國家科學及技術委員會工程司計畫主持人近五年成果績效表

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一、近五年最具代表性之學理創新/實務成果、期刊論文/書籍發表、系統應用/技術突破之表現。

Van-Linh Nguyen is a young security researcher. In **five** recent years (2018-2022), he has gained a total of **28** publications[1], where **18** journal papers are **SCI/SCIE**. He is the first author or the corresponding author in **18/28** papers. **15/18** journal papers are at Q1 ranking, top journals of his field, according WoS Journal Rankings. His achievements on the specific topics are summarized for your reference as follows.

Signal-based Tracking and Indoor Surveillance (close to the proposal's topics)

Under the same umbrella of **physical layer security** research, this branch topic covers our first attempts to successfully demonstrate the surveillance risks in indoor buildings (signal-based tracking and indoor surveillance) through AI-based radio positioning techniques. For example, First, we transform the channel state information (e.g., angle of arrival, time of arrival) from massive MIMO transmission gained over time into living Angle-Delay profiles (ADPs) with fixed objects (building walls, furniture) and a moving object (the mobile user). Second, a Spatial-Temporal Angle-Delay Analysis Scheme (STADAS) learning model is built to remove distorted data points from Angle-Delay video frames. The processed ADPs are trained with a Deep Convolutional Neural Network (DCNN)-based model on estimating the user's location. The locations are then connected together to build a user trajectory in the building through Kalman filters. The initial results from this research approach have been peer-reviewed and accepted to appear in IEEE **ICC 2023**, one of **two major conferences** in our field (besides GlobeCOM). This proposal aims to explore new security applications (i.e., building drawing map regeneration from multiple user signal heatmaps) and then explore efficient anti-surveillance schemes.

^ *means his students or co-advised students.*

1. **Van-Linh Nguyen**, Lan-Huong Nguyen^, Po-Ching Lin, Ren-Hung Hwang, '*Deep Learning-based Localization and Outlier Removal Integration Model for Indoor Surveillance*", to appear in IEEE International Conference on Communications Conference (**ICC 2023**), Rome, Italy.
2. **Van-Linh Nguyen**, Harry Wong Hung-Jun^, Yu-Chia Lin^, Ren-Hung Hwang, "*Efficient Spatial-Temporal Angle-Delay Analysis Scheme for Massive MIMO Indoor Tracking*", to appear in IEEE International Conference on Communications Conference (**ICC 2023**), Rome, Italy.
3. Lan-Huong Nguyen^, **Van-Linh Nguyen**, Yu-Hao Liu^, "*Tracking Risks from Multi-path TDoA-based Localization in Wireless Communications*", to appear in IEEE 25th International Conference on Advanced Communications Technology (**ICACT 2023**), PyeongChang, Korea.

[1] https://sites.google.com/view/nvlinh/publications

Abnormal behavior Detection and Protection Schemes

Exploring vulnerabilities of Vehicle-to-Everything (V2X) communications and proposing efficient defense are our core research. Accordingly, V2X are expected to be used widely in the coming years, particularly in locations where a vehicle's camera or radar is ineffective. However, trusting the sharing data, the control systems in such connected receivers can be trapped to change to a wrong lane or accelerate unexpectedly, and then potentially lead to a crash. The research topics of abnormal behavior includes **signal-based** misbehavior detection and **physical layer security defense** methods to enhance the trustworthiness of V2X broadcasting messages, given the presence of falsification/Sybil attacks. We found that the signal-based approach has many advantages. First, the signal source is hard to be faked, so the detection engine can easily detect sophisticated attacks like Sybil attacks. Second, it requires no additional data exchange between vehicles (extract channel information directly from communications) and thus helps to reduce communication overhead. In recent studies, we have expanded the work to support novel AI-based misbehavior detection schemes, besides a forward-looking research on 6G V2X, i.e., Zero-Touch vehicular security. The host also published the related studies in the top journals of the field, e.g., **IEEE Transactions on Vehicular Technology (TVT)**. Besides, the other notable high-impacted papers are published on **IEEE Network** and **IEEE Communications Tutorials and Surveys (COMST).** Particularly, ***the publications in IEEE Transactions, IEEE COMST, and IEEE Network are expected to be highly influential in the field***. Five typical latest papers are summarized as follows.

