

Bharat Lal

Email: bharat.lal@dimes.unical.it bharat.lal@ieee.org Cell Phone: +393516637882
Address: Via P. Bucci, Cube 41C 4th floor, 87036 Rende (CS) Italy.



Qualifications

- **PhD, Information and Communication Technologies**, University of Calabria Italy (November 2021-In Progress)
Research Topic: Compressive Sensing for Wireless healthcare devices
Abroad Exchange: Center for Sensor Systems (ZESS), University of Siegen Germany (June-September 2023).
- **Master of Engineering in Automation and Control**, Mehran University of Engineering & Technology, Jamshoro, Pakistan, 2018, 3.90cpga. Thesis: *Design and functional verification of PSO-based FIR filter in FPGA.*
- **Bachelor of Engineering in Electronics Engineering**, Mehran University of Engineering & Technology, Jamshoro, Pakistan, 2016, 3.51cpga. Thesis: *Automation and monitoring smart reverse osmosis water treatment plant.*

Research and Industrial Experience

- **Researcher:** Department of Electronic Engineering, Mehran University of Engineering and Technology, Jamshoro, Pakistan (Sept. 2019 to Oct. 2021).
- **Lab Engineer:** Department of Electrical Engineering, Isra University, Hyderabad, Pakistan (August 2016 to June 2018).
- **Instruments and Control Engineer:** CHD Power Plant Operation Co., Ltd, Operation and Maintenance project for Engro Powergen Thar Ltd., in Thar coal block II, Sindh, Pakistan (December 2018 to September 2019).
- **Trainee Engineer:** Operation and Maintenance department, CHD Power Plant Operation Co., Ltd, Guizhou, China (June 2018 to November 2018).

Programming Skills

- C, VHDL, Python, and MATLAB, Vivado HLS

Research Interest

- Compressive Sensing, Wearable Computing, IoT, Machine Learning and Artificial Intelligence, Automation, and Control, Embedded Systems Design, Signal Processing

Professional Trainings

- Joint ICTP-IAEA School on Systems-on-Chip Based on FPGA for Scientific Instrumentation and Reconfigurable Computing (20 Nov. - 01 Dec. 2023).
- International School on Internet of Things & Edge AI: Computing, Communications, and Systems, Calabria Italy, (Sept. 8-12 2022).
- ICTP International Workshop on Embedded Systems and its Applications, Mehran University of Engineering and Technology, Pakistan, (3rd-5th March, 2015).
- Multimedia and Graphics Designing Training by Benazir Bhutto Shaheed Youth Development Project (Apr. to Aug. 2011).

Awards

- **Gold Medal** Best Research Paper award: Paper title "Smart Concrete Strength Measurement Device" in IEEE International Multi-topic Symposium, Karachi Pakistan (Feb. 2022).
- **Runner Up:** Final Year Project Competition, Project Title: Automation and monitoring smart reverse osmosis water treatment plant, (Feb. 2016).
- **Winner:** Scientific Appearance, IMMUET Students Seminar, (Nov. 2014).

Conferences and Talks

- **Program Committee Member:** DIStributed COLlective Intelligence (DISCOLI) Workshop, Cyprus 2023
- **Organizing Committee Member:**
 - International Conference on Embedded Wireless Systems and Networks (EWSN), Rende (CS), September 2023.
 - IEEE CyberSciTech/PICom/DASC/CBDCOM, Calabria, Italy. September 2022.
 - International Conf. on Emerging Tech. in Electronics, Computing and Communication, Pakistan, 2022

- 4th International Multi-Topic Conference, May 2015.
- 29th IEEE International Symposium, May 2014.
- 29th IEEE All Pakistan Students' Seminar 2014
- 3rd International Multi-Topic Conference, Pakistan, May 2013.
- IEEE Pakistan Students' Gold WIE Conference 2013.
- **Talk Delivered:** "Exploring the Potential of Compressive Sensing in Healthcare," Organized by IEEE I&M Society and Mehran UET, Pakistan, June, 2023.
- **Reviewer:**
 - IEEE Transactions on Biomedical Circuits and Systems
 - IEEE Transactions on Systems, Man and Cybernetics
- **Poster Presentation:** Compressed Sensing and Learning Approaches for Secure and Low-Power Health Care Devices, UNICAL PhD Day, May 2023.
- **Poster Presentation:** International School on Internet of Things & Edge AI: Computing, Communications, and Systems, Calabria Italy, September 2022.

