

FACULTY PROFILE AND LIST OF PUBLICATIONS

Name		Dr. Arvind Selwal	Photograph
Designation	Assistant Professor		
Correspondence Address	Department of Computer Science and IT, Central University of Jammu, Bagla (Rahya-Suchani), Distt. Samba, Jammu & Kashmir, India-181143		
Phone Number	9896262552, 8307737229		
Office	-		
Mobile	9896262552		
Email	arvind.csit@gmail.com, arvind.cuj@gmail.com		
Web-Page	http://cujammu.ac.in//5084		
Educational Qualifications:			
Degree/ Exams	University/ Institution	Subjects	
B.Tech. (CSE) (with Honours)	Kurukshetra University, Kurukshetra, Haryana, India	Computer Science and Engineering	
M.Tech. (CSE) (Gold medal)	Kurukshetra University, Kurukshetra, Haryana, India	Computer Science and Engineering	
Ph.D (CSE)	Punjab Technical University, Jalandhar, Punjab, India	Enhancing Template Database Security and Performance in Multimodal Biometric Systems	
UGC(NET), 2012,2013, 2014	University Grant Commission	Computer Science and Applications	
GATE	Conducted by various IITs.	Computer Science and Engineering	
Career Profile:			
<p>Dr. Arvind Selwal is presently working as Assistant Professor in the Department of Computer Science and Information Technology, Central University of Jammu, India, since 2013. He has more than 12 years of experience in teaching and research. His research interests include biometric security, pattern recognition, digital image processing, computer vision, machine & deep learning, and soft computing. He has contributed more than 72 research articles in various reputed International journals/conference proceedings/book chapters that are indexed in databases such as Web of Science, Scopus, DBLP, and etc. He has served as a member of technical programme committee (TPC) in many reputed international conferences. He also serves as a reviewer of several international Journals that are published by reputed publishers such Springer, Elsevier, IEEE and etc. He has supervised 01 Ph.D and 29 M.Tech students and currently supervising 03 Ph.D. scholars 03 M.Tech Students. He has authored a book titled “Fundamentals of Automata Theory and Computation” and co-editor of a book titled “Data Science and Innovations for Intelligent Systems Computational Excellence and Society 5.0” by Taylor and Francis. Besides a resource person in many reputed workshops/FDPS, He is also a keen learner and enhances his skills by continuously participating in reputed international Conferences/ workshops. He is an active member of IEEE biometric council and Computer Society of India (CSI). Presently, He is undertaking two research projects as PI/Co-PI on the topic computational security from funding agencies like DRDO, Ministry of Defence (Government of India) New Delhi, India. He has published one Indian Patent in 2022. His Google Scholar’s i-10 index =19 and h-index =14.</p>			
Areas of Interest / Specialization:			
Biometrics security, Pattern Recognition, Video and Digital Image Processing, computer vision,			

Machine/Deep Learning, Lightweight cryptography, Image Steganalysis.

Research Guidance:

- **M.Tech. Dissertations guidance:** Supervised -29, Ongoing-03
- **Ph.D guidance.:** Ongoing 03: (Supervisor :02 and Co-supervisor:01)

