

# Ranwa Al Mallah

**COMPUTER ENGINEER, Ph.D.**

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♥ Montreal, Quebec, Canada



## EDUCATION

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- October 2018     **Ph.D. in Computer and Software Engineering**  
Polytechnique Montréal  
Thesis: "Road Traffic Congestion Analysis via Connected Vehicles"  
Research domains: Artificial Intelligence, Computer Networks, Connected/Smart Vehicles, Cybersecurity, Cyber-Physical Systems, IoT and Telecommunications.
- January 2008    **M.A.Sc. in Computer and Software Engineering**  
Networking - Polytechnique Montréal
- January 2003    **B. ING. in Electrical Engineering**  
Telecommunications - Polytechnique Montréal
- June 1998       **College diploma - DEC**  
Natural Science - Bois-de-Boulogne College



## PUBLICATIONS

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- "Prediction of traffic flow via connected vehicles." *IEEE Transactions on Mobile Computing*. **Ranwa Al Mallah**, Alejandro Quintero, Bilal Farooq. 2020.
- "Cooperative Evaluation of the Cause of Urban Traffic Congestion via Connected Vehicles." *IEEE Transactions on Intelligent Transportation System* 21(1), 59-67. **Ranwa Al Mallah**, Bilal Farooq, Alejandro Quintero. 2019.
- "Distributed Classification of Urban Congestion Using VANET." *IEEE Transactions on Intelligent Transportation Systems* 18 (9), 2435-2442. **Ranwa Al Mallah**, Bilal Farooq, Alejandro Quintero. 2016.
- "Actor-based Risk Analysis for Blockchains in Smart Mobility." *In Proceedings of the 3rd Workshop on Cryptocurrencies and Blockchains for Distributed Systems@Mobicom*. **Ranwa Al Mallah**, Bilal Farooq. 2020.
- "Analyzing the Resiliency of Microgrid Control Algorithms Against Malicious Input." *In 2020 IEEE Canadian Conference on Electrical and Computer Engineering CCECE*. Christopher Neal\*, **Ranwa Al Mallah**, Jose Fernandez, and Andrea Lodi. 2020.
- "QoS-Aware Adaptive Resource Allocation Framework in the Integrated SDN Transport and IoT." Accepted in the *Fourteenth International Conference on Mobile Ubiquitous Computing, Systems, Services and Technologies UBICOMM 2020*. Atefeh Meshinchi\*, **Ranwa Al Mallah**, Alejandro Quintero. 2020.
- "Status-aware and SLA-aware QoS Routing Model For SDN Transport Network." Accepted in the *Fourteenth International Conference on Mobile Ubiquitous Computing, Systems, Services and Technologies UBICOMM 2020*. Atefeh Meshinchi\*, **Ranwa Al Mallah**, Alejandro Quintero. 2020.
- "Protecting The Internet of Vehicles against Advanced Persistent Threats: A Bayesian Stackelberg Game." Accepted in *IEEE Transactions on Reliability*. Talal Halabi, Omar Abdel Wahab, **Ranwa Al Mallah**. 2020.
- "A Light-Weight Service Discovery Protocol for Ad-Hoc Networks." *Journal of Computer Science* 5(4):330-7. **Ranwa Al Mallah**, Bilal Farooq, Alejandro Quintero. 2009.

