Nazir Ahmed Loan

Ph.D. in Electronics | Expert in Multimedia Security & AI-Based Content Protection | Specializing in Encryption, Watermarking, and Deepfake Detection | Focused on Intelligent Automation

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Scholar.google.com | Researchgate.net | Linkedin.com | Scopus Profile | Web of Science

Summary

Highly motivated and accomplished researcher and educator with a Ph.D. in Electronics, specializing in multimedia security, digital watermarking, image/audio/video encryption, embedded systems, and AI-based automation. Backed by a strong publication record and substantial experience in teaching, research, and student mentorship. Seeking an Assistant Professor position to contribute to academic excellence, foster innovative research, and inspire the next generation of engineers and scientists.

Research Interests

- **Multimedia Watermarking and Encryption**
  Focused on developing robust algorithms for secure multimedia transmission, copyright protection, and tamper detection using advanced encryption and watermarking techniques.
- **AI-Driven Deepfake Detection & Content Verification**
  Investigates intelligent techniques to identify synthetic media, prevent misinformation, and ensure authenticity in digital content.
- **Secure Data Handling in E-Healthcare Systems**
  Explores privacy-preserving methods for protecting sensitive medical data through encryption, authentication, and secure communication protocols in healthcare environments.
- **Intelligent Automation in Smart and Embedded Systems**
  Design and implementation of adaptive embedded solutions for smart environments, emphasizing automation, energy efficiency, and real-time decision-making.
- **Image and Video Processing**
  Focused on feature extraction, enhancement, compression, and analysis techniques for real-time applications in surveillance, healthcare, and multimedia systems.

Core Competencies

- **Multimedia Security:** Image/Audio/Video Encryption, Watermarking, Deepfake Detection.
- **Embedded Systems:** System Design, Microcontroller/Microprocessor Programming, Arduino, IoT Solutions.
- **AI & Smart Systems:** AI-based Multimedia Processing, Smart Home Applications, E-Healthcare Systems.

Technical Skills

- **Programming & Scripting:** C, C++, Embedded C, Python, MATLAB, Arduino, Assembly, Basic VHDL, Java and JavaScript.
- **Tools & Platforms:** MATLAB, Quartus Prime, Multisim, Scilab, Proteus, Keil µVision, CodeBlocks, EMU-8086, Arduino IDE, VSCode.
- **Other:** Microsoft Office Suite, Adobe Photoshop, Hardware/Software Troubleshooting.
- **Operating Systems:** Windows

Projects

- Home Appliances Control System Using IR Technology
  Role: Developer | Tools: IR Sensors, Microcontroller | Outcome: Prototype for smart appliance control
- Automated Thermal Comfort System for Healthcare Bedding
  Role: Mentor | Focus: Embedded system for adaptive temperature control in hospital beds
- Automatic Irrigation System using Arduino Uno
  Role: Mentor | Focus: IoT-based agriculture solution for efficient water use
- Human Presence Detection in Smart Home Systems
  Role: Mentor | Tools: Sensors, Microcontroller | Application: Energy-saving smart automation
- **Secure Video Data Hiding System Using MATLAB GUI**
  Role: Mentor | Tools: MATLAB | Focus: Multimedia steganography and GUI-based encryption

Teaching Experience

Lecturer (**C**) | Dept. of Electronics & IT, University of Kashmir ***Mar 2021 – Dec 2024***

- Taught postgraduate courses for MTech (Embedded Systems and Solutions) and MSc (Electronics and Instrumentation technology)
- Mentored over 20 BTech, MTech, and MSc students in research and project development
- Led tutorials on scientific research methodology, algorithm development, and technical writing

Assistant Professor (C)| Dept. of Electronics & IT, University of Kashmir ***Currently***

Academic Courses (taught at Postgraduate level):

