



# MARIAM NOUH

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PH.D. CYBER SECURITY, UNIVERSITY OF OXFORD | RESEARCH ASSISTANT PROFESSOR, KING ABDULAZIZ CITY FOR SCIENCE AND TECHNOLOGY

## SUMMARY

Mariam Nouh has more than 10 years of experience working in the Cyber Security field in the academic and industry sectors. She holds a DPhil (Ph.D.) in Cyber Security from the University of Oxford. Her doctoral research focuses on the topic of cybercrime and building models and tools to detect abusive behaviour online.

She participated in a number of international cyber security competitions related to policy formulation, and capture the flag. She won a number of awards, including the *best policy brief in the Cyber 9/12 Atlantic Council Cyber policy competition*, which outlined cybersecurity policy recommendations during a cyber crisis.

Mariam engaged in a number of international conferences, panels, and working groups as a speaker discussing different topics related to cyber security. Similarly, she is an active member in a number of national and international organizations including the Global Foundation for Cyber Studies and Research, Women in Cyber Security international community, and Hemaya Saudi Group for Information Assurance.

Interests: Cyber Security, Threat Assessment, Cybercrimes, Online Radicalization, Computational Social Science, Network Science, Machine learning.

## EDUCATION

UNIVERSITY OF  
OXFORD  
2014 - 2020

### Doctor of Philosophy in Cyber Security (DPhil | PhD)

1 year of intensive Cyber Security training followed by research.

Thesis Title: On Combating Online Radicalization: A Framework for Cybercrime Investigations.

CONCORDIA  
UNIVERSITY  
2008 - 2010

### Masters of Applied Science in Information Systems Security (M.A.Sc.)

GPA 4.04/4.30. Thesis Title: Model-to-Model Transformation Approach for Systematic Integration of Security Aspects into UML 2 Design Models.

KING SAUD  
UNIVERSITY  
2002 - 2007

### Bachelor of Science in Information Technology (BSc.)

GPA 4.4/5.0 with Second Class Honors. Graduation project: "AraDict", an Arabic speech recognition system.

## WORK

### EXPERIENCE

CENTER FOR  
COMPLEX SYSTEMS,  
KING ABDULAZIZ  
CITY FOR SCIENCE  
AND TECHNOLOGY  
OCTOBER 2020 -  
PRESENT

#### Research Assistant Professor

Research Assistant Professor at the Center for Complex Systems (CCS), a world-class international research program established as a collaboration between King Abdulaziz City for Science and Technology and MIT. CCS aims to seed a new generation of internationally experienced scholars and to excite and inspire a new generation of researchers and engineers capable of developing new methods and tools that model and manage complex, highly integrated systems by training them in the areas of AI, Big Data Analytics, Modeling & Simulation, and Visualization.

GLOBAL NETWORK  
ON EXTREMISM AND  
TECHNOLOGY  
OCTOBER 2020 -  
PRESENT

#### Associate Fellow

The Global Network on Extremism and Technology (GNET) is an academic research initiative backed by the Global Internet Forum to Counter Terrorism (GIFCT), an independent industry-funded initiative for better understanding, and counteracting, terrorist use of technology. GNET is convened and led by the International Centre for the Study of Radicalisation (ICSR), a globally renowned academic research centre based within the Department of War Studies at King's College London.

INFORMATION  
SCIENCES INSTITUTE,  
UNIVERSITY OF  
SOUTHERN  
CALIFORNIA  
JULY 2019 -

#### Research Assistant

Working on a research project with the Machine Intelligence and Data Science (MINDS) group lead by Dr Emilio Ferrara. The project focuses on analyzing the behaviour of online radical communities to identify the different social roles held by its members.

MASSACHUSETTS  
INSTITUTE OF  
TECHNOLOGY  
JANUARY 2013 -  
JANUARY 2014

**Research Affiliate**

Worked with the Media Lab Human Dynamics group on Cyber Security Initiative project researching problems related to the security and privacy in online social networks.

KING ABDULAZIZ  
CITY FOR SCIENCE  
AND TECHNOLOGY,  
SAUDI ARABIA  
JANUARY 2012 -  
DECEMBER 2013

**Research Associate**

Worked in the Center for Complex Engineering Systems (CCES) on a number of projects with several ministries and government agencies in the energy sector in Saudi Arabia. The aim is to design and develop web-based decision support systems to aid decision-makers in making informed decisions related to the energy mix. Deliverables include system prototypes and research publications.