## ON-GOING RESEARCH

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- "Untargeted Poisoning Attack Detection via Blockchain in Federated Learning." *Under-review in IEEE Symposium on Security & Privacy*. **Ranwa Al Mallah**, David Lopez, Bilal Farooq.
- "A Minimax Game for Resilient-by-design Adaptive Traffic Control Systems." *Under-review in IEEE Transactions on Dependable and Secure Computing*. **Ranwa Al Mallah**, Talal Halabi, Bilal Farooq.
- "Cyber-Security Risk Assessment Framework for Blockchains in Smart Mobility." *Under-review in Digital Communications and Networks*. **Ranwa Al Mallah**, David Lopez, Bilal Farooq.
- "Reinforcement Learning Agent-based to attack on Adaptive Traffic Control Systems." *Writing in progress*. Antonio Dominguez\*, José M. Fernandez, **Ranwa Al-Mallah**, Cristina Alcaraz, and Nicolas Saunier.
- "Complete cryptographic SAT: Security in the Air using Tesla." *Writing in progress*. Mikaëla Ngamboé, Paul Berthier, **Ranwa Al Mallah**, José M. Fernandez, Jean-Marc Robert.
- "Ontology development method for a security expert system: ATOM." *Writing in progress*. Simon Malenfant-Corriveau, Mikaëla Ngamboé, **Ranwa Al-Mallah**, Michel Gagnon, José Fernandez.

### Note: \* Supervised Students

 <https://scholar.google.ca/citations?user=6aIe1BEAAAJ&hl=fr&oi=ao>

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 <https://www.linkedin.com/in/ranwa-al-mallah-b-ing-m-sc-a-ph-d-42112791/>

## SUPERVISION

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I co-supervised students on high-impact research projects with several Canadian universities, such as Polytechnique Montreal, Montreal University, and Ryerson University.

- Christopher Neal, Ph.D. candidate - Cybersecurity of Cyber-physical Systems, Energy.
- Antonio Dominguez, Master candidate - Cybersecurity of intelligent transportation systems.
- Mehdi Meshkani, Ph.D. candidate - Cybersecurity in shared mobility control algorithms.
- Godwin Badu-Marfo, Ph.D. candidate - Poisoning attacks on federated learning, behavioral defenses.
- Atefeh Meshinchi, M.A.Sc. – Software Defined Networking and Internet of Things.



## PROFESSIONAL EXPERIENCE

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**LiTrans – Laboratory of Innovations in Transportation**

**January 2020 - Present**

**Ryerson University – Toronto, Ontario**

**Post Doctoral Research Fellow**

- Research and development of cybersecurity layers in the existing blockchain framework for smart cities that is currently under development in the lab. Especially focusing on the attack and defence strategies, quantum-resistance, security-by-design, and privacy-by-design.
- Publication/presentation of research in top-tier journals and conferences and co-training of graduate students.

**Blockchain Technology Review Committee (BTRC) Consultation Program**

**August 2020 - Present**

**meshMD Inc. – Toronto, Ontario**

**Consultant**

- meshMD is a company that offers technology in the pharmaceutical industry. They plan to use blockchain to create a specific portal which will allow for the enrolment into a specialty care program for each of the viable

hepatitis C therapies on the market. We help them solve technical issues related to blockchain for streamlining reimbursement navigation and prescribing. We have the following objectives:

- Identify the appropriate blockchain network specific for addressing the associated privacy, security, management, and scalability challenges.
- Propose the appropriate roadmap and architecture for blockchain development according to the requirements.

**SecSI Security Lab, Laboratoire de Sécurité des systèmes informatiques**

**August 2018 - January 2020**

**Polytechnique Montréal – Montréal, Québec**

#### **Research Assistant**

- Research on the safety and security of cyber-physical systems, road traffic control systems, micro-grids and air traffic control. Attacks on CPS systems with reinforcement learning and defenses with game theory.
- Participation in the training of students of Professor José Fernandez.
- Leading internal discussion sessions and reading groups.
- Organising a series of seminars in which students formally present their own research results.
- Train students in technical and scientific synthesis and presentation techniques.
- Organisation of presentations to industry partners where students develop skills they will need in their professional careers, aiming more public-specific presentations.