Professional Memberships

- Registered Engineer, Pakistan Engineering Council, Registered Engineer, 2016-Present (ELECTRO/23230)
- Graduate Student Member, Institute of Electrical and Electronics Engineers, 2013-Present (93308329)
 - Chair, IEEE Calabria Student Branch
- Graduate Student Member, IEEE Instrumentation and Measurement Society, 2013-Present (93308329)

Research Publications

1. **Bharat Lal**, F. Spagnolo, P. Corsonello, and R. Gravina "A Novel Compressive Sensing Method for Secure and Energy Efficient ECG Signal Transmission Applications," in IEEE Journal of Biomedical and Health Informatics (*Under Review*).
2. **Bharat Lal**, Khushal Das, Miguel Heredia Conde, Pasquale Corsonello, Raffaele Gravina "Comparative Analysis of Compressive Sensing Reconstruction Algorithms for ECG Signals," in 6th International Workshop on the Theory of Computational Sensing and its applications to Radar, Multimodal Sensing, and Imaging (CoSeRa 2024). (Under Review).
3. **Bharat Lal**, R. Gravina, F. Spagnolo and P. Corsonello, "Compressed Sensing Approach for Physiological Signals: A Review," in IEEE Sensors Journal, doi: 10.1109/JSEN.2023.3243390.
4. **Bharat Lal**, Qimeng Li, Raffaele Gravina and Pasquale Corsonello, "Compressed Sensing-based IoMT Applications," Device-Edge-Cloud Continuum, Internet of Things, Springer Nature Switzerland, November, 2023.
5. Qimeng Li, **Bharat Lal** and Raffaele Gravina, "Multi-user Activity Monitoring based on Contactless Sensing," IoT Springer Series, December 2023 (Accepted).
6. **Bharat Lal**, Q. Li, R. Gravina, P. Corsonello, "Abnormal ECG Detection in Wearable Devices Using Compressed Learning," 20th IEEE International Conference on Networking, Sensing and Control, 25-27 October 2023 - Marseille, France.
7. **Bharat Lal**, Miguel Heredia Conde, Pasquale Corsonello and Raffaele Gravina, "Secure and Energy-Efficient ECG Signal Monitoring in the IoT Healthcare using Compressive Sensing," 21st IEEE International Conference on Dependable, Autonomic & Secure Computing, 24-27 November 2023, Dubai, UAE.
8. **Bharat Lal**, Q. Li, R. Gravina and P. Corsonello, "ECG Signals Analysis based on Compressed Sensing and Learning Techniques for Heart Disease Recognition," 2023 7th International Multi-Topic ICT Conference (IMTIC), Jamshoro, Pakistan, 2023, pp. 1-7, doi: 10.1109/IMTIC58887.2023.10178468
9. B. Abro, **Bharat Lal**, M. Aamir, S. L. Meghwar, F. A. Memon and Z. Hussain, "Smart Concrete Strength Measurement Device," 2022 International Conference on Emerging Technologies in Electronics, Computing and Communication (ICETECC), Jamshoro, Sindh, Pakistan, 2022, pp. 1-5, doi: 10.1109/ICETECC56662.2022.10069766.
10. J. Abbasi, L. Alina, A. M. Abro and **Bharat Lal**, "SEHAT: Smart E-Health App for Telediagnosis and first opinion," 2021 6th International Multi-Topic ICT Conference (IMTIC), 2021, pp. 1-6, doi: 10.1109/IMTIC53841.2021.9719812.
11. Z. Ali, **Bharat Lal**, T. D. Memon, N. Nafi, U. R. Memon, "Digital FIR Filter Design by PSO and its variants Attractive

and Repulsive PSO(ARPSO) & Craziness based PSO(CRPSO)", International Journal of Recent Technology and Engineering, Vol. 9, No. 6, Mar. 2021.

12. M. A. Faheem, D. K. Soother, **Bharat Lal**, J. Kumari, and A. Qureshi, "A Deep Learning based Non-invasive and Real Time Fault Detection System for 3-Phase Induction Motor" Sukkur IBA Journal of Emerging Technologies, Vol. 3, No. 1, 2021.
13. Aisha Baloch, Tayab D Memon, Farida Memon, **Bharat Lal**, Ved Viyas, Tony Jan," Hardware Synthesize and Performance Analysis of Intelligent Transportation Using Canny Edge Detection Algorithm", International Journal of Engineering and Manufacturing (IJEM), Vol.11, No.4, pp. 22-32, 2021.
14. **Bharat Lal**, Shaikh F., B. A. Arain, T. D. Memon and I. H. Kalwar, "FPGA based Synthesize of PSO Algorithm and its Area-Performance Analysis" International Journal of Advanced Computer Science and Applications, Vol. 9, No. 6, June 2018.
15. **Bharat Lal**, S. Sagar, M. Arain, B. A. Arain, F. Shaikh, "Automation and Monitoring of Reverse Osmosis Water Treatment Plant" International Journal of Engineering and Advanced Technology (IJEAT), Vol. 8, No.2, December 2018.
16. B. A. Arian, F. Shaikh, **Bharat Lal**, T. D. Memon, Imtiaz Hussain Kalwar, "Design of PID Controller Based on PSO Algorithm and Its FPGA Synthesization" International Journal of Engineering and Advanced Technology (IJEAT), Vol. 8, No.2, December 2018.
17. R. Akbar, S. R. Mehdi, A. Akhtar, **Bharat Lal**, N. Khaskheli and K. Shahani, "Design and Control of Unmanned Underwater Vehicle," Sukkur IBA Journal of Emerging Technologies, Vol. 1 No. 2, December 2018.
18. M. Farrukh, I. A. Halepoto, B. S. Chowdhry, H. Kazi and **Bharat Lal**, "Design and Implementation of PLC based Automatic Liquid Distillation System," Indian Journal of Science and Technology, Vol 10(29), August 2017.