Dr DIL NASHIN ANWAR

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SUMMARY

I have completed my PhD from IIIT-Delhi at the Centre of Excellence for LiFi (Coe-LiFi IIIT-Delhi: link), India. The dissertation title of the PhD work is, "Designing and analyzing low-complexity energy efficient visible light communication systems for IoT and UAV applications" (online available: Link2). Further, I have worked as a research fellow in collaboration with the University of Sunny Albany, USA and Al-Ain University, Al-Ain UAE, as a part of the FlyServ Project.

RESEARCH INTERESTS

Machine Learning (Reinforcement learning, Deep Neural Network, Convolutional Neural Network), Artificial Intelligence, Indoor Flying Networks (IFNs), Unmanned Aerial Vehicle (UAV), Optical wireless communication, Visible Light Communication (VLC), LiFi, Color Shift Keying (CSK), Optical OFDM, Optimization, Optical Energy Harvesting, Resource Allocation

LIST OF PUBLICATIONS

Journals and Transactions:

Published:

1. **Dil Nashin Anwar**, Rizwana Ahmad, Haythem Bany Salameh et.al, "Performance analysis of neural network-based unified physical layer for indoor hybrid LiFi–WiFi flying networks", Neural Comput & Applic, vol. 35, pp. 24179–24189, 2023 (https://link.springer.com/article/10.1007/s00521-023-09017-7)
2. **Dil Nashin Anwar**, Mansi Peer, Kanak Lata, Anand Srivastava and Vivek Ashok Bohara, "3-D Deployment of VLC Enabled UAV Networks with Energy and User Mobility Awareness", *IEEE Transaction on Green Communications and Networking*, vol. 6, no. 4, pp. 1972-1989, Dec. 2022, doi: 10.1109/TGCN.2022.3171920.
3. **Dil Nashin Anwar**, Rizwana Ahmad, and Anand Srivastava, "Towards Coexistence of LiFi Users and Light Enabled IoT Devices", *IEEE Transaction on Green Communications and Networking*, doi: 10.1109/TGCN.2021.3116267.
4. **Dil Nashin Anwar** and Anand Srivastava, "Constellation Design for Single Photodetector Based CSK with Probabilistic Shaping and White Color Balance," *IEEE Access*, vol. 8, pp. 159609-159621, Aug. 2020, doi: 10.1109/ACCESS.2020.3020403.
5. **Dil Nashin Anwar** and Anand Srivastava, "Design and Analysis of Probabilistic Shaping in Color Shift Keying Modulation Schemes," *IEEE Systems Journal*, vol. 15, no. 1, pp. 1433-1444, March 2021, doi: 10.1109/JSYST.2020.3007391.
6. Rizwana Ahmad, **Dil Nashin Anwar**, Haythem Bany Salameh, Hany Elgala, Moussa Ayyash, Sufyan Almajali, Reyad El-Khazali, "Generalized Hybrid LiFi-WiFi UniPHY Learning Framework Towards Intelligent UAV-based Indoor Networks", International Journal of Intelligent Networks, 2024, https://doi.org/10.1016/j.ijin.2024.05.008. (https://www.sciencedirect.com/science/article/pii/S2666603024000277)
7. Saumya Chaturvedi, **Dil Nashin Anwar**, Vivek Ashok Bohara, Anand Srivastava and Zilong Liu, "Low-Complexity Codebook Design for SCMA-Based Visible Light Communication," *IEEE Open Journal of the Communications Society*, vol. 3, pp. 106-118, 2022, doi: 10.1109/OJCOMS.2022.3141800.
8. Farid Ghani, Hameedah Sultan, **Dil Nashin Anwar**, Omar Farooq, Yusuf Uzzama Khan, "Classification of Wrist Movements Using EEG Signals", *JNIT: Journal of Next Generation Information Technology*, Vol. 4, No. 8, pp. 29 ~ 39, 2013.