RIYAD BANK. SAUDI  
ARABIA  
JANUARY 2011 -  
DECEMBER 2011

**Security Analyst**

- Performing security compliance reviews on production systems following ISO 27000 standard and PCI compliance requirements.
- Performed security evaluation and testing of new systems.
- Vulnerability analysis and management on both network and application levels.
- Business Impact Analysis (BIA) on the bank's Corporate and Retail Banking Divisions.
- Performed Security Risk Management for identifying, assessing and mitigating risks.

ERICSSON INC,  
MONTREAL, CANADA  
JANUARY 2009 -  
JUNE 2010

**Research Assistant**

Worked with the R&D team on a project focusing on designing and developing a framework for automatic integration of security features into UML design models. Using model-to-model and model-to-text transformations.

**SKILLS**

**DATA SCIENCE**



Supervised and unsupervised Machine Learning, Clustering, Data Mining, Deep Learning, Natural Language Processing (NLP), Social Network analysis (SNA)

**SECURITY**



Software Security, Governance and Compliance, Risk Assessment, Network Analysis, Penetration Testing, Cyber Forensics, Digital Investigation, Open-Source Intelligence (OSINT)

**SOFTWARE ENGINEERING**



Object-oriented Software Development, Aspect-oriented Software Development, Unified Modeling Language (UML)

**DATABASES AND ENVIRONMENTS**



[No-SQL] MongoDB, RethinkDB (expert), [Relational] MySQL (expert), Oracle (intermediate), [Graph] Neo4J (basic)

**PROGRAMING LANGUAGES**



Python, JavaScript, HTML5 (expert), Java, C++, C# (Intermediate), C (basic)

**RESEARCH AND PROJECT MANAGEMENT**



Independent self-driven researcher with experience in inter-disciplinary research. Excellent analytical and problem-solving skills. Experience managing long-term and short-term projects.

**STUDENT MENTORING AND SUPERVISION**



Experience mentoring and supervising undergraduate and master students in preparing their postgraduate applications, scoping their research and formulating new ideas.

**COMMUNICATION SKILLS**



English (fluent), Arabic (native), French (beginner)

**PROJECTS**

**IDENTIFYING SOCIAL ROLES WITHIN**

**Information Sciences Institute (ISI), University of Southern California | Individual Project**

This research project aims to understand the different social roles held by a group of online users that belong to a

**RADICAL  
COMMUNITIES**  
2019 - PRESENT

radical (extremist) group. For instance, individuals may start off by being seekers and lurkers for radical content (passive mode) and by time could be more engaged with the content and become inquirers, advocates, and activators (active mode).

We empirically identify different factors that can describe some of these states (roles). And study how these roles change over time. This project aim to predict when an individual could turn from being only a seeker for example to an advocate for a particular radical ideology.

**DETECTION AND  
ANALYSIS OF ONLINE  
RADICAL CONTENT**  
2017 - 2020

**University of Oxford, Cyber Security CDT | Individual Project**

This project focuses on understanding the linguistic and psycholinguistic markers associated with extremist propaganda. Then using these markers design a system to detect radical extremist content and pro-extremist users in online social networks. We analyse user's behaviour and psychological properties using techniques such as social network analysis, natural language processing, and machine learning.

**THE CYBER-CRIME  
INTELLIGENCE  
FRAMEWORK**  
2016 - 2019

**University of Oxford, Cyber Security CDT | Individual Project**

The objective of this project is to build a framework, and supporting toolset, to aid law enforcement in conducting their investigations. The framework allows identifying online criminal accounts, content, as well as the key influential members within a cyber-criminal network

**CYBER SECURITY  
INITIATIVE (CSI)  
PROJECT**  
2013 - 2014

**Center for Complex Engineering Systems & Human Dynamics Lab at MIT | Group Project**

Worked with the Human Dynamics group lead by Prof Alex Pentland on multiple tracks tackling different security and privacy issues. These tracks include (1) Design a spam detection approach to detect spam messages in microblogging applications such as Twitter. (2) Examine the effects of awareness and peer pressure on a user's behaviour in terms of the privacy decisions they make within different online social networks. I contributed to track (1) and led track (2).

