

Shashi Raj Pandey

Department of Electronic Systems, Connectivity Section, Aalborg University (AAU), Denmark
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CURRENT RESEARCH	I work at the intersection of wireless networks, distributed machine learning (DML), and economics.	
ACADEMIC POSITION	Postdoctoral Researcher , Connectivity Section, AAU • Advisor: Prof. Petar Popovski • Understanding the valuation of data on learning, privacy and pricing <ul style="list-style-type: none">– Data Markets and Econometrics– Distributed ML, Semantic Communications and Causal Reasoning	Sept. 2021 - Present
INDUSTRY POSTIONS	Network Engineer , Huawei Technologies <i>Worked for Nepal Telecom 10M GSM Line Project (2G/3G)</i> Intern , Network Operations, Subisu Cablenet Pvt. Ltd., Nepal	2013 - 2016 Summer 2013
EDUCATION	Ph.D. in Computer Science and Engineering Kyung Hee University , Yugin-si, South Korea • Thesis title: Federated Learning over Wireless Networks: Incentive Design and Game-theoretic Analysis • Advisor: Prof. Choong Seon Hong B.E. in Electrical and Electronics Engineering Kathmandu University , Dhulikhel, Nepal <i>Specialization in Communication</i>	2016 - 2021 September, 2013
ACADEMIC EXPERIENCE	Aalborg University, Denmark Teaching , Dependable and Secure Distributed Systems (CE7-NDS) Student's Project Supervision , EIT-5 (Ung), CT-9 (MSc) Kyung Hee University, Networking Intelligence Lab, South Korea Graduate Research Assistant with Prof. Choong Seon Hong and Dr. Nguyen H. Tran (The University of Sydney) Kyung Hee University, DoCSE Teaching Assistant with Dr. Nguyen H. Tran (at present with The University of Sydney) <i>CSE-710100 Advanced Probability and Statistics</i> <i>CSE-710400 Queuing Theory</i> <i>CSE-710200 Optimization Theory</i> <i>CSE-840200 Network Optimization</i> <i>AMTH 1004-03 Introduction to Linear Algebra</i> • Answer student's questions and clarify them on Piazza • Coordinate for assignments and course materials	Fall 2022 2016 - 2021 2016 - 2018

- Develop new problem sets and assist for tutorials
- Manage classroom (approx. 25 students in each class)

Kyung Hee University, Networking Intelligence Lab 2016 - 2020

Fault Resilient IoT Networks, IoT Project

Ministry of Science and ICT, Republic of Korea

Collaborators: *Kyung Hee University, KAIST, Seoul National University, Data Alliance (Industry Partner)*

M2M Communication Module, System Implementation

Developed softwares:

- CoAP-based IoT Node Connection Module
Registration Number: C-2021-003005 2021
- CoAP/MQTT-based IoT Module for Network Information Collection
Registration Number: C-2021-003006 2021
- Multi-threaded Server Module
Registration Number: C-2018-029163 2018
- Raspberry Pi Module
Registration Number: C-2018-029164 2018
- Data Collection Module
Registration Number: C-2018-029165 2018
- Client Communication Module
Registration Number: C-2018-029166 2018

Kathmandu University, DoEEE 2009 - 2013

Modeling and Simulation of WiMAX/IEEE 802.16e Physical Layer

Undergraduate Final Year Research Project

*Miscellaneous Projects:

3D LED-Display, Wall Following Robot, IR Switch, Filters Design

SELECTED SCHOLARSHIPS AND AWARDS	Best PhD Thesis Nominee at Kyung Hee University, DoCSE	2021
	Excellent Paper at Korea Software Congress, KIISE	2021
	Student Best Paper Award at APNOMS	2019
	Ministry of Science and ICT Fellowship , Republic of Korea	2018 - 2021
	Brain Korea 21st Century Plus Fellowship	2018 - 2021
	Presidential Scholarship at Kyung Hee University	2016 - 2018
	Best Paper at Korea Software Congress, KIISE	2018
	Outstanding Paper at Korea Software Congress, KIISE	2017
	Honorable Award for Bravery at HUAWEI - for contribution in restoring Nepal Telecom's network services in Nepal Earthquake	2015
	Top 3 Highest Score in Huawei Nepal Engineering Foundation Exam	2014
	Best New Employee Award , Huawei Technologies Nepal Pvt. Ltd	2014
	Outstanding UNG Project Award , Nepal Telecom Authority	2013
	Nuchenarayan Ramdevi Takhache Sirapa Award	2006
	- presented to a student who secure highest academic position	
	Excellent Academic Performance Award - Gold Medalist	2006