SCI indexed Research Articles

1. Deepika Sharma, **Arvind Selwal**: *FinPAD: State-of-the-art of fingerprint presentation attack detection mechanisms, taxonomy and future perspectives*, *Pattern Recognition Letters (Elsevier)*, Volume 152, 2021, Pages 225-252, ISSN 0167-8655, <https://doi.org/10.1016/j.patrec.2021.10.013>. [**SCI, IF=5.1**].
2. Deepika Sharma, **Arvind Selwal**: "SFincBuster: Spoofed fingerprint buster via incremental learning using leverage bagging classifier", *Image and Vision Computing*, Elsevier,2023, <https://doi.org/10.1016/j.imavis.2023.104713> [**SCI IF=4.7**].
3. Ambreen Sabha **Arvind Selwal** (2023). *Domain adaptation-assisted automatic human-centric video summarization*, *Engineering Applications of Artificial Intelligence*, Elsevier, 124, 102544. [**SCI, IF=8.0**].
4. Sabha, Ambreen, and **Arvind Selwal**. "CoSumNet: A video summarization-based framework for COVID-19 monitoring in crowded scenes." *Artificial Intelligence in Medicine* (2023): 102544. [**SCI, IF=7.5**].
5. Deepika Sharma, **Arvind Selwal**: HyFiPAD: a hybrid approach for fingerprint presentation attack detection using local and adaptive image features. *The Visual Computer* (2021). <https://doi.org/10.1007/s00371-021-02173-8> [**SCI IF=3.5**].
6. Palak Verma, **Arvind Selwal & Deepika Sharma**: "IVIDNet: Intelligent iris vitality detection via weighted prediction score level fusion". *Multimedia Tools and Applications* (2023). <https://doi.org/10.1007/s11042-022-14014-4>. [**SCI IF=3.6**].
7. Deepika Sharma, **Arvind Selwal**. *An intelligent approach for fingerprint presentation attack detection using ensemble learning with improved local image features. Multimedia Tools and Application (Springer)* (2021). <https://doi.org/10.1007/s11042-021-11254-8> [**SCI, IF=3.6**].
8. Deepika Sharma, **Arvind Selwal**: "A survey on face presentation attack detection mechanisms: hitherto, and future perspectives" *Multimedia Systems* (2023). <https://doi.org/10.1007/s00530-023-01047-4>[**SCI IF=3.9**].
9. Sabha, A., **Selwal, A.** Towards machine vision-based video analysis in smart cities: a survey, framework, applications and open issues. *Multimed Tools Appl* (2023). <https://doi.org/10.1007/s11042-023-16434-2> [**SCI IF=3.6**].
10. Farooq Numerena, **Selwal Arvind**. *Image steganalysis using deep learning: a systematic review and open research challenges. J Ambient Intell Human Comput* (2023). <https://doi.org/10.1007/s12652-023-04591-z>[**SCI, IF=7.6**].
11. Ambreen Sabha **and Arvind Selwal**, "Data-driven enabled approaches for criteria-based video summarization: A comprehensive survey, taxonomy, and future directions" *Multimedia Tools and Application (Springer)* (2023). [**SCI, IF=3.6**].
12. Palak Verma, **Arvind Selwal & Deepika Sharma**: *A survey on data-driven iris spoof detectors: state-of-the-art, open issues and future perspectives*. *Multimedia Tools Appl.* (2022). <https://doi.org/10.1007/s11042-022-14014-4>. [**SCI IF=3.6**].
13. Samridhi Singh, **Arvind Selwal and Deepika Sharma**, *Leveraging deep learning to fingerprint spoof detectors: hitherto and futuristic perspectives*, *International Journal of Pattern Recognition and Artificial Intelligence*, <https://doi.org/10.1142/S0218001422520292>, [**SCI,**

IF=1.5].