Conferences:

1. **Dil Nashin Anwar**, Anand Srivastava and Vivek Ashok Bohara, “Adaptive Channel Estimation in VLC for Dynamic Indoor Environment,” in Proc. 21st International Conference on Transparent Optical Networks (ICTON), Angers, France, . 2019, pp. 1-5.
2. Anand Singh, **Dil Nashin Anwar**, Anand Srivastava, Vivek Ashok Bohra, and G. S. VRK Rao, “Power and SER analysis of VLC- and RF-based links in indoor environment,” in Proc. SPIE 10945, Broadband Access Communication Technologies XIII, 109450R, San Francisco, U.S., Feb. 2019, p.109450R.
3. **Dil Nashin Anwar** and Anand Srivastava, “Energy saver VLC using off-the-shelf devices: an experimental study,” in Proc. IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS), Indore, India, Dec. 2018, pp. 1-6.
4. **Dil Nashin Anwar** and Anand Srivastava, “VLC-based safe, low-cost, and accurate healthcare system for video EEG using colour constellation scheme,” in Proc. SPIE Photon. Europe, Strasbourg, France, Apr. 2018, p. 1068549.
5. **Dil Nashin Anwar**, Prince Garg, Vinayak Naik, Anubha Gupta, and Akshay Kumar, "Use of Portable EEG Sensors to Detect Meditation," International Conference on Communication Systems & Networks (COMSNETS)- NetHealth WS, Bengaluru, India, Jan. 2018. (*received best paper runner-up award*)
6. **Dil Nashin Anwar**, Vinayak Naik, and Anubha Gupta, "Detecting Meditation using a Dry Mono-Electrode EEG Sensor," International Conference on Communication Systems & Networks (COMSNETS)- NetHealth WS, Bangalore, India, Jan. 2017.

EXPERIENCE

Assistant Professor (Contractual)- Jamia Milia Islamia, New Delhi August 2024-present

Courses Taught: Wireless Communication
Information and communication Theory
Basics of Electronics and Communication

Labs Conducted: Analog Electronics Lab-I
Advance Communication Lab
Digital Signal Processing Lab
Advance Digital Signal Processing Lab

Research Fellow: FlyServ Project in collaboration with the University of Sunny Albany, USA and Al-Ain University, Al-Ain UAE (https://aau.ac.ae/en/centers/airc/staff).
Nov 2022- June 2024

The study focused on integrating machine learning into indoor flying networks, enhancing their artificial intelligence capabilities for efficient operation in various domains like communication, monitoring, hovering, energy utilization, and time management. I have developed an innovative, comprehensive end-to-end learning framework for a UniPHY system. This framework can be trained using Convolutional Neural Networks (CNN) and Deep Neural Networks (DNN) for both LiFi and WiFi communication. The goal is to enable the creation of hybrid LiFi WiFi network-based indoor flying networks (HLW-IFNs) that operate seamlessly. Further, I have worked towards optimizing the monitoring coverage of HLW-IFNs, particularly in the context of dynamic user mobility.

PhD Research:
August 2017 – June 2023 - Ph.D. Student (Awarded Visvesvaraya PhD fellowship), IIIT-Delhi.
Supervisor: Prof Anand Srivastava
Projects Undertaken:

1. Improving the performance of various colour shift keying (CSK) modulation schemes (CSK-3PD, CSK-1PD and CSK-1APD) with probabilistic shaping. For shaping the CSK input symbols, four different source distributions are considered viz. uniform, exponential, Maxwell-Boltzmann and Pareto.
2. Designing and optimizing the constellation symbols for CSK-1PD scheme with and without white color balance. Finally, proposed RGB LED based solution to achieve any desired white tone light as CSK-1PD modulated output light in the white light region.

3. Energy-Efficient Coexistence of LiFi Users and Light Enabled IoT (LIOT) Devices. The proposed coexistence schemes utilize the amalgamation of wavelength division multiplexing, Hartley transform based DCO-OFDM, null DC element, interleaved subcarrier mapping, modified data sequence to achieve concurrent interference-free, low complex and reliable communication.
4. The altitude deployment of VLC enabled UAV have been optimized for maximum coverage of ground mobile users while fulfilling illumination and reliable communication requirements. The maximum coverage radius has been enhanced with energy-aware techniques: novel RGB LED based solution and holographic LSD. A joint optimization has been proposed to maximize the number of covered users with VLC specific QoS constraints at an update instant by ensuring the user fairness as well as UAV flight time constraint.
5. Low-Complexity Codebook Design for SCMA (Sparse code multiple access)-Based Visible Light Communication. A novel codebook have been designed for SCMA based VLC system, which suffers from the varying shot noise.
6. Collaboration work with Professor Marcos Katz (University of Oulu, Finland): Energy autonomy of light enabled IoT devices and their resource allocation in the coexistence environment supported by theoretical, simulation and experimental results.