**INTEGRATED ENERGY  
DECISION SUPPORT  
SYSTEM**  
2012 - 2013

**Center for Complex Engineering Systems | Group Project**

My role within this project was investigating different methods for designing and architecting a web-based collaborative platform for a decision support system for the Power System in Saudi Arabia. I used MVC architecture and focused on the design and development of the back-end of the system using NodeJS and MongoDB technologies.

**MODEL-BASED  
ENGINEERING OF  
SECURE SOFTWARE  
AND SYSTEMS  
(MOBS2)**  
2009 - 2010

**Concordia University & Ericsson INC, Canada | Group Project**

- Researched new solutions for Model-to-Model transformations in UML diagrams. Designed an aspect-oriented modelling profile for specifying and integrating security concerns into UML design models. The profile adds the capabilities of aspect-oriented modelling to UML.
- Designed and implemented a weaving engine to automatically inject security aspects into UML software design models. The UML profile and the weaving engine were implemented as plug-Ins to IBM Rational Software Architecture Framework.
- Designed and implemented a model to text transformation engine to automatically generate AspectJ code from UML aspect models.

**AWARDS**

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- **NDSS 2019 Distinguished Poster Presentation Award:** *For poster titled Cybercrime Investigators are Users Too! Understanding the Socio-Technical Challenges Faced by Law Enforcement.*
  - **ACM Student Research Competition / at Grace Hopper Celebration:** *The ACM Student Research Competition (SRC), sponsored by Microsoft, offers a unique forum for undergraduate and graduate students to present their original research before a panel of judges and attendees at well-known ACM-sponsored and co-sponsored conferences. My research titled: "CCINT: The Cyber-Crime INTElligence Framework for Detecting Online Radical Content" won 3rd place in the Graduate Category.*
  - **Cyber 9/12 an Atlantic Council Cyber policy competition, 2018.** *Won best policy brief which outlined cyber security policy recommendations, and qualified to semi-finals in the Cyber 9/12 Atlantic Council Cyber Policy Competition, London, UK.*
  - **Google Web Security Summit:** *Invited to the Google Web Security Summit and awarded a full scholarship to attend the summit taking place in Munich, Germany, 2018.*
  - **HutZero Cyber Security Entrepreneurship Bootcamp, 2018** London, UK
  - **Honoured by HRH Prince Mohammed bin Nawaf Al Saud Ambassador of the Kingdom of Saudi Arabia in the UK:** *I was honoured as a distinguished student by the Saudi Embassy to recognize excelling students in the UK, 2017.*
  - **C2C Cyber Security / Capture the flag competition:** *C2C is a 3-day cybersecurity challenge held in Cambridge University between selected students from USA and UK universities. My team won 1st place for cracking enigma*

*challenge and ranked 2nd place during the third-day challenges which included forensic and network attack/defence challenges.*

- **McKinsey Women Leadership Award / Next Generation Women Leaders:** *Awarded the NGWL award by Mckinsey in 2016. This award had a 10% acceptance rate which was granted to young women exhibiting promising leadership skills from Europe, Asia, and the Middle East.*
- **Google Grant / Conference and Travel Grant:** *Awarded the Google Travel and Conference Grants to attend security conference HITBSECCONF in Amsterdam, 2016.*
- **Awarded a full graduate scholarship** *from the King Abdulaziz City for Science and Technology, 2014*
- **Best Paper Award / European Group on Decision Support Systems:** *Won the best paper award in the EURO Working Group on Decision Support Systems (EWG-DSS) which took place in Thessaloniki, 2013. Paper titled: A Collaborative Web-based Decision Support Platform for Planning Complex Engineering Systems: A Design and Architecture Framework.*
- **Best Undergraduate Project / King Saud University:** *Won the best graduate project award from the Information Technology Department at King Saud University. This qualified us to a college-wide competition sponsored by Advanced Electronics Company where we won 3rd place.*