** means corresponding author, ^ denotes his students or assisted students.*

#	論文名稱	Paper ranking/category	IF 值	Year
1	**(NETWORK) Van-Linh Nguyen***, Ren-Hung Hwang, Po-Ching Lin, Abhishek Vyas^, Van-Tao Nguyen, "*Towards the Age of Intelligent Vehicular Networks for Connected and Autonomous Vehicles in 6G*", **IEEE Network**, to appear, **2022**	SCI/SCIE, Rank 4/156, **Q1**, in Computer Science and Information systems, top **1 %** journal	**10.693**	**2022**
2	**(S&P)** Edy Kristianto^, **Van Linh, Nguyen*,** Po-Ching Lin "*Decentralized PKI with Blockchain in V2X Communications: Promising or only Euphoria*", to appear in **IEEE Security & Privacy**, **2022**	SCI/SCIE, Rank 20/108, **Q1** in Computer Science, top 20% journal	**7.574**	**2022**
3	**(COMST) Van-Linh Nguyen**, Po-Ching Lin, Bo-Chao Cheng, Bo-Chao; Ren-Hung Hwang, Ying-Dar Lin "*Security and privacy for 6G: A survey on prospective technologies and challenges*," **IEEE Communications Surveys and Tutorials, 2021** (citation >= 80)	SCI/SCIE, Rank 1/161, Q1 in Computer Science and Information systems, **top 1%** journal	**25.25**	**2021**
4	**(TVT) Van-Linh Nguyen***, Po-Ching Lin, and Ren-Hung Hwang, "*Enhancing Misbehavior Detection in 5G Vehicle-to-Vehicle Communications*", **IEEE Transactions on Vehicular Technology**, Vol. 69, No. 9, 9417-9430, **2020** (citation >= 30)	SCI/SCIE, Rank 29/319, **Q1**, **Top #2** journal in Transportation Science & Technology	**5.978**	**2020**

5	(**COMML**) **Van-Linh Nguyen***, Po-Ching Lin, and Ren-Hung Hwang, "Multi-array relative positioning for verifying the truthfulness of V2X messages"**, IEEE Communications Letters,** Vol. 23, No. 10, pp. 1704-1707, **2020**	SCI/SCIE, Rank 28/88, Q1, in Telecommunications	**3.436**	**2020**

Intrusion Detection and Security for Connected and Autonomous Vehicles

Besides main topics on abnormal/misbehavior detection in wireless networks, the host has also published several research papers about intelligent transportation managements and intrusion detection for connected and autonomous vehicles. For example, the T-ITS paper presents an efficient path planning and traffic clear-out scheduling scheme to lessen the emergency vehicles (EVs)' travel time by estimating a list of candidate paths to the rescue spot with the estimated time of arrival at the EVs' maximum speed, regardless of the traffic conditions. After that, a vehicle clear-out process evaluates the delay time of clearing out the traffic obstacles on each path to identify the fastest driving path. Finally, the system estimates and issues the signal preemption schedules for the junctions of the selected route to coordinate the traffic flows and let the EV pass through smoothly. This approach can outperform the state-of-the-art solutions in terms of the EV's travel time reduction, particularly if the congestion appears on the selected route but is far from the departure location of the EV. The work has been published in **IEEE Transactions on Intelligent Transportation Systems (T-ITS)**. Five typical articles for this branch are as follows.

