

Yehia Elrakaiby

CONTACT INFORMATION

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MAIN COMPETENCIES

Security & Privacy, Access & Usage Control, Network Security, Model-Driven Security Engineering, Business Process Compliance, Security Testing

WORK EXPERIENCE

[since May 2016]

Research Fellow at Lero, Limerick, Ireland.

- Team: Security, Privacy, Adaptation & Requirements Engineering (SPARE)
- Engineering of Adaptive Cyber Defence and Response Systems

[August 2014 - December 2015]

Scientist at Fraunhofer IESE, Kaiserslautern, Germany.

- Department: Security Engineering
- Development of the Integrated Distributed Data Usage Control Framework (IND2UCE)

[August 2011 - January 2014]

Research Associate at the [Interdisciplinary Center for Security, Reliability and Trust](#), Luxembourg, Luxembourg.

- Team: Serval - Prof. Yves Le Traon
- Application of Model Driven Techniques for Security
- Grants: AFR Postdoc Grant

[January 2006 - December 2010]

Ph.D. Candidate at TELECOM-Bretagne, Rennes, France.

- Team: SERES - Prof. Frédéric Cuppens
- Specification and Enforcement of Access and Usage Control Policies
- Grants: Brittany Region Ph.D. Scholarship

[March 2005 - October 2005]

Network Security Architect at Orange R&D Labs, Lannion, France.

- Laboratory: Network Architecture centre for Services deployment (NAS)
- Unit: Architecture & uRbanism for Converged telecom (ARC) - Gaël Fromentoux
- Network Security Analysis of France Telecom's Video on Demand (VoD) services

EDUCATION

[January 2006 - December 2010]

Ph.D. in Computer Science, **Telecom-Bretagne**, France.

- Thesis Topic: *Specification and Management of Obligations for Usage Control*
- Advisers: Prof. Frédéric Cuppens, Dr. Nora Cuppens-Boulahia
- Keywords: Security Models, Policy Languages, Usage Control, Access Control

[September 2003 - September 2005]

Diplôme d'Ingénieur (M.Sc.), **Telecom-Bretagne**, France.

- Department: Network, Security and Multimedia (RSM)
- Specialization: Network and System Security
- Keywords: Network Protocols, Network Security, System Security

[September 1998 - July 2003]

BSc in Electrical Engineering, **Cairo University**, Egypt.

- Department: Electronics & Electrical Communications Engineering Department

- Keywords: Electronics, Communications, Electrical Circuits, Signal Processing, Electromagnetics, Control Systems, Computer Networks, C++.

PROJECTS
EXPERIENCE

Engineering of Adaptive Cyber Defense and Response Systems

- Definition of a formal framework for reasoning about attacks and selection of optimal countermeasures given the system's functional requirements.

Using Argumentation Theory to Explain Ambiguity in Requirements Elicitation

- Definition of a formal framework for modeling and reasoning about ambiguities which arise during elicitation of requirements.

Privacy Compliance and Data Usage Control in RESCUER

- Leader of the data usage control task in the FP7 project RESCUER,
- Analysis of European privacy regulations and directives such as the Data Protection Directive 95/46/EC,
- Definition of privacy and data usage control requirements for RESCUER,
- Conception of a technical architecture for enabling compliance with privacy and usage control requirements.

Privacy Enforcement and Data Usage Control for an Industrial IoT platform

- Integration of Fraunhofer's IND2UCE data usage control framework with a major German company's IoT platform,
- Definition and implementation of techniques for ensuring the scalability and performance of the data usage control solution.

Security@Runtime: A Tool for Enforcement of Usage Control Requirements in Java Applications

- Definition of a Domain-Specific modeling Language (the *security@runtime* DSL) and an application-independent non-intrusive architecture to enable the high-level specification, enforcement and runtime updating of security requirements in Java applications,
- Implementation of a tool comprising of a Policy Administration Point (PAP), a Policy Enforcement Point (PEP) and a Policy Decision Point (PDP) using *emfText*, Java, *AspectJ* and *XSB Prolog*.

Dynamic Analysis of Usage Control Policies

- Specialization of the action language C^+ to allow the expression of usage controls in dynamic systems,
- Formalization of usage control enforcement mechanisms and formal verification and analysis of usage control policies properties using model checking to ensure policy consistency and soundness.

Specification and Management of Obligations for Usage Control [Ph.D. Thesis]

- Definition of a security model and a policy language to enable expression of access and usage control requirements,
- Formalization of model semantics,
- Implementation of the model into the *MotOrBAC* tool.

Business Process Compliance

- Modeling and formalization of interactions between resources and tasks in timed business processes,
- Introduction of a language to enable the specification of resource usage constraints and to formally verify compliance of business processes with the specified resource-

usage constraints.

Security Policy Testing

- Definition of mutation operators for testing correct enforcement of obligation policies,
- Investigation of static and dynamic analysis techniques for detection of misimplemented access control enforcement mechanisms.

BGP Multi-homing and Load Balancing Solution

- Introduction of a BGP multihoming solution for autonomous systems connected to more than one Internet Service Provider,
- Implementation of a tool enabling router reconfiguration and load balancing according to the state of available links in order to ensure an efficient and reliable routing of outbound data traffic.