## EXTRA-CURRICULAR ACTIVITIES

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- **Secretary of the Oxford Arab Society, 2019.** The society aims to bring together Arab students at the university and organize several academic, and social events.
- **President of the Oxford Saudi Student Society, 2018.** The society aims to bring together Saudi students in Oxford and organize several academic, and social events.
- **Organizing Committee member of Oxford Women in Computer Science Society (OxWoCS)** Active member of the OxWoCS society for 3 years (2015-2017), holding different roles including organizing industry events, hosting academic seminar series, and doing outreach activities.
- **Saudi Federation for Cyber Security, Programming, and Drones** Invited to the first working group held by the federation and participated in defining the vision and goals of the federation, and organize local efforts under its umbrella.
- **Volunteered with the InspireHer Initiative** supported by Google, to educate young girls on computer science and maths concepts by teaching them how to program a Sphero robot in a fun interactive environment.
- **Organizing Committee member - Early-Careers Researchers Symposium** in Oxford. The symposium aims to bring together researchers from across the university to share their work in the area of Cyber Security.
- **Volunteered with the Interface Magazine**, a student-run online magazine published by the Saudi Cultural Bureau in UK, 2016. Holding the roles of photographer, and reporter. Helped increase the number of followers by 40%.
- **Volunteered in an outreach program** to talk to high school students to encourage them to pursue STEM studies during the Women in Computer Science Event at Oxford University, 2016.
- **Global Foundation for Cyber Studies and Research, Washington, D.C. USA - Research Member**
- **Institute of Electrical and Electronics Engineers (IEEE) – Member**
- **Association for Computing Machinery (ACM) – Member**
- **Institute of Information Security Professionals (IISP) – Member**
- **Women in Cyber Security international community – Member**
- **Hemaya Saudi Group for Information Assurance (<http://hemayagroup.org>) – Member**
- **CompTIA Security+ Certified**

## PUBLICATIONS

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### Books

- **2015** D. Mouheb, M. Debbabi, M. Pourzandi, L. Wang, **M. Nouh**, R. Ziarati, D. Alhadidi, C. Talhi, and V. Lima. Aspect-Oriented Security Hardening of UML Design Models, 256 pages, Springer. ISBN: 978-3319161051.  
<http://www.springer.com/us/book/9783319161051>

### Book Chapters

- **2013** **M. Nouh**, A. Alabdulkareem, W. Gowharji, A. Alfaris, A. Sanchez. A Web-based Decision Support Platform for Multidimensional Modeling of Complex Engineering Systems. Lecture Notes in Business Information Processing (LNBIP), Impact of the Web of Things in Decision Support Systems for Global Environments).
- **2010** D. Mouheb, C. Talhi, **M. Nouh**, V. Lima, M. Debbabi, L. Wang, and M. Pourzandi. 2010. Aspect-Oriented Modeling for Representing and Integrating Security Concerns in UML. In Proceedings of the 8th ACIS Conference on Software Engineering, Research, Management, and Applications (SERA'2010), Studies in Computational Intelligence Series, Volume 296/2010, Pages 197-213, DOI: 10.1007/978-3-642-13273-5\_13, 2010, Springer.

### Journals

- 2020 M.Nouh, J.R.C. Nurse, and M. Goldsmith. On Understanding Extremist Narrative: Comparative Linguistic Analysis of Extremist Propaganda. *New Media & Society*. (Under Submission)
- 2016 A. Almaatouq, E. Shmueli, M. Nouh, A. Alabdulkareem, V. K. Singh, M. Alsaleh, A. Alarifi, A. Alfaris, and A. S. Pentland. "If it looks like a spammer and behaves like a spammer, it must be a spammer: analysis and detection of microblogging spam accounts," *International Journal of Information Security*, pp. 1–17, 2016.
- 2014 D. Mouheb, D. Alhadidi, M. Nouh, M. Debbabi, L. Wang, and M. Pourzandi. Aspect-Oriented Modeling Framework for Security Hardening. *Innovations in Systems and Software Engineering Journal*, Volume 12, Issue 1, pp 41-67, 2016.
- 2011 D. Mouheb, C. Talhi, M. Nouh, V. Lima, M. Debbabi, L. Wang, and M.Pourzandi. Aspect-Oriented Modeling for Representing and Integrating Security Concerns in UML. In *International Journal of Computer and Information Sciences (IJCIS)*, Volume 12, Number 1, Pages 1-10, 2011, ISSN: 1525-9293.