14. Junaid Amin, **Arvind Selwal**, and Ambreen Sabha: *SaffNet: An ensemble-based approach for Saffron adulteration prediction using statistical image features*, *Multimedia Tools and Application (Springer)* (2023) [**SCI, IF=3.6**].
15. **Arvind Selwal**, S. K. Gupta (2017): "Low Overhead Octet Indexed Template Security Scheme for Multi-modal Biometric System", *Journal of Intelligent & Fuzzy Systems*, ISSN 1875-8967 (online), Vol. 32, no. 5, pp. 3325-3337 [**IF: 3.0**].
16. Swarnkar, N., Thomas, A. & Selwal, A. A generalized image steganalysis approach via decision level fusion of deep models. *Multimed Tools Appl* (2023). <https://doi.org/10.1007/s11042-023-17068-0>. [**SCI, IF=3.6**].
17. **Rafiq, Shehla., Arvind Selwal**, *Block - XOR based cancellable template protection scheme for multi-instance iris biometric system*. *Multimedia Tools Application* 81, 23217–23235 (2022). <https://doi.org/10.1007/s11042-022-12655-z> [**SCI, IF=3.6**].
18. **Eain U. Sehar, Arvind Selwal and Deepika Sharma**: *FinCaT: a novel approach for fingerprint template protection using quadrant mapping via non-invertible transformation*, *Multimedia Tools Application* 81, 23217–23235 (2023) [**SCI IF=3.6**].
19. Deep Kumar Bangotra, Yashwant Singh, **Arvind Selwal** et al. "An Intelligent Opportunistic Routing Algorithm for Wireless Sensor Networks and Its Application Towards e-Healthcare", *Sensors* 2020, 20(14), 3887. [**SCI IF: 3.9**].
20. Reza Mehmood, **Arvind Selwal** (2020), "Polynomial Based Fuzzy Vault Technique for Template Security in Fingerprint Biometrics", *The International Arab Journal of Information Technology*, vol. 17. no.5. [**SCI, IF=1.5**].
21. Pooja Anand, Y. Singh, **Arvind Selwal**, M. Alazab, S. Tanwar and N. Kumar, "IoT Vulnerability Assessment for Sustainable Computing: Threats, Current Solutions, and Open Challenges," in *IEEE Access*, vol. 8, pp. 168825-168853, 2020, doi: 10.1109/ACCESS.2020.3022842. [**IF= 3.9**].
22. Anand, P.; Singh, Y.; **Selwal Arvind.**; Singh, P.K.; Felseghi, R.A.; Raboaca, M.S. *IoVT: Internet of Vulnerable Things? Threat Architecture, Attack Surfaces, and Vulnerabilities in Internet of Things and Its Applications towards Smart Grids*. *Energies* 2020, 13, 4813 [**IF=3.7**].
23. Bangotra, D.K., Singh, Y., **Selwal A.** et al. *A Trust Based Secure Intelligent Opportunistic Routing Protocol for Wireless Sensor Networks*. *Wireless Personal Communication (Springer)* 127, 1045–1066 (2022). <https://doi.org/10.1007/s11277-021-08564-3>. [**SCI IF=2.2**].
24. Anand, P., Singh, Y., **Selwal, A.**, Singh, P. K., & Ghafoor, K. Z. (2022). *IVQF_{IoT}: An intelligent vulnerability quantification framework for scoring internet of things vulnerabilities*. *Expert Systems*, 39(5), e12829. <https://doi.org/10.1111/exsy.12829> [**SCI IF=3.9**].
25. Nadish Ayub and **Arvind Selwal** (2020), "An improved image steganography technique using edge based data hiding in DCT domain" *Journal of Interdisciplinary Mathematics*, Taylor and Francis, Volume 23, Issue 2, pp 357-366 [**ESCI/ Scopus**].
26. **Arvind Selwal**, Sunil Kumar Gupta (2016) "A Scheme for Template Security at Feature Fusion Level in Multimodal Biometric System", *Advances in Science & Technology Research Journal*, Polish Academy, Volume 10, No. 31, pp 23-30 ICV:100 [**ESCI IF=1.2**]
27. **Arvind Selwal**, S.K. Gupta (2016): "Template Security Analysis of Multimodal Biometric frameworks based on Fingerprint and Hand Geometry", *Perspectives in Science (Elsevier)*, ISSN: 2213-0209, Vol. 8, pp 705-708.

28. Deepika Sharma and **Arvind Selwal**: *Presentation Attacks and Detection in Face Recognition Systems: State-of-the-Art, Open Research Issues and Opportunities*, Artificial Intelligence Review, Springer, **IF: 9.747** [Revised and under Review].
29. Ifrah Raof and **Arvind Selwal(2020)**. *A Multi-layer perceptron based intelligent thyroid disease prediction system*, Indonesian Journal of Electrical Engineering and Computer Science, Vol. 17, No. 1, January 2020, pp. 524~533. [Scopus Indexed].
30. **Arvind Selwal**, S.K. Gupta (2016): “*Fuzzy Analytic Hierarchy Process based Template Data Analysis of Multimodal Biometric Conceptual Designs*”, Computer Procedia (Elsevier Science Direct), ISSN: 1877-0509, Vol. 85 (2016) pp. 899 – 905. [**Indexed in Scopus, SNIP: 0.7**].
31. Deep Kumar Bangotra, Yashwant Singh, **Arvind Selwal**, “*An Intelligent Opportunistic Routing Protocol for Big Data in WSNs*”, International Journal of Multimedia Data Engineering and Management , Volume 11 , Issue 1 , January-March 2020, pp15-29. [ESCI indexed]
32. Annu Sharma, ShwetankArya, PraveenaChaturvedi, **Arvind Selwal**. “*Multispectral Image Fusion System Based on Wavelet Transformation for Secure Human Recognition*”. *International Journal of Advanced Science and Technology* 28, no. 19. (Indexed in Scopus)
33. **Arvind Selwal**, S.K. Gupta, Surender, “*A Hybrid Template Security Scheme for Multimodal Biometric System based on Fingerprint and Hand Geometry*”, International Journal of Control Theory and Applications, Vol.10 Number 15, pp147-152. (Scopus indexed).

