

# Ehsan Toreini

Research Associate in Cyber Security

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## Research Interests and Skills

- ◆ Physical Security
- ◆ Web Security
- ◆ Protocol Design
- ◆ Sensor Security
- ◆ Trustworthy Machine Learning
- ◆ Electronic Voting
- ◆ Blockchain
- ◆ Usable Security and Privacy

## Key Publications (Top 5, Ranked by Significance)

- (1) Texture to the Rescue: Practical Paper Fingerprinting based on Texture Patterns** 2017  
Ehsan Toreini, Siamak F. Shahandashti (University of York), Feng Hao (University of Warwick), *ACM Transactions on Privacy and Security (Formerly ACM TISSEC, Q1)*
- (2) DOMtegrity: Ensuring Web Page Integrity against Browser Extension Modifications** 2019  
Ehsan Toreini, Maryam Mehrnezhad, Siamak F. Shahandashti, Feng Hao, *International Journal of Information Security (Q2)*
- (3) The relationship between trust in AI and trustworthy machine learning technologies** 2020  
Ehsan Toreini, Mhari Aitken, Aad van Moorsel, Karen Elliot, Kovila Koopamootoo, *ACM conference on Fairness, Accountability and Transparency in Machine Learning, Spain, 2020*
- (4) Stealing PINs via mobile sensors: actual risk versus user perception.** 2018  
Maryam Mehrnezhad, Ehsan Toreini, Siamak F. Shahandashti, and Feng Hao. *International Journal of Information Security (Q2)*,
- (5) TouchSignatures: Identification of user touch actions and PINs based on mobile sensor data via JavaScript.** 2016  
Maryam Mehrnezhad, Ehsan Toreini, Siamak F. Shahandashti, FengHao, *Journal of Information Security and applications (Q2)*

## All Publications (Ranked by Year)

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- Trustworthy Machine Learning Technologies: How can we address trustworthiness beyond accuracy-focused approaches?** 2020  
Ehsan Toreini, et al., to be submitted to *ACM Computing Surveys*
- Establishing a Social Licence for Financial Technology: Reflections on the Role of the Private Sector in Pursuing Ethical Data Practices** 2020  
M. Aitken, Ehsan Toreini, A. Moorsel, K. Elliot, K. Coopamootoo, *Journal of Big Data & Society*
- What Is This Sensor and Does This App Need Access to It?** 2019  
M. Mehrnezhad, Ehsan Toreini, *Informatics Journal*
- Making sense of sensors: mobile sensor security awareness and education.** 2018  
M. Mehrnezhad, Ehsan Toreini, and S. Alajrami. *7th ACM Workshop on Socio-Technical Aspects in Security and Trust.*
- PiSHi: click the images and I tell if you are a human** 2017  
M. Mehrnezhad, A. G. Bafghi (Ferdowsi University), A. Harati (Ferdowsi University), Ehsan Toreini - *International Journal of Information Security (Q2)*
- Removing trusted tallying authorities** 2016  
P. McCorry, Ehsan Toreini, and M. Mehrnezhad, *Technical report, Newcastle University,*
- Touchsignatures: Identification of user touch actions based on mobile sensors via javascript.** 2015  
M. Mehrnezhad, Ehsan Toreini, S. F. Shahandashti, F. Hao, *Proceedings of the 10th ACM Symposium on Information, Computer and Communications Security, AsiaCCS*
- Determining User Passwords from Partial Information,** 2015  
D. Clarke, Ehsan Toreini, F. Hao, *Technical report, Newcastle University*
- An acoustic side channel attack on enigma** 2015  
Ehsan Toreini, B. Randell, and F. Hao. *Technical Report, Newcastle University*
- On the privacy of private browsing—a forensic approach.** 2014  
K. Satvat, M. Forshaw, F. Hao, Ehsan Toreini, *Journal of Information Security and Applications*

