Liang, J. Zhao, S. Shetty, J. Liu, D. Li, Integrating blockchain for1data sharing and collaboration in mobile healthcare applications, in:2017 IEEE 28th Annual International Symposium on Personal, Indoor,and Mobile Radio Communications (PIMRC), 2017, pp. 1–5. doi:10.1109/PIMRC.2017.8292361
- [3] H. Zhao, P. Bai, Y. Peng, R. Xu, Efficient key management scheme for1195health blockchain, CAAI Transactions on Intelligence Technology 3 (2018)114–118.