Experimental Works:

1. Laptop to Laptop and mobile to mobile communication using visible light. (demo can be viewed here)
2. VLC-test bed using USRP.

Research Associate, IIIT-Delhi, New Delhi.
Worked as a Research Associate under Prof Vinayak Naik. The project was to detect meditation using a consumer dry mono-electrode EEG sensor. The final aim was to develop an affordable healthcare app which can track brain activities.

Worked in a Startup Audibyte:
Audio News App, got first hand experience of running an Idea (https://apkpure.com/audibyte-hindi-audio-news-app/com.ne.app.newsapp).

M. Tech (awarded UGC fellowship), *ZHCET-Aligarh*.
Thesis Title: Video Streaming over P2P Network
Supervisor: Dr Athar Ali Moinuddin and Prof Ekram Khan
The primary goal of this work was to understand the effect of different quality metrics on video streaming over Peers in a MANET by emulating network scenario in EXata. The received video via the emulated network is evaluated and analysed by several metrics such as PSNR, SSIM and PDR at various layers of TCP/IP protocol stack. PSNR of the received video is found to be low at lower as well as higher bitrate. HEVC codec gives better result in comparison to H.264 and with mobility and traversing route of receiver the performance of network routing protocols changes.

B. Tech Project, *ZHCET-Aligarh*.
Title: BCI for Hand Movement Detection
Supervisor: Dr Omar Farooq
The main objective of project was to process EEG signals to detect wrist movements from brain activity, and classify 4 different kinds of wrist movements of both hands (Extension, Flexion, Pronation and Supination).The first part of the project consists of detecting whether a left hand movement has been performed or a right hand movement. Next, the category of wrist movement performed out of the four different movements on each of the wrists (Extension, Flexion, Pronation and Supination) was to be determined.

Academia:
Teaching Assistant, *ZHCET-Aligarh and IIIT-Delhi*.
Assisting faculties for courses, conducting tutorials, labs, viva-voce and exams

- Successfully completed AICTE Training And Learning (ATAL) Academy Online FDP on "Artificial Intelligence" at IIIT-Delhi.
- Session volunteer in hosting the technical events in IEEE ANTS 2020.

- Successfully completed 100% of the self-paced Mathworks training courses on Machine Learning Onramp and Deep Learning Onramp.
- December 2022, Delivered CSK-tutorial video lecture for NPTEL course on Optical Wireless Communication for B5G and IoT (https://www.youtube.com/watch?v=8FkmpJ210BE&list=PLyqSpQzTE6M_yqX6gn0Zmx-C7gv5IAEx5&index=40)
- December 2022, Delivered O-OFDM tutorial video lecture for NPTEL course on Optical Wireless Communication for B5G and IoT (https://www.youtube.com/watch?v=1swX4YJuZi4&list=PLyqSpQzTE6M_yqX6gn0Zmx-C7gv5IAEx5&index=43)

EDUCATION

Qualification	Institute	CPI
PhD, Optical Wireless Communication	IIIT Delhi	9.73/10
M. Tech, Information & Communication Systems	ZHCET, AMU, Aligarh	9.778/10 (Honours) Topper- Communication Branch
B. Tech, Electronics and Communication Engineering	ZHCET, AMU, Aligarh	9.03/10 (Honours)
Senior Secondary(AISSCE)	Laxman Public School, New Delhi	91.2%
High School(CBSE)	Scottish Public School, Katihar (Bihar.)	92.8%

PROGRAMMING LANGUAGES AND TOOLS

MATLAB, Google Collab, Latex, python, LabVIEW, Arduino, NS-3, EXata, C, MS-OFFICE (Word, Power Point, Excel).

AWARDS, ACHIEVEMENTS AND POSITIONS OF RESPONSIBILITY

- Awarded **Visvesvaraya Fellowship** for PhD.
- Got certificate of appreciation in project work of IoT course- IIITD.
- Presented papers in various international and national Conferences. Also, received best paper runner-up award for one of the paper.
- As a Joint technical Coordinator, AMU ROBOCLUB: Successfully organized classes and workshops.
- Won 2nd position in “Follow me” a line follower robot competition in ZARF.
- Editor- Renaissance, @ingenious solution-a students’ forum, Hall Magazine - ZHCET, AMU: Successfully brought out newsletters, write-ups and magazines.