ERCIM fellowship Programme
Final scientific report

ERCIM
European Research Consortium
for Informatics and Mathematics

ERCIM Alain Bensoussan Fellowship Programme

Fellow	Nishu/**Gupta**

Host Organisation	VTT Technical Research Centre of Finland Ltd., Oulu, Finland

Scientific coordinator	
	Jukka/**Mäkelä**

I – SCIENTIFIC ACTIVITY DURING YOUR FELLOWSHIP

During the fellowship, I

(i)   Worked as a scientific member of a research team focusing on Future communication technologies.

(ii)   Participated working with topics related to Eware-6G project (https://www.eware6g.com/), a co-innovation project focusing on Mobile Radio Access network, applications and devices as well efficient use of edge processing and renewable energy sources.

(iii)   Organized an international workshop (https://cnl.fi/eware-2024/)

(iv)   Worked towards the solution to look after the whole end-to-end data path to have more holistic view on the energy consumption.

(v)   Collaborated with various research/academic partners to mobilize research and development activities in the research group.

II – PUBLICATION(S) DURING YOUR FELLOWSHIP

1. Mikko Uitto, Jukka Mäkelä, Olli Apilo, Seppo Rantala, Jarno Pinola, Nishu Gupta, "Study and analysis of runtime energy consumption in cellular 5G network: An empirical approach", under review in *IET Communications*.

2. Nishu Gupta, Jukka Mäkelä, Arun Prakash, "Channel Prediction for Resource Allocation in 5G Massive Machine-Type Communications using Graph Neural Network", *in press*, presented at the 7th International Conference on VLSI, Communication and Signal Processing (VCAS 2024) held at Motilal Nehru National Institute of Technology Allahabad, India during 25-27 October, 2024.

3. Surjeet, Nishu Gupta, Manuel J. C. S. Reis, Jukka Mäkelä, "Optimal Capacity Utilization in 5G Enabled Mobile Ad hoc Network with Adaptive Contention Window Management and Blockchain-Secured Medium Access Control Mechanism", under review in *Transactions on Emerging Telecommunications Technologies, Wiley*.

4. Surjeet, M. Ravisankar, Shashi Kant Dargar, Nishu Gupta, Jukka Mäkelä, "Multi-Scale Path Attention Residual Network -Driven Smart Congestion Control in 5G/6G Networks", under review in *IEEE Transactions on Wireless Communications*.

5. M. Uitto, O. Apilo, J. Koivisto and N. Gupta, "Towards Energy-Aware Video Streaming in 5G/B5G - Application Perspective", submitted to European Conference on Networks and Communications (EuCNC'25) & 6G Summit, to be held at Poznan, Poland during 3-6 June, 2025.

6. Nimisha Rajput, Amit Kumar, Raghavendra Pal, Nishu Gupta, Mikko Uitto, Jukka Mäkelä, "Reinforcement Learning-Driven Protocol for Enhanced Border Surveillance with Extended Wireless Sensor Network Lifespan", under review in *CMES-Computer Modeling in Engineering & Sciences under SI: Next-Generation Intelligent Networks and Systems: Advances in IoT, Edge Computing, and Secure Cyber-Physical Applications*.

7. Nishu Gupta, Rakesh Ranjan, Vivek Srivastava, Jukka Mäkelä, "AI-Driven Resource Allocation and Interference Cancellation in Energy-Harvesting Relay Networks for Narrowband IoT", *pending for submission.*
8. Nishu Gupta, Jukka Mäkelä, Mikko Uitto, Mauro Mazzei, "Optimized K-means Routing Protocol with Black Winged Kite Algorithm for Sustainable 5G/6G Sensor Networks", *pending for submission*.

III – ATTENDED SEMINARS, WORKHOPS, CONFERENCES

1. I attended and presented a research article during the 7th International Conference on VLSI, Communication and Signal Processing (VCAS 2024) held at Motilal Nehru National Institute of Technology Allahabad, India during 25-27 October, 2024.
2. I chaired and attended the International Workshop on Energy-Aware Mobile IoT (Eware-IoT 2024, https://cnl.fi/eware-2024/) held in Oulu, Finland, on 19 November, 2024.

IV – RESEARCH EXCHANGE PROGRAMME (REP)

I visited IASI, Institute of Systems Analysis and Computer Science, CNR, Italian National Research Council, Rome, Italy as part of the REP, under the supervision of Dr. Mauro Mazzei. Duration of my visit was from 2nd December 2024 to 10th December 2024.