**GENINOV Group Inc.**

**October 2008 - December 2013**

#### **R&D Engineer**

- Managing projects in partnership with a security firm - Palo Alto Perimeter Security Systems – Firewalls, under the Network and Information Systems Security Division.
- Intervene in the design, deployment, installation and commissioning of edge security systems of corporate networks.
- Structuring, and managing the progress of the consulting firm's bid to requests for proposals for telecommunication and computer projects.
- Manager for the project of interconnection of the offices of the General Administration of Customs (AGD) of the Republic of Haiti to the application server SYNODIAWORLD in operation phase using the platform of iDirect via satellite links SCPC, microwaves and fiber optics.
- Preparation and presentation of a training program regarding the maintenance and support of a Network Operating Center (NOC) and targeting computer and electrical engineers.
- Development of an application to determine the Line of Sight (LOS) of a wireless path from 3D digital maps.
- Integration of applications into a module of the 3G-4G network planning platform.
- Support and guide the work of the Working Group on Fixed and Mobile Number Portability established by the National Telecommunications Council (CONATEL) in Haiti.

**Voysis IP Solutions**

**September 2003 - September 2005**

#### **Sales Engineer**

- Writing submissions for the upgrade phone systems.
- Formulation of an Option 1 with the MSW software (Mitel Sales WorkBench) for the deployment of a telephony solution in a hotel.
- Formulated a structured sales strategy, Business Solution Engineering, with Visio's Process Planning platform.



## **TEACHING EXPERIENCE**

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**Course and lab instructor - Polytechnique Montréal**

**December 2016 - Present**

- Procedural programming in MATLAB : Introducing and explaining programming concepts, guiding large number of students and preparing exams.
- Fixed/mobile network security and Advanced concepts in computer security: Several course modules over a year.
- Introduction to computer engineering, fall and winter sessions for two years.
- Practical sessions in procedural programming: Guiding students during sessions, preparing and evaluating assignments.

## TECHNICAL SKILLS

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**Languages :** C/C++, C#, Java, Python, Javascript, PHP, SQL.

**Operation systems :** Windows, UNIX, virtualisation technologies.

**Networks and protocols :** TCP/IP, Qualnet, NS-2, SUMO, Opnet, DHCP, NAT, PoE.

**Security :** Firewall, VPN, resiliency, redundancy, WireShark.

**QoS :** high availability, bandwidth management, VLAN (IEEE802.1p/Q), QOS, TOS/Diffserv, STP, SLA.

**Artificial Intelligence:** Bayesian networks, Markov chain, Decision Tree, Randon Forest, Boosting, Neural networks, Deep learning, Multitask learning, Reinforcement learning.

**Telecommunication:** Protocols GSM and UMTS, SS7.

**Others :** Latex, AutoCad, Matlab, Visual Basic, OMNeT++, Netica, Weka, Pmtk, iTetris, cabling Cat-3/Cat-5, PBX, T1/E1, BRI, PRI, LS, PyTorch, TensorFlow, cryptography, Tesla

## INTERESTS

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- **PROFESSIONAL AFFILIATION:** Former Member of Ordre des Ingénieurs du Québec (OIQ)
- **MEMBER OF EDITORIAL BOARD:** Review Editor in Connected Mobility and Automation (specialty section of Frontiers in Future Transportation).
  - I am a member of the Editorial Board and I act as a regular reviewer for the journal of Frontiers in Future Transportation. I am responsible for assessing the rigour and validity of the research, and I work collaboratively with authors and editors to improve the manuscripts, ensuring only high-quality content is published.
- **DISTINCTIONS :**
  - **BMP innovation FRQNT-CRSNG AWARD:** The BMP is a 3-year partnership between university students and industry to make the most of the excellence of research and industrial know-how in Quebec.
  - Nominated by the pedagogical office as best lecturer for the years 2016-2017 and 2017-2018. Achieved 4.9/5.0 in student assessment of teaching.
  - Recipient of an award for the contest ‘Génie en Herbe’ in 1996.
- **REVIEWED ARTICLES:**
  - *IEEE Transactions on Intelligent Transportation Systems:* 4 papers reviewed.
  - I also reviewed one paper in each of the following journals: *Wireless Personal Communications, Journal of Physics: Conference Series, EURASIP Journal on Wireless Communications and Networking, IEEE Internet of Things Journal.*
- **SKILLS :** **Collegiality**, Scientific curiosity, Creativity, Leadership, Independent
- **OTHER :** Travelling  
Volunteering at the Montreal Children’s Hospital