- **Microcontroller Architecture & Programming**
  Covered 8051/PIC architecture, instruction set, serial communication, timers, interrupts, peripheral interfacing, assembly and C programming.
  Lab: *Keil µVision, Proteus, Multisim, hardware kits.*
- **Microprocessor Architecture & Programming**
  Covered 8086 architecture, assembly language, BIOS calls, peripheral interfacing (8255, 8259).
  Lab: *EMU8086, Multisim, trainer kits.*
- **Advanced Embedded Programming**
  Taught C/C++ for embedded systems, real-time constraints, low-level hardware access, and object-oriented techniques, introduction to JavaScript, .
  Tools: *Keil, Atmel Studio, Node.js.*
- **Computer Organization & Architecture**
  Taught computer structure and functions, memory hierarchy, instruction set architecture, I/O organization, Integer and Floating-point arithmetic, and ALU/Control unit design
  Lab: *Multisim, digital hardware.*
- **Data Structures**
  Taught Array Implementation of Lists, Linked Lists, Stacks, Implementation of Stack using Arrays, Implementation of Stack using Linked Lists, Linear Search, Binary Search, Bubble Sort.
  Lab: *CodeBlocks, Visual Studio Code.*
- **Digital Electronics & C-Programming**
  Taught logic gates, flip-flops, counters, code converters, multiplexers, and more, along with C Programming, covering syntax, data types, control structures, functions, standard libraries, and basic algorithms.

Lab: *Code::Blocks, hardware components.*

- **Signals & Systems**: LTI analysis, Fourier/Laplace transforms, random processes.
  Lab: *MATLAB signal processing.*
- **Digital Image Processing**: Image operations, Sampling, filtering, compression.
  Lab: *MATLAB implementation.*
- **Simulation and Modeling using MATLAB**
  Matrix operations, Simulink, system design, image processing.
- **Embedded Systems**
  Architectures, OS-level scheduling, memory organization.
  Labs: *Arduino IDE, Core system components.*
- **Lab-Only Courses:** Embedded system design | Digital signal processing | Digital image processing | Linear IC applications, Power Electronics, Digital signal Processor.

Education

Ph.D. in Electronics
University of Kashmir | Oct 2019
Advisor: Dr. Shabir A. Parah, **Co-advisor:** Dr. Javaid A. Sheikh
Thesis: *Design, Development, and Implementation of Robust Image Watermarking Techniques for Copyright Protection.*
Advisor: Dr. Shabir A. Parah & Dr. Javaid A. Sheikh

M.Sc. in Electronics
University of Kashmir | 2013 | **Gold Medalist**
Thesis: *Design and Development of Home Appliances Control System Using IR Technology*

B.Sc. (Non-Medical: Electronics, Physics, Math)
S.P. College, University of Kashmir | 2010

Achievements and Awards

- **First class first position** |Gold Medal | *M.Sc. Electronics, batch 2011* |University of Kashmir.
- **Junior Research Fellowship |** *DST-INSPIRE Fellowship*| March 2015 to June 2018| Department of Science and Technology, Govt. of India
- **Senior Research Fellowship |** *DST-INSPIRE Fellowship*| June 2018 to October 2019| Department of Science and Technology, Govt. of India
- **Best Paper Presentation Award** | *2015 International Conference on Advances in Computer, Communication and Electronic Engineering (COMMUNE)* | 16–18 March 2015 | University of Kashmir, J&K, India

Review Activities and Professional Service

- **IEEE Student Member |** *IEEE Signal Processing Society Member* **|** Membership id: #95486109.
- **Registration Committee Member |** *JK Science Congress* (JKSC-2018) **|** University of Kashmir
- **Registration Committee Member |** *Department of Electronics*| University of Kashmir
  National/international seminars and conferences organized (**2014 to 2018**).