** means corresponding author, ^ denotes his students or assisted students.*

#	論文名稱	Paper ranking/category	IF 值	Year
1	Ying-Dar Lin, Ze-Yu Wang^, Po-Ching Lin, **Van-Linh Nguyen**, Ren-Hung Hwang and Yuan-Cheng Lai, "Multi-datasource Machine Learning in Intrusion Detection: Packet Flows, System Logs and Host Statistics", **Journal of Information Security and Applications** (Elsevier), **2022**	SCI/SCIE, Rank 56/156, Q1, in Computer Science, Information Systems	**3.872**	**2022**
2	Huu-Khoi Bui^, Ying-Dar Lin, Ren-Hung Hwang, Po-Ching Lin, **Van-Linh Nguyen**, and Yuan-Cheng Lai, "CREME: A toolchain of automatic dataset collection for machine learning in intrusion detection", **Journal of Network and Computer Applications** (Elsevier), 2022	SCI/SCIE, Rank 20/108, **Q1** in Computer Science, top 20% journal	**7.574**	**2022**
3	**(T-ITS) Van-Linh Nguyen**, Ren-Hung Hwang, and Po-Ching Lin "Controllable path planning and traffic scheduling for emergency services in the Internet of Vehicles", **IEEE Transactions on Intelligent Transportation Systems**, p. 1-15, Jul. **2021**	SCI/SCIE, 5/137, **Q1** Civil Engineering top 3 % journal	**6.492**	**2021**
4	**Van-Linh Nguyen**, Po-Ching Lin, Ren-Hung Hwang, "A Beamforming Signal-Based Verification Scheme for Data Sharing in 5G Vehicular Networks", **IEEE Access**, Vol. 8, **2020**	SCI/SCIE, Rank 23/155, **Q1** in Computer Science and Information Systems	**3.476**	**2020**
5	Ren-Hung Hwang, Min-Chun Peng^, Chien-Wei Huang^, Po-Ching Lin, and **Van-Linh Nguyen***, "An	SCI/SCIE, Rank 23/155, **Q1** in	**5.978**	**2020**

	unsupervised deep learning model for early network traffic anomaly detection", **IEEE Access**, Vol. 8, **2020** (citation >= 90)	Computer Science and Information Systems		

二、 近五年在人才培育、研究團隊建立及服務方面的重要貢獻及成就

The PI currently leads Cyber Information Security Lab[2], a home of eleven graduate students (2 Ph.D., 9 master) and six undergraduate students. *The project will provide vital resources to assist up to six talents to work aggressively and expand high-quality publications at his early career. Three students are expected to graduate with related topics at the end of this project period.*

In teaching, the PI currently teaches three English-taught courses (EMI courses):

- ✓ System and software security (系統和軟體安全)
- ✓ Security in wireless cellular networks (電信網路安全)
- ✓ Computer networks (電腦網路)

He also joins the efforts of the Advanced Institute of Manufacturing with High-Tech Innovations (AIM-HI) at National Chung Cheng University through the EMI (English as a Medium of Instruction) teaching framework and Featured Areas of Research (STEM program). The goal is to train domestic/international talents, particularly undergraduate/graduate students, with the cutting-edge security technologies as well as independent research skills in a highly international competitive environment. He got OUTSTANDING AWARD for Excellent Faculty Member in Research and Development in Ministry of Education and Training and Thai Nguyen University, Vietnam, 2020.

Besides actively working in research and teaching, contributing to the academic community through peer reviews is an important duty of a scholar. He has contributed many reviews for prestigious journals and conferences. Several typical records can be listed as follows.

1. **Journal paper reviewer**:
   - IEEE Journal on Selected Areas in Communications
   - IEEE Communication Magazine
   - IEEE Network Magazine
   - IEEE Transactions on Vehicular Technology,
   - IEEE Communications and Surveys Tutorials
   - IEEE Consumer Electronics Magazine
   - IEEE Vehicular Technology Magazine
   - IEEE Transactions on Emerging Topics in Computational Intelligence
   - IEEE Internet of Things Journal
   - IEEE Communication Letters
   - Vehicular Communications (Elsevier)
   - Journal of Information Science and Engineering, Scientific Reports …. and several others
2. **Conference paper reviewer**: IEEE Vehicular Technology Conference (VTC-2021 Spring/Fall), IEEE Vehicular Networking Conference (VNC), IEEE GlobeCOM, IEEE ICC
3. **Conference TPC member**: VTC-2021 Fall

Some of the above records are verified by Web of Science[3] if the journal/proceeding publishers support the connection. Generally, his early impact over time in publications, citations (~470), and reviews tends to **increase rapidly**.

[2] https://ccucyberseclab.github.io/

[3] https://www.webofscience.com/wos/author/record/1555128