Books Published

- i. Taneja, K., Taneja, H., Kumar, K., Selwal, A., &Ouh, E. L. (Eds.). (2021). *Data Science and Innovations for Intelligent Systems: Computational Excellence and Society 5.0*. Taylor & Francis, CRC Press.
- ii. Fundamentals of Automat Theory and Computation, Ishan publications, 2009.

Articles/Research Paper in Books

1. Sharma, Deepika, and Arvind Selwal. "Feature Engineering for Presentation Attack Detection in Face Recognition: A Paradigm Shift from Conventional to Contemporary Data-Driven Approaches." In *Data Science and Innovations for Intelligent Systems*, pp. 241-260. CRC Press, 2021.
2. Chadgal, Amit, and Arvind Selwal. "Lightweight Cryptography Using a Trust-Based System for Internet of Things (IoT)." *Data Science and Innovations for Intelligent Systems*. CRC Press, 2021. 319-338.
3. Reza Mehmood, **Arvind Selwal(2020)** “*Fingerprint Biometric Template Security Schemes: Attacks and Countermeasures*” Proceedings of ICRIC 2019. Lecture Notes in Electrical Engineering, vol 597, pp 455-467, Springer.
4. ShehlaRafiq, **Arvind Selwal** (2020) “*Template Security in Iris Recognition Systems: Research Challenges and Opportunities*” Proceedings of ICRIC 2019. Lecture Notes in Electrical Engineering, vol 597, pp 771-784, Springer.
5. **Arvind Selwal** et al. “*Low Overhead Time Coordinated Checkpointing Algorithm for Mobile Distributed Systems*” Lecture Notes in Electrical Engineering, book series (LNEE, volume 131), 2013.
6. MahaparaKhurshid, **Arvind Selwal(2020)**“*A Novel Block Hashing-Based Template Security Scheme*

for Multimodal Biometric System" Decision Analytics Applications in Industry pp 173-183, ISBN:978-981-15-3643-4.

7. Bashir, N., Sharma, H., Padha, D., Selwal, A. (2023). Exploring Data-Driven Approaches for Apple Disease Prediction Systems. In: Singh, Y., Singh, P.K., Kolekar, M.H., Kar, A.K., Gonçalves, P.J.S. (eds) Proceedings of International Conference on Recent Innovations in Computing. Lecture Notes in Electrical Engineering, vol 1001. Springer, Singapore. https://doi.org/10.1007/978-981-19-9876-8_10.
8. Sharma, H., Padha, D., Selwal, A. (2023). A Survey on Attention-Based Image Captioning: Taxonomy, Challenges, and Future Perspectives. In: Singh, P., Singh, D., Tiwari, V., Misra, S. (eds) Machine Learning and Computational Intelligence Techniques for Data Engineering. MISP 2022. Lecture Notes in Electrical Engineering, vol 998. Springer, Singapore. https://doi.org/10.1007/978-981-99-0047-3_58.