<b>Analysis of The Usage of Chaotic Theory in Data Clustering Using Particle Swarm Optimization.</b>	2014
S. Poursiah Navi, Ehsan Toreini, M. Mehrnejad, And S. Kazem. <i>Indian J. of Scientific Research</i>	
<b>On the privacy of private browsing—a forensic approach.</b>	2013
S. Satvat, M. Forshaw, F. Hao, Ehsan Toreini, <i>Data Privacy Management and Autonomous Spontaneous Security</i>	
<b>SEIMCHA: A New Semantic Image CAPTCHA Using Geometric Transformations.</b>	2012
M. Mehrnejad, A. G. Bafghi, A. Harati, and Ehsan Toreini, <i>ISeCure</i>	
<b>Multiple SEIMCHA: multiple semantic image captcha.</b>	2011
M. Mehrnejad, A. G. Bafghi, A. Harati, and Ehsan Toreini. <i>IEEE International Conference for Internet Technology and Secured Transactions</i>	
<b>A novel method in fuzzy data clustering based on chaotic PSO.</b>	2011
Ehsan Toreini, M. Mehrnejad. <i>IEEE International Conference for Internet Technology and Secured Transactions</i>	
<b>Security analyzing and designing GUI with the resources model.</b>	2011
M. Mehrnejad, Ehsan Toreini, and A. G. Bafghi. <i>IEEE International ISC Conference on Information Security and Cryptology</i>	
<b>Clustering data with Particle Swarm Optimization using a new fitness.</b>	2011
Ehsan Toreini, M. Mehrnejad. <i>Conference on IEEE Data Mining and Optimization (DMO)</i>	

### Registered Patents

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<b>US Patent Application No US 15972922:</b>	2018
<ul style="list-style-type: none"> <li>• <b>Title: Authentication of Physical Object Using Internal Structure;</b></li> <li>• A method for preventing counterfeiting of an object (e.g. paper) is described. The method comprises capturing an image of at least a portion of the object, wherein the portion of the object whose image is captured is at least partially transparent, and wherein the captured image includes features of the internal structure of the object (e.g. the texture of the paper resulting from the arrangement of fibres from which the paper is made). The method further comprises generating, based on the image, a code that encodes features of the internal structure of the object, and recording the code. A method for authenticating an object is also described.</li> </ul>	

### Academic Pathway

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<b>Research Associate, Newcastle University,</b>	2018 - Now
<ul style="list-style-type: none"> <li>• Project Title: <a href="#">Fintrust</a></li> <li>• Funder: EPSRC</li> <li>• Project Description: quantify the extent to which trust matters to Fintech consumers, assess bias in automated advice, establish whether algorithms may lead to financial exclusion or financial distress and protect services from erroneous algorithmic results</li> <li>• In collaboration with Atom Bank, UK's first bank built exclusively for smartphone</li> <li>• Responsibilities: security analysis of responsible AI, trust issues of machine learning and safe computation of fairness in Machine Learning</li> </ul>	
<b>Research Associate, Newcastle University</b>	2018
<ul style="list-style-type: none"> <li>• Project Title: SEEV, Verifiable electronic voting for real-world elections</li> <li>• Funder: Innovate UK academic cyber security startup program</li> <li>• Project Description: "Self-enforcing e-voting" End-to-end verifiable e-voting without tallying authorities</li> <li>• Project Outcomes include two MVPs under CyberASAP which successfully <a href="#">tried at Gateshead</a> during the last local election</li> <li>• University spin-out under discussion: likely jointly by Newcastle and Warwick due to the PI changing job</li> <li>• Responsibilities: secure analysis of the e-voting protocol design and implementation</li> </ul>	

