

# Shashi Raj Pandey

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

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

**Kyung Hee University, Networking Lab** 2016 - Present

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

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

<b>PREPRINTS</b>	[P6] Pandey, S.R., Nguyen, L.D. and Popovski, P., 2022. <b>"FedToken: Tokenized Incentives for Data Contribution in Federated Learning."</b> (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