Conference Proceedings

1. Deepika. Sharma and Arvind Selwal, "A face anti-spoofing approach based on generic sequential model using scale invariant features," 2021 13th IEEE International Conference on Electronics, Computers and Artificial Intelligence (ECAI), 2021, pp. 1-6, doi: 10.1109/ECAI52376.2021.9515179.
2. Sharma, Deepika, Selwal Arvind. (2023). A Comparative Analysis of Deep Learning-Based Frameworks for Face Vitality Detection. In: Ranganathan, G., Fernando, X., Piramuthu, S. (eds) Soft Computing for Security Applications. Advances in Intelligent Systems and Computing, vol 1428. Springer, Singapore. https://doi.org/10.1007/978-981-19-3590-9_7.
3. Sharma Deepika., Selwal Arvind (2021) On Data-Driven Approaches for Presentation Attack Detection in Iris Recognition Systems, Recent Innovations in Computing. ICRIC 2020. Lecture Notes in Electrical Engineering, vol 701. Springer, Singapore. https://doi.org/10.1007/978-981-15-8297-4_38.
4. Sharma Deepika, Selwal Arvind (2021): Feature Engineering for Presentation Attack Detection in Face Recognition: A Paradigm Shift from Conventional to Contemporary Data-driven Approaches, Taylor and Frances 8.
5. Ambreen Sabha and Arvind Selwal, "HAVS: Human action-based video summarization, Taxonomy, Challenges, and Future Perspectives," 2021 International Conference on Innovative Computing, Intelligent Communication and Smart Electrical Systems (ICSES), Chennai, India, 2021, pp. 1-9, doi: 10.1109/ICSES52305.2021.9633804.
6. Akhil Kalsi, Arvind Selwal and Ambreen Sabha, "Computational intelligence paradigms for audio-based video summarization," 2022 Fifth International Conference on Computational Intelligence and Communication Technologies (CCICT), Sonapat, India, 2022, pp. 590-595, doi: 10.1109/CCICT56684.2022.00108.
7. Rutba Ishfaq, Arvind Selwal and Deepika Sharma, "Fingerprint Spoofing Attacks and their Deep Learning-enabled Remediation: State-of-the-art, Taxonomy, and Future Directions," 2021 Fourth International Conference on Computational Intelligence and Communication Technologies (CCICT), 2021, pp. 22-28, doi: 10.1109/CCICT53244.2021.00016.
8. Eain U. Sehar, Arvind Selwal and Deepika Sharma, "FinCaT: Fingerprint Cancellable Template Protection Remediation Schemes, Challenges, and Future Directions," 2021 Fourth IEEE International Conference on Computational Intelligence and Communication Technologies (CCICT), 2021, pp. 260-267, doi: 10.1109/CCICT53244.2021.00056.
9. Samridhi Singh, Arvind Selwal and Deepika Sharma, "Exploring Pre-Processing Approaches for Deep