PREPRINTS	[P6] Pandey, S.R., Nguyen, L.D. and Popovski, P., 2022. "FedToken: Tokenized Incentives for Data Contribution in Federated Learning." (NeurIPS 2022 Workshop, under review).
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- [P5] Christensen, R.B., **Pandey, S.R.**, and Popovski, P., 2022. “**Semi-Private Computation of Data Similarity with Controlled Leakage.**” (under review, *IEEE Transactions on Information Forensics & Security*)
- [P4] **Pandey, S.R.**, Pinson, P., and Popovski, P., 2022. “**Participation and Data Valuation in IoT Data Markets through Distributed Coalitions.**” (under review, *IEEE Transactions on Control of Network Systems*)
- [P3] Nguyen, M. N., Le, H. Q., **Pandey, S.R.**, and, Hong, C.S., 2022. “**CDKT-FL: Cross-Device Knowledge Transfer using Proxy Dataset in Federated Learning.**” (NeurIPS 2022, under review)
- [P2] Nguyen, L. D., **Pandey, S.R.**, Beatriz, S., Broering, A., & Popovski, P. (2021). “**A Marketplace for Trading AI Models based on Blockchain and Incentives for IoT Data**” (under review)
- [P1] Popovski, P., Chiariotti, F., Croisfelt, V., Kalør, A.E., Leyva-Mayorga, I., Marchegiani, L., Pandey, S.R., and Soret, B., 2021. “**Internet of Things (IoT) Connectivity in 6G: An Interplay of Time, Space, Intelligence, and Value.**”

JOURNAL PUBLICATIONS

*Selected Publications

- [J20] **Pandey, S.R.**, Nguyen, L.D. and Popovski, P., 2022. “**A Contribution-based Device Selection Scheme in Federated Learning.**” (in press, *IEEE Communications Letters*)
- [J19] Nguyen, M. N., **Pandey, S.R.**, Dang, T.N., Huh, E.N., Hong, C.S., Tran, N. H. and Saad, W., 2022. “**Self-organizing Democratized Learning: Towards arge-scale Distributed Learning Systems.**” (in press, *IEEE Transactions on Neural Networks and Learning Systems*).
- [J18] **Pandey, S.R.**, Nguyen, M.N., Dang, T.N., Tran, N.H., Thar, K., Han, Z. and Hong, C.S., 2020. “**Edge-assisted Democratized Learning Towards Federated Analytics.**” arXiv preprint arXiv:2012.00425. (in press, *IEEE Internet of Things Journal*)
- [J17] Zaw, C.W., **Pandey, S.R.**, Kim, K., and Hong, C.S. “**Energy-aware Resource Management for Federated Learning in Multi-access Edge Computing Systems.**”(in press, *IEEE Access*)
- [J16] Le, T.H.T., Tran, N.H., Tun, Y.K., Nguyen, M.N., **Pandey, S.R.**, Han, Z. and Hong, C.S., 2020. “**An Incentive Mechanism for Federated Learning in Wireless Cellular network: An Auction Approach.**” arXiv preprint arXiv:2009.10269. (in press, *IEEE Transactions on Wireless Communications*)
- [J15] Alsenwi, M., Tran, N. H., Bennis, M., **Pandey, S. R.**, Bairagi, A. K., and Hong, C. S., 2020. **Intelligent Resource Slicing for eMBB and URLLC Co-existence in 5G and Beyond: A Deep Reinforcement Learning Based Approach.** arXiv preprint arXiv:2003.07651. (in presss, *IEEE Transactions on Wireless Communications*)
- [J14] **Pandey, S.R.**, Kim, K., Alsenwi, M., Tun, Y.K., Han, Z. and Hong, C.S., 2020. Latency-sensitive Service Delivery with UAV-Assisted 5G Networks. 2021. (in press, *IEEE Wireless Communications Letters*)