Scientific Publications

➢ Book Chapters

1. Parah, S. A., Sheikh, J. A., **Loan, N. A.,** & Bhat, G. M. (2017). *A Robust and Computationally Efficient Digital Watermarking Technique Using Inter Block Pixel Differencing.* In Multimedia Forensics and Security (pp. 223-252). Springer, Cham.
2. Parah, S. A., Ahmad, I., **Loan, N. A.,** Muhammad, K., Sheikh, J. A., & Bhat, G. M. (2019). *Realization of an Adaptive Data Hiding System for Electronic Patient Record, Embedding in Medical Images*. In Security in Smart Cities: Models, Applications, and Challenges (pp. 47-70). Springer, Cham.
3. Parah, S. A., Bashir, A., Manzoor, M., Gulzar, A., Firdous, M., **Loan, N. A.,** & Sheikh, J. A. (2019). *Secure and reversible data hiding scheme for healthcare system using magic rectangle and a new interpolation technique.* In Healthcare Data Analytics and Management (pp. 267-309). Academic Press.
4. Parah, S. A., Digoo, T., Hamdani, G. A., Shah, A. A., Khan, I., Khan, O., **Loan, N. A.,** & Sheikh, J. A. (2019*). A reversible and secure electronic patient record embedding technique using histogram bin shifting and RC6 encryption*. In Healthcare Data Analytics and Management (pp. 245-266). Academic Press.
5. Parah, S. A., Ahad, F., Sheikh, J. A., **Loan, N. A.,** & Bhat, G. M. (2017). *Pixel repetition technique: A high capacity and reversible data hiding method for e-healthcare applications*. In Intelligent Techniques in Signal Processing for Multimedia Security (pp. 371-398). Springer, Cham.

➢ Book

Nasir Hurrah, **Nazir Loan,** *Design of Oversampled ΣΔ ADC Decimation Filters with High Performance: A state-of-the-art work for researchers,* LAP LAMBERT Academic Publishing, 2021

➢ Journal Articles

1. **Loan, N. A.,** Hurrah, N. N., Parah, S. A., Lee, J. W., Sheikh, J. A., & Bhat, G. M. (2018). *Secure and Robust Digital Image Watermarking using Coefficient Differencing and Chaotic Encryption*. IEEE Access, Vol. 6, pp. 19876 – 19897, SCI IF: 3.745.
2. **Loan, N. A.,** Parah, S. A., Sheikh, J. A., Akhoon, J. A., & Bhat, G. M. (2017). *Hiding Electronic Patient Record (EPR) in medical images: A high capacity and computationally efficient technique for e-healthcare applications.* Journal of biomedical informatics, vol. 73, pp. 125-136, SCI IF: 3.526.
3. Altaf, N., **Loan, N. A**., Hussan, M., Parah, S. A., "TDLCI: *An efficient scheme for tamper detection and localization in color images*". Multimedia Tools and Applications, 2024.
4. Hurrah, N. N., **Loan, N. A.,** Parah, S. A., Sheikh, J. A., Muhammad, K., De Macedo, A. R. L., De Albuquerque, V. H. C. "*INDFORG: Industrial Forgery Detection using Automatic Rotation Angle Detection and Correction*". IEEE Transactions on Industrial Informatics, doi: 10.1109/TII.2020.3014158, SCI IF: 9.112.