- Learning-based Fingerprint Spoof Detection Mechanisms," 2022 6th IEEE International Conference on Trends in Electronics and Informatics (ICOEI), 2022, pp. 1381-1387, doi: 10.1109/ICOEI53556.2022.9777133.
10. Syed Z. Rufai, Arvind Selwal and Deepika Sharma, "On Analysis of Face Liveness Detection Mechanisms via Deep Learning Models," 2022 IEEE International Conference on Sustainable Computing and Data Communication Systems (ICSCDS), 2022, pp. 59-64, doi: 10.1109/ICSCDS53736.2022.9760922.
 11. Palak Verma, Arvind Selwal and Deepika Sharma, "An exploration of pre-processing approaches for iris spoof detectors," 2022 IEEE International Conference on Computational Intelligence and Sustainable Engineering Solutions (CISES), 2022, pp. 271-277, doi: 10.1109/CISES54857.2022.9844401.
 12. Ishrat Gull, Arvind Selwal and AmbreenSabha, "An Analysis of Video-based Human Activity Detection Approaches," 2022 International Conference on Sustainable Computing and Data Communication Systems (ICSCDS), Erode, India, 2022, pp. 1554-1561, doi: 10.1109/ICSCDS53736.2022.9760868.
 13. Bashir, Bisma, and Arvind Selwal. "Towards Deep Learning-Based Image Steganalysis: Practices and Open Research Issues." Proceedings of the International Conference on IoT Based Control Networks & Intelligent Systems-ICICNIS. 2021.
 14. Bashir, Shameer, and Arvind Selwal. "A Comprehensive Survey of Sentiment Analysis: Word Embeddings Approach, Research Challenges and Opportunities." In 2nd International Conference on IoT Based Control Networks and Intelligent Systems (ICICNIS 2021), Proceedings of the International Conference on IoT Based Control Networks & Intelligent Systems-ICICNIS. 2021.
 15. Amin, Junaid, Arvind Selwal, and Ambreen Sabha. "SAPS: Automatic Saffron Adulteration Prediction Systems, research issues, and prospective solutions." 2021 Fourth International Conference on Computational Intelligence and Communication Technologies (CCICT). IEEE, 2021.
 16. Habib, Ahnisa, and Arvind Selwal. "Robust anti-spoofing techniques for fingerprint liveness detection: A Survey." IOP Conference Series: Materials Science and Engineering. Vol. 1033. No. 1. IOP Publishing, 2021.
 17. Anand, P., Singh, Y., Selwal, A. (2022). Learning-Based Techniques for Assessing Zero-Day Attacks and Vulnerabilities in IoT. In: Singh, P.K., Singh, Y., Kolekar, M.H., Kar, A.K., Gonçalves, P.J.S. (eds) Recent Innovations in Computing. Lecture Notes in Electrical Engineering, vol 832. Springer, Singapore. https://doi.org/10.1007/978-981-16-8248-3_41.
 18. Anayat, Syed Umayya, and Arvind Selwal. "Template Attacks and Protection in Multi-biometric System: A Systematic Review." Recent Innovations in Computing: Proceedings of ICRIC 2020 (2021): 831-843.
 19. **Arvind Selwalet.al.**, "Performance Analysis of Template Data Security and Protection in Biometric Systems", *IEEE International Conference RAECS*, IEEE Xplore digital library, UIET Punjab University, Chandigarh, 2015,pp. 1-7. ISBN: 978-1-4673-8253-3.
 20. **Arvind Selwalet.al.**, "Hyper Spectral Image Restoration Approach using LRMR and LDA", *3rd International Conference on Image Information Processing (ICIIP-2015)*, IEEE Xplore digital library, 2015, ISBN: 978-1-5090-0148-4.
 21. Sheikh Imroza Manzoor and **Arvind Selwal**, "An Analysis of Biometric Based Security Systems," 2018 Fifth International Conference on Parallel, Distributed and Grid Computing (PDGC), Solan Himachal Pradesh, India, 2018, pp. 306-311, doi: 10.1109/PDGC.2018.8745722.
 22. Bangotra, Deep Kumar, Yashwant Singh, and Arvind Selwal. "Intelligent Opportunistic Routing Protocol in Wireless Sensor Networks: A Security Perspective." Recent Innovations in Computing: Proceedings of ICRIC 2020. Springer Singapore, 2021.

23. Deep Kumar Bangotra, Yashwant Singh, **Arvind Selwal**, "Machine Learning in Wireless Sensor Networks: Challenges and Opportunities", in Proc. of *2018 Fifth IEEE International Conference on Parallel, Distributed and Grid Computing (PDGC)*, Solan, Himachal Pradesh, India, 2018, ISBN: 978-1-7281-0646-5, pp.534-539. doi: 10.1109/PDGC.2018.8745845.
24. Rajab Ali, Arvind Selwal, Deepika Sharma and Ambreen. Sabha, "Data-driven COVID-19 Prediction Mechanisms: Recent Advancement and Open Issues," 2023 2nd IEEE International Conference on Applied Artificial Intelligence and Computing (ICAAIC), Salem, India, 2023, pp. 750-756, doi: 10.1109/ICAAIC56838.2023.10140553.
25. Z. Zahra, A. Selwal and D. Sharma, "Deep Learning-Assisted Iris Liveness Detection Mechanisms," *2023 15th IEEE International Conference on Electronics, Computers and Artificial Intelligence (ECAI)*, Bucharest, Romania, 2023, pp. 1-6, doi: 10.1109/ECAI58194.2023.10194066.
26. T. Gupta, A. K. Sharma and A. Selwal, "A Lightweight Image Cryptography Approach via Invertible Transformation," *2023 15th IEEE International Conference on Electronics, Computers and Artificial Intelligence (ECAI)*, Bucharest, Romania, 2023, pp. 1-6, doi: 10.1109/ECAI58194.2023.10194010.
27. S. Goel and A. Selwal, "Web- Services Scheduled Outage Modeling," *2023 15th IEEE International Conference on Electronics, Computers and Artificial Intelligence (ECAI)*, Bucharest, Romania, 2023, pp. 1-4, doi: 10.1109/ECAI58194.2023.10194228.

