

BLOCKCHAIN

A Dissertation Outline Presented

by

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ABSTRACT

BLOCKCHAIN

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INTRODUCTION

Contributions

The following is a summary of the contributions in each chapter of this proposal.

- 1.

Collaborators

CHAPTER 1

TARGET ESTIMATION

1.1

Overview

CHAPTER 2

GRAPHENE

CHAPTER 3

RL APPLIED TO BITCOIN

CHAPTER 4
RELATED WORK

CHAPTER 5

TIMELINE

BIBLIOGRAPHY

- [1] Acquisti, Alessandro. Privacy in electronic commerce and the economics of immediate gratification. In *Proceedings of the 5th ACM conference on Electronic commerce* (2004), ACM, pp. 21–29.
- [2] Andrés, Miguel E, Bordenabe, Nicolás E, Chatzikokolakis, Konstantinos, and Palamidessi, Catuscia. Geo-indistinguishability: Differential privacy for location-based systems. In *Proceedings of the 2013 ACM SIGSAC conference on Computer & communications security* (2013), ACM, pp. 901–914.
- [3] Ben-Sasson, Eli, Chiesa, Alessandro, Garman, Christina, Green, Matthew, Miers, Ian, Tromer, Eran, and Virza, Madars. Zerocash: Decentralized Anonymous Payments from Bitcoin. In *Proc. IEEE Symp. Security & Privacy* (May 2014), pp. 459–474.
- [4] Beresford, A.R., and Stajano, F. Mix zones: user privacy in location-aware services. In *Proc. Pervasive Computing and Communications Wrkshps* (2004), pp. 127–131.
- [5] Bissias, George, Ozisik, A Pinar, Levine, Brian N, and Liberatore, Marc. Sybil-Resistant Mixing for Bitcoin. In *Proceedings of the 13th Workshop on Privacy in the Electronic Society* (2014), pp. 149–158.
- [6] Cunha, Felipe D, Alvarenga, Davidysson A, Viana, Aline C, Mini, Raquel AF, and Loureiro, Antonio AF. Understanding interactions in vehicular networks through taxi mobility. In *Proceedings of the 12th ACM Symposium on Performance Evaluation of Wireless Ad Hoc, Sensor, & Ubiquitous Networks* (2015), ACM, pp. 17–24.
- [7] Dabrowski, Adrian, Pianta, Nicola, Klepp, Thomas, Mulazzani, Martin, and Weippl, Edgar. Imsi-catch me if you can: Imsi-catcher-catchers. In *Proceedings of the 30th annual computer security applications Conference* (2014), ACM, pp. 246–255.
- [8] De Mulder, Yoni, Danezis, George, Batina, Lejla, and Preneel, Bart. Identification via location-profiling in gsm networks. In *Proceedings of the 7th ACM workshop on Privacy in the electronic society* (2008), ACM, pp. 23–32.
- [9] Eagle, Nathan, and Pentland, Alex Sandy. Reality mining: sensing complex social systems. *Personal and ubiquitous computing* 10, 4 (2006), 255–268.

- [10] Ficek, Michal, Pop, Tomáš, and Kencl, Lukáš. Active tracking in mobile networks: An in-depth view. *Computer Networks* 57, 9 (2013), 1936 – 1954.
- [11] Freudiger, Julien, Manshaei, Mohammad Hossein, Hubaux, Jean-Pierre, and Parkes, David C. On non-cooperative location privacy: a game-theoretic analysis. In *Proceedings of the 16th ACM conference on Computer and communications security* (2009), ACM, pp. 324–337.
- [12] Greenwald, Glenn, and MacAskill, Ewen. Boundless informant: the nsas secret tool to track global surveillance data. *The Guardian* 11 (2013).
- [13] Ho, Shen-Shyang, and Ruan, Shuhua. Differential privacy for location pattern mining. In *Proceedings of the 4th ACM SIGSPATIAL International Workshop on Security and Privacy in GIS and LBS* (2011), ACM, pp. 17–24.
- [14] Jaqaman, Khuloud, Loerke, Dinah, Mettlen, Marcel, Kuwata, Hirotaka, Grinstein, Sergio, Schmid, Sandra L, and Danuser, Gaudenz. Robust single-particle tracking in live-cell time-lapse sequences. *Nature methods* 5, 8 (2008), 695–702.
- [15] Krumm, John. A survey of computational location privacy. *Personal and Ubiquitous Computing* 13, 6 (2009), 391–399.
- [16] LEE RAINIE, SARA KIESLER, RUOGU KANG, and MADDEN, MARY. Anonymity, privacy, and security online.
- [17] Markov, Andreĭ. Theory of algorithms.
- [18] Miers, Ian, Garman, Christina, Green, Matthew, and Rubin, Aviel D. Zerocoin: Anonymous Distributed E-Cash from Bitcoin. In *Proc. IEEE Symposium on Security and Privacy* (2013), pp. 397–411.
- [19] Mulder, Yoni De, Danezis, George, Batina, Lejla, and Preneel, Bart. Identification via Location-profiling in GSM Networks. In *Proc. ACM Wrkshp on Privacy in the Electronic Society* (2008), pp. 23–32.
- [20] Nillius, Peter, Sullivan, Josephine, and Carlsson, Stefan. Multi-target tracking-linking identities using bayesian network inference. In *Computer Vision and Pattern Recognition, 2006 IEEE Computer Society Conference on* (2006), vol. 2, IEEE, pp. 2187–2194.
- [21] Qin, Zhen, and Shelton, Christian R. Improving multi-target tracking via social grouping. In *Computer Vision and Pattern Recognition (CVPR), 2012 IEEE Conference on* (2012), IEEE, pp. 1972–1978.
- [22] Rainie, Lee. The state of privacy in post-snowden america.
- [23] Razavi, Sara Modarres. *Tracking Area Planning in Cellular Networks [Elektro-nisk resurs] : Optimization and Performance Evaluation*. Linköping, 2011.

- [24] Sankar, Lalitha, Rajagopalan, S Raj, and Poor, H Vincent. Utility-privacy trade-offs in databases: An information-theoretic approach. *IEEE Transactions on Information Forensics and Security* 8, 6 (2013), 838–852.
- [25] Shokri, Reza, Theodorakopoulos, George, Le Boudec, Jean-Yves, and Hubaux, Jean-Pierre. Quantifying location privacy. In *Security and privacy (sp), 2011 ieeesymposium on* (2011), IEEE, pp. 247–262.
- [26] Soroush, Hamed, Sung, Keen, Learned-Miller, Erik, Levine, Brian Neil, and Liberatore, Marc. Turning off gps is not enough: Cellular location leaks over the internet. In *International Symposium on Privacy Enhancing Technologies Symposium* (2013), Springer, pp. 103–122.
- [27] Sung, Keen, Levine, Brian Neil, and Liberatore, Marc. Location Privacy without Carrier Cooperation. In *Proc. IEEE Workshop on Mobile System Technologies (MoST)* (May 2014).
- [28] Wong, V. W.-S., and Leung, V. C.M. Location Management for Next-generation Personal Communications Networks. *IEEE Network* 14, 5 (Sept. 2000), 18–24.
- [29] Yang, Bo, and Nevatia, Ram. An online learned crf model for multi-target tracking. In *Computer Vision and Pattern Recognition (CVPR), 2012 IEEE Conference on* (2012), IEEE, pp. 2034–2041.