<b>PHD, Computing Science, Newcastle University</b>	2013 - 2017
<ul style="list-style-type: none"> <li>• Thesis Title: "New Advances in Tamper Evident Technologies",</li> <li>• Supervisor: Prof. Feng Hao,</li> <li>• Shortlisted for EPSRC Connected Nation Pioneers Competition (detail in the grants and awards section)</li> <li>• Thesis projects have been featured in the Economist, Wall Street Journal</li> <li>• Offers of research collaboration from FBI Forensics, DeLaRue and Mozilla based on the findings of this dissertation</li> <li>• Newcastle University filed a patent based on my research (detail in the patents section)</li> </ul>	
<b>Guest Lecturer, Newcastle University, Cyber Security Modules</b>	
<ul style="list-style-type: none"> <li>• On the privacy of private browsing—a forensic approach</li> <li>• New solutions for old problems: Tampering-aware protection</li> <li>• Texture to the Rescue: Practical Paper Fingerprinting based on Texture Patterns</li> </ul>	2013 2017 2017, 2018
<b>Visiting Researcher, Newcastle University</b>	2013 - 2014
<ul style="list-style-type: none"> <li>• Project Description: <a href="#">an acoustic side channel attack on historic Enigma by the noises produced while typing.</a></li> </ul>	
<b>Lecturer in Azad University, Iran</b>	2007 - 2012
<ul style="list-style-type: none"> <li>• Mainly Taught: Web Programming, Database Systems, Data Storage and Retrieval, Logical Circuits, Operating Systems Fundamentals</li> </ul>	
<b>MSc, Artificial Intelligence, Azad University, Mashhad, Iran</b>	2007 - 2010
<b>BSc, Software Engineering, Ferdowsi University of Mashhad, Iran</b>	2002 - 2007

## Grants and Awards

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<b>StandICT Grant (€3k)</b>	2019
<ul style="list-style-type: none"> <li>• To attend Annual W3C (standardization body of Web Technologies) technical Plenary Committee in Japan</li> <li>• The final report and impact of my proposal is available in <a href="#">standICT.eu final report.</a></li> </ul>	
<b>Shortlisted in EPSRC Connected Nation Pioneers Competition</b>	2018
<b>Winner of Cyber Security Case Study Competition, <a href="#">The Economist</a></b>	2016
<ul style="list-style-type: none"> <li>• Winner of £3k award</li> <li>• Research on Electronic Voting over Blockchain</li> <li>• Ranked 3<sup>rd</sup> (the only winner outside USA, outranking UCL and other UK universities) in The Kaspersky Lab Cyber Security Case Study Competition Hosted by The Economist Which MBA?</li> </ul>	
<b>Summer Research Scholarship,</b>	2015
<ul style="list-style-type: none"> <li>• School of Computing Science, Newcastle University</li> <li>• <a href="#">Designed and implemented a PowerPoint plug-in</a> for "Verifiable Classroom Voting System" in Newcastle University.</li> </ul>	
<b>Summer Vocation Studentship,</b>	2014
<ul style="list-style-type: none"> <li>• School of Computing Science, Newcastle University</li> <li>• Project Title: "Security Analysis of Browser Extensions" for £2,000</li> <li>• Investigated the security impact of browser extensions in web.</li> </ul>	
<b>Travel Grant to attend FOSAD Summer School,</b>	2013
<ul style="list-style-type: none"> <li>• International School on Foundations of Security Analysis and Design (FOSAD)</li> </ul>	

## Key Accomplishments

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<b>W3C Invited Expert</b>	2019
<ul style="list-style-type: none"> <li>• Expert on "Devices and Sensors Working Group"</li> <li>• In collaboration with "Browser Extension Community Group"</li> </ul>	
<b>Participated in the organization of "Women in mathematics day"</b>	2018
<ul style="list-style-type: none"> <li>• Funded by London Mathematical Society to promote EDI values in mathematics</li> </ul>	
<b>Co-organized Workshop on "Mobile Sensor Security"</b>	2017, 2018
<ul style="list-style-type: none"> <li>• Part of Thinking Digital</li> <li>• More than 100 participants</li> </ul>	