Conference / Workshops/Training Organized:

1. Member of organizing committee of ICRIC-2018, ICRIC 2019, ICRIC-2020, ICRIC-2021, ICRIC-2022 conducted by Department of Computer Science and IT, Central University of Jammu.
2. Member of Organizing committee of Faculty Development Programme (FDP) on "Artificial Intelligence" organized by Department of Computer Science & IT, Central University of Jammu sponsored by AICTE Training and Learning (ATAL) Academy, during 18-11-2019 to 22-11-2019.
3. Member of Organizing committee of one week Faculty Development Programme (FDP) on "Internet of Things" organized by Department of Computer Science & IT, Central University of Jammu sponsored by AICTE Training and Learning (ATAL) Academy, during 14-10-2019 to 18-10-2019.

Conference/Workshops/Training attended as Faculty Member:

1. Certification course of six weeks on "**Deep learning Applications for computer vision**" **University of Colorado, USA** during March-April 2022.
2. Participated in one week Faculty Development Programme (FDP) on "**Deep Learning and its Applications**" held at IIT Roorkee during 23-08-2021 to 03-09-2021.
3. Participated in one week Faculty Development Programme (FDP) on "**Machine learning for Computer vision**" held at IIT Roorkee during 21-02-2022 to 04-03-2022
4. Participated in one week Faculty Development Programme (FDP) on "**Computer vision and Image Processing**" held at IIT Roorkee during 14-12-2020-24-12-2020.
5. Participated in one week Faculty Development Programme (FDP) on "**Deep Learning**" held at IIT Roorkee during 22-08-2019-26-08-2019.
6. Participated in one week Faculty Development Programme (FDP) on "**AI and Machine Learning**" held at IIT Roorkee during 23-12-2019 to 27-12-2019.
7. Participated in one week Faculty Development Programme (FDP) on "**Artificial Intelligence**" organized by Department of Computer Science & IT, Central University of Jammu sponsored by AICTE Training and Learning (ATAL) Academy, during 18-11-2019 to 22-11-2019..
8. Participated in one week Faculty Development Programme on "**Data Analytics using Python**" held

at Indian Institute of Technology (IIT), Roorkee, during June 18-22, 2019.

9. Participated in one week Faculty Development Programme (FDP) on “**Internet of Things**” organized by Department of Computer Science & IT, Central University of Jammu sponsored by AICTE Training and Learning (ATAL) Academy, during 14-10-2019 to 18-10-2019.
10. Attended four weeks 29th orientation programme at HRDC, Punjabi University, Patiala during 18th May to 14th June 2016.
11. Attended one week workshop on “**e-Suruksha**” under the aegis of the project on Information Security Education and Awareness (ISEA), Ministry of Electronics and Information Technology, Govt. of India, Organised by Central University of Jammu during December 10-14, 2018.
12. Attended five days Workshop on “**Policy based IP Creation and Management**”.Feb. 22-26, 2016 held at IIT-Roorkee.
13. Attended one week Workshop on “Recent Trends in Computer Technology” organised by Department of Computer Science & IT, October 21 to 28, 2016.
14. Participated in three days workshop “**Enhancing Research Collaborations through NKN**”, 17-19 October 2013, IISc Bangalore.
15. Attended refresher Course on “**Information Communication Technology**”, 18th June- 07th July 2018, held at, HRDC, Punjabi University, Patiala, Punjab.
16. Attended 7- days residential AICTE sponsored Faculty Development Programme for Student Induction on “**Universal Human Values (UHV)**” held at Panjab University, Chandigarh during June 4-10, 2019.
17. Attended Three days National Workshop on “**Biometrics and Privacy Protection**”, held at Malaviya National Institute of Technology, Jaipur, 23-25 December, 2013.
18. Attended National workshop on “**Intellectual Property Rights: Implementation and Enforcement**” DIETY & MCIT, GOI sponsored workshop on IPR awareness programme in E & IT sector, held from 14th -15th January, 2016, Organised by UBIC, Central University of Jammu.
19. Attended two days “**Professional Development Programme on Online Teaching, Learning and Assessment using Moodle MOOC Platform& Open Educational Resources**” held at Central University of Jammu, on 15th -16th September 2017.
20. Attended one day Workshop on **Digital India** conducted by Central University of Jammu, Sponsored by Department of Electronics and Information Technology, GOI, held on 05th March 2016.