- [J13] Tun, Y.K., Park, Y.M., Tran, N.H., Saad, W., **Pandey, S.R.** and Hong, C.S., 2020. “**Energy-efficient resource management in UAV-assisted mobile edge computing**”. *IEEE Communications Letters*.
- [J12] Manzoor, A., Kazmi, S.M., **Pandey, S.R.** and Hong, C.S., 2020. “**Contract-based Scheduling of URLLC Packets in Incumbent EMBB Traffic**”. *IEEE Access*.
- [J11] Nguyen, M. N., **Pandey, S. R.**, Thar, K., Tran, N. H., Chen, M., Saad, W., and Hong, C. S., 2020. “ **Distributed and Democratized Learning: Philosophy and Research Challenges**”. arXiv preprint arXiv:2003.09301v1. (in press, *IEEE Computational Intelligence Magazine*).
- [J10] **Pandey, S. R.*** Khan, L. U.*(*co-first author, equal contribution), Tran, N. H., Saad, W., Han, Z., Nguyen, M. N., and Hong, C. S. “**Federated Learning for Edge Networks: Resource Optimization and Incentive Mechanism**”. *IEEE Communication Magazine*, 58, no. 10 (2020): 88-93.
- [J9] **S. R. Pandey**, N. H. Tran, M. Bennis, Y. K. Tun, A. Manzoor, and C. S. Hong., 2020. “ **A Crowdsourcing Framework for On-Device Federated Learning**”. *IEEE Transactions on Wireless Communications*. DOI:10.1109/TWC.2020.2971981.
- [J8] Suhail, S., Hussain, R., Abdellatif, M., **Pandey, S.R.**, Khan, A. and Hong, C.S., 2020. “**Provenance-enabled Packet Path Tracing in the RPL-based Internet of Things**”. *Computer Networks*
- [J7] Suhail, S., **Pandey, S.R.**, and Hong, C.S., 2020. “**Using Provenance to Detect Selective Forwarding Attack in RPL-Based Internet of Things**”. *KIISE Transactions on Computing Practices*.
- [J6] Manzoor, A., Kim, K., **Pandey, S. R.**, Tran, N.H., Saad, W., Kazmi, S.A., **Pandey, S.R.** and Hong, C.S., 2020. “**Ruin Theory for Energy-Efficient Resource Allocation in UAV-assisted Cellular Networks**”. (in press, *IEEE Transactions on Communications*)
- [J5] Tun, Y.K., Ndikumana, A., **Pandey, S.R.**, Han, Z. and Hong, C.S.,. “**Joint Radio Resource Allocation and Content Caching in Heterogeneous Virtualized Wireless Networks**”. *IEEE Access*. (in press)
- [J4] Alsenwi, M., Yaqoob, I., **Pandey, S.R.**, Tun, Y.K., Bairagi, A.K., Kim, L.W., and Hong, C.S., “ **Towards Coexistence of Cellular and WiFi Networks in Unlicensed Spectrum: A Neural Networks Based Approach**”. *IEEE Access*, vol. 7, pp. 110023 - 110034, Aug. 2019.
- [J3] Tun, Y.K., Tran, N.H., Ngo, D.T., **Pandey, S.R.**, Han, Z. and Hong, C.S.,. “**Wireless Network Slicing: Generalized Kelly Mechanism Based Resource Allocation**”. *IEEE Journal on Selected Areas in Communications*, Vol. 37, pp. 1794-1807, July. 2019.
- [J2] Manzoor, A., Tran, N.H., Saad, W., Kazmi, S.A., **Pandey, S.R.** and Hong, C.S., 2018. “**Ruin Theory for Dynamic Spectrum Allocation in LTE-U Networks**”. *IEEE Communications Letters*, 23(2), pp.366-369.
- [J1] **Pandey, S.R.**, Suhail, S. and Hong, C.S., 2017, December. “**Q-learning Sup-**

plemented Crowdsensing Framework for Resource Constrained Devices”. *KIISE Transactions on Computing Practices*, 24(7), pp. 1239-1241.

CONFERENCE *Selected Publications
PUBLICATIONS

[C9] Pandey, S.R., Kim, K., Alsenwi, M., Tun, Y.K. and Hong, C.S., 2021, February. **“A Crowd-enabled Task Execution Approach in UAV Networks Towards Fog Computing”**. In 2021 IEEE International Conference on Big Data and Smart Computing (BigComp). 17–20 January, Jeju Island, South Korea. (Selected for Oral Presentation)

[C8] Alsenwi, M., Tun, Y.K., Pandey, S.R., Ei, N.N. and Hong, C.S., 2020, January. **“UAV-Assisted Multi-Access Edge Computing System: An Energy-Efficient Resource Management Framework”**. In 2020 International Conference on Information Networking (ICOIN) (pp. 214-219). Barcelona, Spain.