Top 5% of all research outputs scored by <a href="#">Altmetric</a> with score: 1411	2017
Featured in <a href="#">the Economist</a> and <a href="#">Wall Street Journal</a> for <a href="#">Paper Fingerprinting</a>	2017
Our Paper: "TouchSignatures: Identification of user touch actions and PINs based on mobile sensor data via JavaScript" got several including:	2015 - 2016
<ul style="list-style-type: none"> <li>• <b>Acknowledged by <a href="#">Apple</a>, <a href="#">Mozilla</a>, and <a href="#">Chrome</a>:</b> discovered critical bugs in mainstream browsers for JavaScript Sensor Permissions. Firefox and Safari fixed the vulnerability in their releases in iOS 9.3 and Firefox 46.</li> <li>• <b>Cited by W3C standard draft for <a href="#">deviceorientation API</a>:</b> W3C sensor standard committee added a security section based on our contributions.</li> <li>• <b>widely featured by the international media e.g. <a href="#">Newcastle University Press Office</a>, <a href="#">BBC</a>, <a href="#">Guardian</a>, <a href="#">Telegraph</a>, <a href="#">Independent</a>, <a href="#">Dailymail</a>, <a href="#">NewYork Post</a>, <a href="#">Sun</a>, <a href="#">The Australian</a>, <a href="#">Economic Times</a>, <a href="#">TechCrunch</a>, <a href="#">Engadget</a>, <a href="#">Popular Science</a>, <a href="#">Science Friday</a>, <a href="#">ars Technica</a>, <a href="#">Reddit</a>, <a href="#">xda-developers</a>, <a href="#">CBC News</a>, <a href="#">German Public Radio Deutschlandfunk</a>, <a href="#">Die Welt (German national daily newspaper)</a>, <a href="#">Sina</a>, <a href="#">Sohu</a></b></li> </ul>	

## Academic Services

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<b>Program Committee member</b>	2019
Workshop on Security Standardization Research Conference (ACM CCS 2019)	
<b>Invited Reviewer</b>	2018 - Now
<ul style="list-style-type: none"> <li>• IEEE Transactions on Information Forensics and Security (Q1)</li> <li>• International Journal of Advanced Manufacturing Technology (Q1)</li> <li>• MDPI: Journal of Future Internet, Informatics, MDPI, Applied Sciences</li> </ul>	

## Selected Technical Experience

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<b>Project Technician, Newcastle University</b>	2013 - 2016
<b>Software Analyst, Mashhad Municipality, Iran</b>	2011 - 2012
<b>Co-Founder and Developer, Amir Kabir Inc., Iran</b>	2010 - 2012
<ul style="list-style-type: none"> <li>• Co-Founded a software technology start-up company</li> <li>• Hired more than 10 people</li> <li>• Products managed supply chain and sales in supermarket chains with more than 50 working staff.</li> <li>• The system was implemented successfully for more than a year.</li> </ul>	

## CPD

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<b>Participated in series of workshops as a part of "Academic Cyber Security Start-up Program"</b>	2018
<ul style="list-style-type: none"> <li>• focused on various aspects of launching a spin-out start-up company from academic research.</li> <li>• The workshops include programs on market analysis, marketing techniques, legal aspects of intellectual rights, networking principles, self-promotion, Minimum Viable Products, business strategies and more.</li> </ul>	
<b>Attended Several Workshops during my PhD studies in Newcastle University</b>	2014 - 2017
<ul style="list-style-type: none"> <li>• regarding self-improvement and professional development</li> </ul>	
<b>Member of EPSRC CryptoForma Network.</b>	2013 - 2015
<ul style="list-style-type: none"> <li>• a network in computer science and mathematics to support the development of formal notations, methods and techniques for modelling and analysing modern cryptographic protocols.</li> </ul>	
<b>Attended "School on Foundations of Security Analysis and Design (FOSAD)",</b>	2015, 2013