#### Conferences & Workshops

- 2019 M. Nouh, J. R. C. Nurse, and M. Goldsmith. *Understanding the Radical Mind: Identifying Signals to Detect Extremist Content on Twitter*. IEEE International Conference on Intelligence and Security Informatics (ISI), July 2019
- 2019 M. Nouh, J. R. C. Nurse, Helena Webb, and M. Goldsmith, *Cybercrime Investigators are Users Too! Understanding the Socio-Technical Challenges Faced by Law Enforcement*. Workshop on Usable Security and Privacy (USEC) Internet Society, San Diego, California, Feb 24, 2019. ISBN 1-891562-57-6  
<https://dx.doi.org/10.14722/usec.2019.23032>
- 2016 M. Nouh, J. R. C. Nurse and M. Goldsmith, Towards Designing a Multipurpose Cybercrime Intelligence Framework, European Intelligence and Security Informatics Conference (EISIC), Uppsala.
- 2015 M. Nouh and J. Nurse. Identifying Key-Players in Online Activist Groups on Facebook Social Network. In IEEE 15th International Conference on Data Mining (ICDM) Workshop on Intelligence and Security Informatics. IEEE Computer Society. November 14, 2015.
- 2013 M. Nouh, A. Almaatouq, A. Alabdulkareem, V. Singh, E. Shmueli, M. Alsaleh, A. Alarifi, A. Alfaris, and A. S. Pentland, Social Information Leakage: Effects of Awareness and Peer Pressure on User Behavior. *HCI International 2014*
- 2013 A. Almaatouq, A. Alabdulkareem, M. Nouh, M. Alsaleh, A. Alarifi, A.Sanchez, A.Alfaris, J. Williams. 2013. A Malicious Activity Detection System Utilizing Predictive Modeling in Complex Environments. IEEE Consumer Communications and Networking Conference (CCNC'13).
- 2013 M. Nouh, M. Hadhrawy, A.Sanchez, A.Alfaris. 2013. Towards Cloud-based Decision Support Platform for Group Decision Making. IEEE International Conference on Systems, Man, and Cybernetics (SMC'13).
- 2013 M. Nouh, M. Hadhrawy, A.Sanchez, A.Alfaris. 2013. A Collaborative Web-based Decision Support Platform for Planning Complex Engineering Systems: A Design and Architecture Framework. EURO Working Group on Decision Support Systems Workshop (EWG-DSS Thessaloniki-2013). (Best Paper Award.)
- 2013 M.Hadhrawi, M.Nouh, A.Alfaris, A.Sanchez. 2013. CPI: A Web-based Multi-user Collaborative Planning, Decision Support and Visualization Interface. *HCI International '13*, July 21–26, 2013, Las Vegas, Nevada, USA.
- 2012 D. Mouheb, D. Alhadidi, M. Nouh, M. Debbabi, L.Wang, M.Pourzandi. 2012. Aspect Weaving in UML Activity Diagrams: A Semantic and Algorithmic Framework. In the Proceedings of the 7th International Workshop on Formal Aspects of Component Software (FACS 2010), October 14-16, 2010, Guimaraes, Portugal, Lecture Notes in Computer Science, LNCS, Pages 182-199, Springer Berlin Heidelberg.
- 2010 M. Nouh, R. Ziarati, D. Mouheb, D. Alhadidi, M. Debbabi, L. Wang, and M. Pourzandi. 2010. Aspect Weaver: A Model Transformation Approach for UML Models. In the Proceedings of the 20th Annual International Conference on Computer Science and Software Engineering of the IBM Centers for Advanced Studies (CASCON 2010), November 1-4, 2010, Toronto, Ontario, Canada.

#### Posters

- 2019 M. Nouh, J. R. C. Nurse and M. Goldsmith. *Cybercrime Investigators are Users Too! Understanding the Socio-Technical Challenges Faced by Law Enforcement* at the Network and Distributed System Security Symposium (NDSS) (*Distinguished Poster Presentation Award*)
- 2018 M. Nouh, J. R. C. Nurse and M. Goldsmith. *Applying Machine Learning to Detect Evidence of Online Radical Behavior*. AI@Oxford: Artificial Intelligence at Oxford Conference
- 2017 M. Nouh, J. R. C. Nurse and M. Goldsmith, "CCINT: The Cyber-Crime INTelligence Framework for Detecting Online Radical Content, Grace Hopper Celebration Conference (GHC), Orlando, USA. October 2017.
- 2017 M. Nouh, J. R. C. Nurse and M. Goldsmith, POSTER: Detection of Online Radical Content Using Multimodal Approach, IEEE Euro S&P, Paris, France. April 2017.

#### Invited Talks

- 2020 مواجهة الشائعات في اوقات الأزمات. جمعية المكتبات و المعلومات السعودية
- 2019 Understanding Cybercrime for Better Policing: Regional and Global Challenges, at Chatham House The Royal Institute for International Affairs, London, UK
- 2019 Panel discussion on Cyber Security and Emerging Online threats, Manchester, UK