Invited Lectures/Resource Persons

- Invited talk on “Fingerprint biometric attacks and countermeasures” in Faculty Development Programme on the topic “Advances in “Biometric Security and Image Processing”, Kurukshetra University, during 15 March-19 March, 2022.
- Invited talk on “Cyber Crimes & Cyber Security: Preventive & Reactive Measures” in Faculty Development Programme organized by HRDC, Dr. Harisingh Gour Central University, Sagar - 470 003, Madhya Pradesh, India held during 07-13 January, 2021.
- Invited talk on “Cyber safety and security” in Training Programme for school teachers organized by JKSCERT, Jammu held during 17 September, 2021.
- Invited talk on “Emerging trends in Assessment and Evaluation for Teaching and Learning” in Faculty Development Programme organized by School of Education, Central University of Jammu, during

16-22 March, 2021.

- Invited talk on “ICT Tools in Education” in Faculty Development Programme organized by School of Education, Central University of Jammu, during 01-07 February, 2021.
- Invited talk on “Role of biometrics in smart cities” in AICTE ATAL sponsored Faculty Development Programme held at JSS Academy of Technical Education Noida, on 19 January, 2022.
- Guest lecture on “Introduction to Biometric systems” held at Govt. Women College, Parade Jammu, on 07 September, 2021.
- Invited talk on Biometrics for Secured Authentication: Challenges and Research opportunities in National Conference on Emerging Trends in Advanced Computing and Information Technology, Kathua Campus, University of Jammu, Feb. 24-25, 2018.
- Invited lecture on “Data Mining” at Baderwah Campus, University of Jammu, during 26-28 March, 2019.
- Invited talk on “Data Reduction Techniques and Classification” in Faculty Development Programme on “ Emerging Trends in Machine Learning Technologies” held at Guru Jambheshwar University of Science and Technology, Hisar on 24th January 2020.
- Invited talk on “Data Reduction Using PCA” in Faculty Development Programme on “Deep Learning and its Applications” held at Sri Mata Devi University, Katra on 9th January 2020.
- Invited talk on “Biometrics as an ICT Tool in Education” ICT IN EDUCATION” under Central Sponsored Scheme (CSS), MHRD Govt. of India, organized by Govt. College of Education, Kanal Road, Jammu, December 18- 22 , 2017.
- Invited Talk on Computer Hardware, Workshop on “Working with Computer” organized by Department of Computer Science & IT, Central University of Jammu, Jammu, 12th-18th December, 2013.

Research Projects (Major Grants/Research Collaboration):

1. Development and Analysis of a light weight cryptography for sensor nodes and IoT, sponsored by DRDO New Delhi (KCST), worth Rs. 44.16 Lakhs, from 2020 to 23. **(PI: Dr. Arvind Selwal)**.
2. Development of Vulnerability Analysis Framework and Test Bed for IoT and Embedded Devices, Sponsored by DRDO New Delhi, worth Rs. 46.322 Lakhs, from 2019-22, **(Co-PI: Dr. Arvind Selwal)**.
3. **Indian patent published** by Deepika Sharma and Arvind Selwal, **title of invention “A REAL TIME DEEP LEARNING-INSPIRED HYBRID FINGERPRINT SPOOF DETECTION SYSTEM AND ITS METHOD THEREOF”, 2022.**

Awards and Distinctions:

- Won “**Emerging research contributor in Higher Educational Institute**” Shiksha Saman-2022, Nikhil Bharat Parishad, Kolkata
- Gold medal in M.Tech. with distinction
- B.Tech. degree with Honors

Association with Professional Bodies:

- Member of IEEE biometric council
- Member of Computer Society of India(CSI)