[C7] S. R. Pandey, N. H. Tran, M. Bennis, Y. K. Tun, Z. Han, and C. S. Hong. **“Incentivize to Build: A Crowdsourcing Framework for Federated Learning”**. IEEE Global Communications Conference (GLOBECOM), Waikoloa, HI, USA, 9 - 13 December 2019. (Selected for Mobile Wireless Networks Interactive Presentation Session)

[C6] Alsenwi, M., Tun, Y.K., Pandey, S.R., and Hong, C.S., 2019, January. **“A Hopfield Neural Networks Based Mechanism for Coexistence of LTE-U and WiFi Networks in Unlicensed Spectrum”**. In 2017 20th Asia-Pacific Network Operations and Management Symposium (APNOMS). IEEE. 18 - 20 September, Matsue, Japan. (**Student Best Paper Award**)

[C5] Tun, Y.K., Alsenwi, M., Pandey, S.R., Zaw, C.W. and Hong, C.S., 2019, January. **“Energy Efficient Multi-Tenant Resource Slicing in Virtualized Multi-Access Edge Computing”**. In 2017 20th Asia-Pacific Network Operations and Management Symposium (APNOMS). IEEE. 18 - 20 September, Matsue, Japan.

[C4] Alsenwi, M., Pandey, S.R., Tun, Y.K., Kim, K.T. and Hong, C.S., 2019, January. **“A Chance Constrained Based Formulation for Dynamic Multiplexing of eMBB-URLLC Traffics in 5G New Radio”**. In 2019 International Conference on Information Networking (ICOIN) (pp. 108-113). IEEE. Kuala Lumpur, Malaysia. (Selected for Oral Presentation)

[C3] Tun, Y.K., Pandey, S.R., Alsenwi, M., Zaw, C.W. and Hong, C.S. 2019, January. **“Weighted Proportional Allocation Based Power Allocation in Wireless Network Virtualization for Future Wireless Networks”**. In 2019 International Conference on Information Networking (ICOIN) (pp. 284-289). IEEE. Kuala Lumpur, Malaysia. (Selected for Oral Presentation)

[C2] Pandey, S.R., Alsenwi, M., Tun, Y.K. and Hong, C.S., 2019, February. **“A Downlink Resource Scheduling Strategy for URLLC Traffic”**. In 2019 IEEE International Conference on Big Data and Smart Computing (BigComp) (pp. 1-6). Kyoto University, Kyoto, Japan. (Selected for Oral Presentation)

[C1] Pandey, S.R. and Hong, C.S., 2018, January. **“Response Driven Efficient Task Load Assignment in Mobile Crowdsourcing”**. In 2018 International Conference on Information Networking (ICOIN) (pp. 442-446). IEEE. Chiang Mai, Thailand.

PATENTS

[P2] **Pandey, S. R.**, Suhail, S., et.al., “**Smart Contract-based Method and System for Purchasing Resources for Seamless Media Streaming at Mobile Edge**”. Reg. No. 1024351880000. KIPO. 2019. November. (Granted)

[P1] Suhail, S., **Pandey, S. R.**, Kim, Young-ki, and Hong, C.S., “**Method for Estimating Integrity of Packet in Sensor Network**”. Reg. No. 1019482140000. KIPO. 2019. February. (Granted)

MEMBERSHIP AND ACADEMIC SERVICE

Reviewer, IEEE JSAC Series on ML4ComNet

Reviewer, IEEE JSAC-SI- EDL

Reviewer, IEEE Network

Reviewer, IEEE TWC

Reviewer, IEEE TNNLS

Reviewer, IEEE TCCN

Reviewer, IEEE TPDS

Reviewer, IEEE TVT

Reviewer, IEEE Communications Letters

Reviewer, IEEE Access

Reviewer, Journal of Communications and Networks

Reviewer, IEEE ICC, GLOBECOM, 5G-WF, SmartGridComm, IWCMC

Technical Program Committee, IEEE GLOBECOM 2022 NextGRAN Workshop, ACM EmeRTeS 2023 (Co-located with ACM ICDCN), ICN 2020, ICN 2021

Editorial Staff, IEEE The Institute’s Editorial Advisory Board 2022-2024

Member-at-Large, IEEE ComSoc On-line Content Board 2021-Present

Member-at-Large, IEEE ComSoc YP 2019-2021

IEEE Member 2020 - present

IEEE ComSoc Member 2020 - present

Registered Engineer, Category A, NEC, Reg. **1002** 2013

University Coordinator, SONSIK 2018 - 2020

Editor, “Tech-Brief Newsletter”, SEEE, KU 2012

Contributor, “Encipher 2012”, KU 2012

Executive Member, Society of Electrical and Electronic Engineering (SEEE) 2011

Coordinator, Eco-Active Forum, KU 2010

Member, Amnesty International, KU Youth Network

Member, Youth Redcross Circle, KU

Lifetime member, NIST Alumni Association