5. Hurrah, N. N., Parah, S. A., **Loan, N. A.,** Sheikh, J. A., Elhoseny, M., Muhammad, K., "*Dual watermarking framework for privacy protection and content authentication of multimedia*". Future Generation Computer Systems, Elsevier, vol. 94, pp. 654-673, (May 2019). SCI IF: 6.125. Available at: https://doi.org/10.1016/j.future.2018.12.036.
6. Parah, S. A., **Loan, N. A.,** Shah, A. A., Sheikh, J. A., & Bhat, G. M. (2018). *A new secure and robust watermarking technique based on logistic map and modification of DC coefficient*. Nonlinear Dynamics, vol. 93, issue 4, pp. 1933–19511, SCI IF: 4.867.
7. Kaw, J. A., **Loan, N. A.,** Parah, S. A., Muhammad, K., Sheikh, J. A., & Bhat, G. M. (2019). *A reversible and secure patient information hiding system for IoT driven e-health*. International Journal of Information Management, vol. 45, pp. 262-275, SCI IF: 8.210.
8. Gull, S., **Loan, N. A.,** Parah, S. A., Sheikh, J. A., & Bhat, G. M. (2018). *An efficient watermarking technique for tamper detection and localization of medical images*. Journal of Ambient Intelligence and Humanized Computing, vol. 11, pp. 1799-1808-(retracted)
9. Parah, S. A., Sheikh, J. A., Loan, N. A., Ahad, F., & Bhat, G. M. (2018). *Utilizing neighborhood coefficient correlation: a new image watermarking technique robust to singular and hybrid attacks*. Multidimensional Systems and Signal Processing, vol. 29, issue 3, pp. 1095-1117, SCI IF: 1.810.
10. Parah, S. A., Sheikh, J. A., **Loan, N. A.,** & Bhat, G. M. (2016). *Robust and blind watermarking technique in DCT domain using inter-block coefficient differencing*. Digital Signal Processing, vol. 53, pp. 11-24, SCI IF: 2.871.
11. Parah, S. A., Sheikh, J. A., Akhoon, J. A., & **Loan, N. A.** (2018). *Electronic Health Record hiding in Images for smart city applications: A computationally efficient and reversible information hiding technique for secure communication.* Future Generation Computer Systems, vol. 108, pp. 935-949, SCI IF: 6.125.
12. Shabir A. Parah, Javaid A. Kaw, Paolo Bellavista, **Nazir A. Loan,** G. M. Bhat, Khan Muhammad, & Albuquerque Victor, "*Efficient Security and Authentication for Edge-based Internet of Medical Things*" in IEEE Internet of Things Journal, 10.1109/JIOT.2020.3038009, SCI IF: 9.5,
13. Parah, S. A., Ahad, F., Sheikh, J. A., **Loan, N. A.,** & Bhat, G. M. (2017). *A New Reversible and high capacity data hiding technique for E-healthcare applications.* Multimedia Tools and Applications, Vol. 76, issue 3, pp. 3943-3975, SCI IF: 2.313.
14. Parah, S. A., Sheikh, J. A., Akhoon, J. A., **Loan, N. A.,** & Bhat, G. M. (2018*). Information hiding in edges: a high capacity information hiding technique using hybrid edge detection*. Multimedia Tools and Applications, vol. 77, issue 1, pp. 185-207, SCI IF: 2.313.
15. Parah, S. A., Sheikh, J. A., Ahad, F., **Loan, N. A.,** & Bhat, G. M. (2017). *Information hiding in medical images: a robust medical image watermarking system for E-healthcare*. Multimedia Tools and Applications, vol. 76, issue 8, pp. 10599-10633, SCI IF: 2.313.
16. Hurrah, N. N., **Loan, N. A.,** Parah, S. A., & Iqbal, Z., "*Area Optimized Decimation Filter for Wideband ΣΔ Analog to Digital Converters", International Journal of Emerging Technologies and Innovative Research (UGC Approved)*, ISSN:2349-5162, Vol. 6, Issue 2, page no. pp334-341, 2019. Available at: http://doi.one/10.1729/Journal.19844.
17. Hurrah, N. N., **Loan, N. A.,** Parah, S. A., & Sheikh, J. A., "*A Hybrid Transform Domain Based Secure and Robust Watermarking Technique for Privacy for Medical Applications*," *in Int. Journal of Advance Research in Science and Engg. (IJARSE),* (UGC Approved at time of publish), Vol. 7(4), 3066-3078, March 2018.
18. Hurrah, N. N., Parah, S. A., & **Loan, N. A.,** "Power Efficient Multi-Stage *Decimation Filter for Wideband Sigma-Delta ADCs", International Journal of Computer Sciences and Engineering* (UGC

Approved), ISSN:2347-2693, Vol.7, Issue 3, pp. 854-860, 2019. Available at: https://doi.org/10.26438/ijcse/v7i3.854860.

19. Hurrah, N. N., **Loan, N. A.,** Parah, S. A., & Sheikh, J. A., "*Realization of Highly Secure Fragile Watermarking Technique for Authentication of Digital Images",* Advanced Research in Electrical and Electronic Engineering, e-ISSN: 2349-5812, Vol. 5, Issue 3, 2018, pp. 188-192.