PUBLICATIONS LIST

Journals and Book Chapters

- Frédéric Cuppens, Nora Cuppens-Boulahia, Yehia Elrakaiby: Formal specification and management of security policies with collective group obligations. *Journal of Computer Security* 21(1): 149-190 (2013)
- Jan Broersen, Stephen Cranefield, Yehia Elrakaiby, Dov M. Gabbay, Davide Grossi, Emiliano Lorini, Xavier Parent, Leendert W. N. van der Torre, Luca Tummolini, Paolo Turrini, Francois Schwarzentruher: Normative Reasoning and Consequence. *Normative Multi-Agent Systems (2013)*: 33-70
- Yehia Elrakaiby, Frédéric Cuppens, Nora Cuppens-Boulahia: Formal enforcement and management of obligation policies. *Data Knowl. Eng.* 71(1): 127-147 (2012)
- Yehia Elrakaiby, Frédéric Cuppens, Nora Cuppens-Boulahia: An Integrated Approach for the Enforcement of Contextual Permissions and Pre-Obligations. *IJMCMC* 3(2): 33-51 (2011)

Conference & Workshop Papers

- Christian Jung, Denis Feth and Yehia Elrakaiby. Automatic Derivation of Context Descriptions. *IEEE International Inter-Disciplinary Conference on Cognitive Methods in Situation Awareness and Decision Support. IEEE, CogSIMA 2015.*
- Donia El Kateb, Yehia Elrakaiby, Tejeddin Mouelhi, Iram Rubab and Yves Le Traon. Towards a Full Support of Obligations In XACML. *Risks and Security of Internet and Systems. Springer International Publishing, CRiSIS 2014.* 213-221.
- Yehia Elrakaiby and Jun Pang. Dynamic Analysis of Usage Control Policies. *SECURITY 2014.*
- Pouyan Ziafati, Yehia Elrakaiby, Mehdi Dastani, Leendert van der Torre, Marc Van Zee, Jon-Jules Meyer and Holger Voos: Reasoning on Robot Knowledge from Discrete and Asynchronous Observations. *Knowledge Representation and Reasoning in Robotics Symposium at AAAI Spring Symposium Series 2014.*
- Yehia Elrakaiby, Moussa Amrani, Yves Le Traon. *Security@Runtime: A Flexible MDE approach to Enforce Fine-grained Security Policies. ESSoS 2014.*
- Silvano Colombo Tosatto, Yehia Elrakaiby, Pouyan Zyafiti. Compliance in Resource-based Process Models. *BNAIC 2013.*

- Diego Ambrossio, Alessio Antonini, Yehia Elrakaiby, Dov M. Gabbay, Marc van Zee. Argument Revival in Annotated Argumentation Networks. ARGAIIP 2013.
- Yehia Elrakaiby, Yves Le Traon. A PEP-PDP Architecture to Monitor and Enforce Security Policies in Java Applications. FARES 2013.
- Donia Elkateb, Yehia Elrakaiby, Tejeddine Mouelhi and Yves Le Traon. Access Control Enforcement Testing. AST 2013.
- Yehia Elrakaiby, Tejeddine Mouelhi, Yves Le Traon: Testing Obligation Policy Enforcement Using Mutation Analysis. Mutation Workshop, ICST 2012.
- Yehia Elrakaiby, Frédéric Cuppens, Nora Cuppens-Boulahia: From Contextual Permission to Dynamic Pre-obligation: An Integrated Approach. ARES 2010.
- Stere Preda, Frédéric Cuppens, Nora Cuppens-Boulahia, Joaquin Garca-Alfaro, Laurent Toutain, Yehia Elrakaiby: Semantic context aware security policy deployment. ASIACCS 2009.
- Yehia Elrakaiby, Frédéric Cuppens, Nora Cuppens-Boulahia: From state-based to event-based contextual security policies. ICDIM 2009.
- Yehia Elrakaiby, Frédéric Cuppens, Nora Cuppens-Boulahia: Formalization and Management of Group Obligations. POLICY 2009.
- Yehia Elrakaiby, Frédéric Cuppens, Nora Cuppens-Boulahia: Interactivity for Reactive Access Control. SECURECRYPT 2008.

TECHNICAL SKILLS **A solid background in imperative and declarative programming languages, formal methods, networks and Model-Driven Engineering**

Functional and Logic Programming

- Java, C, C++, Visual C++, VBA, AspectJ, Jess, Drools, Matlab and Prolog

Networks and Network Security

- Ethernet, TCP/IP, IPv6, RIP, OSPF, BGP, SIP, HTTP, HTTPS, TLS, IPsec, Firewalls, IDS, IPS

Formal Modeling Languages and Techniques

- Propositional Logic, First-order Logic, Temporal Logics, Situation Calculus, Event Calculus, Action Languages, Non-monotonic Logics, Argumentation Theory, Planning, (Probabilistic) Model Checking and Markov Models

Databases

- Deductive Databases, Active Databases, MySQL

Operating Systems

- Microsoft Windows, Mac OS, Linux