➢ International Conferences

1. **Loan, N. A.,** Hurrah, N. N., Parah, S. A., & Sheikh, J. A. (2017, December). *High capacity reversible stenographic technique based on image resizing and pixel permutation.* In 2017 Fourth International Conference on Image Information Processing (ICIIP), (pp. 1-6). IEEE.
2. Hurrah, N. N., **Loan, N. A.,** Parah, S. A., & Sheikh, J. A. (2017, December). *A transform domain based robust color image watermarking scheme for single and dual attacks.* In 2017 Fourth International Conference on Image Information Processing (ICIIP), (pp. 1-5). IEEE.
3. Hurrah, N. N., **Loan, N. A.,** Parah, S. A., & Sheikh, J. A. (2018, April). *A hybrid Transform Based Secure and Robust Watermarking Technique for Privacy for Medical Applications*. In 1st international conference on recent developments in science, humanities & Management-(ICRDSHM), 20 March 2018.
4. Hurrah, N. N., **Loan, N. A.,** Parah, S. A., & Sheikh, J. A., "*Realization of Highly Secure Fragile Watermarking Technique for Authentication of Digital Images*" in Int. Conf. on Recent Trends in Engg., Tech., Agriculture, Applied Sciences, Humanities and Business Management for Sustainable Development (ETAHBS-2018), NIT Srinagar, J&K, India, 20-21 Oct., 2018.
5. Hurrah, N. N., **Loan, N. A.,** Parah, S. A., & Sheikh, J. A., "*Realization of Highly Accurate Tamper Localization Framework for Digital Image Watermarking Applications*" in Proc. Of 5th Int. Conf. on Recent Trends & Advancements in Engg. Tech., SMVDU Katra, J&K, India, 25-26 Oct, 2018.
6. Parah, S. A., Sheikh, J. A., **Loan, N. A.,** & Bhat, G. M. (2015, March). *A blind watermarking technique in spatial domain using inter-block pixel value differencing.* In 2015 International Conference on Advances in Computer, Communication and Electronic Engineering (COMMUNE) (pp. 321-326).
7. Parah, S. A., Akhoon, J. A., Sheikh, J. A., **Loan, N. A.,** & Bhat, G. M. (2015, December). A high capacity data hiding scheme based on edge detection and even-odd plane separation. In 2015 Annual IEEE India Conference (INDICON), (pp. 1-5). IEEE.
8. Qureshi, I., Parah, S. A., **Loan, N. A.,** Hurrah, N. N., Qureshi G. J., "*Realization of a robust watermarking system in spatial domain*" in Proceedings of 3rd International Conference on Recent Innovations in Computing (ICRIC-2020), Lecture Notes in Electrical Engineering, Springer.

➢ National Conferences/Seminars

1. **Loan, N. A.,** Parah, S. A., Sheikh, J. A., Hurrah, N. N., & Akhoon, J. A. (2016). *Robust Watermarking for General and Medical Images in Pixel Domain.* In Proceedings of 2016 UGC Sponsored National Seminar on Electronic Devices, Systems and Information Security, Department of Electronics and Instrumentation Technology University of Kashmir, Srinagar, India. 18-19 March, 2016, pp. 61.
2. **Loan, N. A.,** Hurrah, N. N., Akhoon, J. A., Parah, S. A., & Sheikh, J. A., Nazir A. Loan, Nasir N. Hurrah, Jahangir A. Akhoon, Shabir A. Parah & Javaid A. Sheikh, "*High Capacity Watermarking Technique for Authentication of Medical Images*", in Proc. of 13th J&K Science Congress, University of Kashmir, J&K, ISBN: 978-93-5291-653-5.

3. **Loan, N. A**., Akhoon, J. A., Hurrah, N. N., Parah, S. A., & Sheikh, J. A., (2017). *High Capacity Reversible Data Hiding Technique based on Image Resize and Pixel Scrambling.* In Proceedings of 2017 UGC Sponsored National Seminar on Electronic Devices, Systems and Information Security, Department of Electronics and Instrumentation Technology University of Kashmir, Srinagar, India. 24-25 March, 2017, pp. 22.
4. **Loan, N. A.,** Hurrah, N. N., & Parah, S. A., (2018). *A New Fragile and Semi-Reversible Image Watermarking Technique for Temper Detection and Authentication*. in Proceedings of 2018 UGC Sponsored National Seminar on Electronic Devices, Systems and Information Security, Department of Electronics and Instrumentation Technology University of Kashmir, Srinagar, India. 3rd and 4th April, 2018, pp. 31.
5. **Loan, N. A.,** Hurrah, N. N., Parah, S. A., Akhoon, J. A., & Sheikh, J. A., (2018). *Blind Robust Image Rotation Estimation Technique Based on Pythagorean Theorem*. In Proceedings of 13th Session of J&K Science Congress, University of Kashmir, Srinagar, India. 02-04 April, 2018, pp. 704.
6. Akhoon, J. A. Parah, S. A., Sheikh, J. A., **Loan, N. A.,** & Hurrah, N. N., (2016). *On the Realization of a High Capacity Data Hiding Technique for Color Images using Edge Detection.* In Proceedings of 2016 UGC Sponsored National Seminar on Electronic Devices, Systems and Information Security, Department of Electronics and Instrumentation Technology University of Kashmir, Srinagar, India. 18-19 March, 2016, pp. 76.
7. Hurrah, N. N., **Loan, N. A.,** Akhoon, J. A., Parah, S. A., Masoodi, I. S., & Sheikh, J. A., (2017*). A Multipurpose Robust Watermarking Algorithm with Multilayer Security.* In Proceedings of 2017 UGC Sponsored National Seminar on Electronic Devices, Systems and Information Security, Department of Electronics and Instrumentation Technology University of Kashmir, Srinagar, India. 24-25 March, 2017, pp. 66.
8. Hurrah, N. N., **Loan, N. A.,** Akhoon, J. A., Parah, S. A., & Sheikh, J. A., (2018). *A Highly Sensitive Encryption Technique for High Security Watermarking Applications.* In Proceedings of 13th Session of J&K Science Congress, University of Kashmir, Srinagar, India. 02-04 April, 2018, pp. 674.
9. Kaw, J. A., **Loan, N. A.,** Bhat, G. M., Sheikh, J. A., Amin, M., Parah, S. A., (2017), *Reversible Stenographic Technique Based on Pixel Repetition Method and Data Shifting,* In Proceedings of 2017 UGC Sponsored National Seminar on Electronic Devices, Systems and Information Security, Department of Electronics and Instrumentation Technology University.
10. Hurrah, N. N., Parah, S. A., Sheikh, J. A., **Loan, N. A.,** & Akhoon, J. A., (2015), *Hardware realization of Watermarking Algorithm for Multimedia Applications*. In Proceedings of 11th Session of J&K Science Congress, University of Kashmir, Srinagar, India. 12-14 October, 2015.
11. Parah, S. A., Sheikh, J. A., Akhoon, J. A., **Loan, N. A.,** Hurrah, N. N., & Ahad, F., (2015), *High Capacity Steganographic Technique based on Modular Arithmetic.* In Proceedings of 11th Session of J&K Science Congress, University of Kashmir, Srinagar, India. 12-14 October, 2015.
12. Hurrah, N. N., **Loan, N. A.,** Masoodi, I. S., & Parah, S. A., "*Development of robust digital watermarking technique with two level security for simultaneous attacks*," National Seminar on National Development Through Science and Technology 25-26 September, 2017
13. Hurrah, N. N., **Loan, N. A.,** Akhoon, J. A., Amin, M., "*Power Efficient Non-Recursive Decimation Filter for Oversampled SD ADCS*", in Proc. of 11th J&K Science Congress, University of Kashmir, J&K, ISBN: 978-93-82288-87-9.

References

Available upon request