

## Profile

**Name:** Dr. Aparna P  
**Designation:** Associate Professor, E&C Dept, National Institute of Technology Karnataka,  
**Address:** Srinivas Nagar Post, Surathkal, Mangalore-575025  
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### Academic records:

(A) **Ph.D.:** From NITK, Surathkal in March 2012 in the **Area of:** Multimedia Signal Processing.  
under the guidance of Prof. Sumam David, EC Dept, NITK, Surathkal

(B) **Post Graduate: M.Tech** (Digital Electronics and Advanced Communication) - NITK, Surathkal, in July 2004.

(C) **Graduate: B.E.(E&C) from** N.M.A.M. Institute of Technology, Nitte, Mangalore University in 1999.

### Teaching Experience:

Joined Department of ECE, NITK, Surathkal in 2008 Feb as Assistant Professor.

### **Courses Handled:**

1. Microprocessor (ARM7)
2. Embedded System
3. Advanced Computer Architecture
4. Data Structures
5. Digital Signal Compression
6. Linear Systems and Circuits
7. Advanced DSP
8. Digital Electronics and Computer Architecture
9. Digital Design with FPGA
10. Audio and speech processing
11. Pattern Recognition and Machine Learning

### **Ph.D. Guided: Completed: 7 Ongoing: 2**

1. "Visually lossless compression of volumetric medical images" - 2017, Chandrika B. K.
2. "Pattern recognition and machine learning framework for automated analysis of retinal images"-2019, Chetan L Srinidhi
3. "Intra prediction strategies for Lossless Compression in High Efficiency Video Coding" – 2020 , Shilpa Kamath
4. "Development of GPS spoofing and anti-spoofing algorithms in data association and target tracking frameworks" -2021, Pardha Saradhi
5. "Development of low complexity encoder and summarization techniques for Wireless Capsule Endoscopy video" – 2022, Sushma B.
6. "Area efficient hardware architectures of intra prediction and sample adaptive offset filter For HEVC encoder" – 2022, Lakshmi K Poola
7. "Enhancing speech perception in Cochlear Implants: Novel approaches in encoding temporal fine structures and noise reduction"- 2023, 1. Venkateswarlu Poluboina

### Projects Guided recently:

- Video summarization and Compression of Wireless Capsule Endoscopy videos.
- Classification of Wireless Capsule Endoscopy images
- Noise reduction in Cochlear implant coders
- Improving speech intelligibility in Cochlear implants
- Complexity reduction of Intracoding in HEVC.
- Implementation of VLIW processor.
- Architectures for signal processing

### List of Papers Published in Journals:

1. Poluboina, V., Pulikala, A. & Pitchaimuthu, A.N. "Deep Speech Denoising with Minimal Dependence on Clean Speech Data.", *Circuits Syst Signal Process* (2024). <https://doi.org/10.1007/s00034-024-02644-y>
2. Sushma B., Aparna Pulikala, "AAPFC-BUSnet: Hierarchical encoder–decoder based CNN with attention aggregation pyramid feature clustering for breast ultrasound image lesion segmentation.", *Biomedical Signal Processing and Control*, Volume 91, 2024, 105969, ISSN 1746-8094, <https://doi.org/10.1016/j.bspc.2024.105969>.
3. V. Poluboina, A. Pulikala and A. N. P. Muthu, "An Improved Noise Reduction Technique for Enhancing the Intelligibility of Sinewave Vocoded Speech: Implication in Cochlear Implants," in *IEEE Access*, vol. 11, pp. 787-796, 2023, doi: 10.1109/ACCESS.2022.3232549.
4. Sushma B., Aparna P., Recent developments in wireless capsule endoscopy imaging: Compression and summarization techniques, *Computers in Biology and Medicine*, Volume 149, 2022, 106087, ISSN 0010-4825, <https://doi.org/10.1016/j.combiomed.2022.106087>.
5. Sushma B., Aparna P., Deep chroma prediction of Wyner–Ziv frames in distributed video coding of wireless capsule endoscopy video, *Journal of Visual Communication and Image Representation*, Volume 87, 2022, 103578, ISSN 1047-3203, <https://doi.org/10.1016/j.jvcir.2022.103578>. 9 (SCIE)
6. Poola, L., Aparna, P. An efficient parallel-pipelined intra prediction architecture to support DCT/DST engine of HEVC encoder. *J Real-Time Image Proc* (2022). <https://doi.org/10.1007/s11554-022-01206-2> (SCIE)
7. Poluboina, Venkateswarlu, Aparna Pulikala, and Arivudai Nambi Pitchai Muthu. "Contribution of frequency compressed temporal fine structure cues to the speech recognition in noise: An implication in cochlear implant signal processing." *Applied Acoustics* 189 (2022): 108616 (SCIE)
8. B. Sushma and P. Aparna, "Summarization of Wireless Capsule Endoscopy Video Using Deep Feature Matching and Motion Analysis," in *IEEE Access*, vol. 9, pp. 13691-13703, 2021, doi: 10.1109/ACCESS.2020.3044759
9. B. K. Chandrika, P. Aparna & S. Sumam David (2020) An Approach for Diagnostically Lossless Coding of Volumetric Medical Data Based on Wavelet and Just-Noticeable-Distortion Model, *IETE Journal of Research*, DOI: 10.1080/03772063.2020.1844070 (SCIE)
10. Lakshmi Poola & P. Aparna (2020) A Mixed Parallel and Pipelined Efficient Architecture for Intra Prediction Scheme in HEVC, *IETE Technical Review*, 11 Nov 2020. (SCIE) DOI: 10.1080/02564602.2020.1841686
11. B. Sushma, P. Aparna, "Distributed video coding based on classification of frequency bands with block texture conditioned key frame encoder for wireless capsule endoscopy", *Biomedical Signal Processing and Control*, Volume 60, July 2020, 101940, DOI:10.1016/j.bspc.2020.101940, (SCIE indexed)
12. S. Shilpa Kamath, P. Aparna and Abhilash Anthony (2020), "Performance enhancement of HEVC lossless mode using context-based angular and planar intra predictions", *Multimedia Tools and Applications*, Springer, pp. 1–23. DOI: 10.1007/s11042-019-08466-4, (SCIE indexed)

13. S. Shilpa Kamath, P. Aparna and Abhilash Anthony (2020), "Pixelwise improvised blend of predictors in HEVC lossless mode", *International Journal of Electronics and Communications (AEU)*, Elsevier, Vol. 114, DOI: 10.1016/j.aeue.2019.153000, (SCIE indexed)
14. Srinidhi, C. L., Aparna, P., & Rajan, J. , " Automated Method for Retinal Artery/Vein Separation via Graph Search Metaheuristic Approach", *IEEE Transactions on Image Processing.*, doi: 10.1109/TIP.2018.2889534, vol 28, pp 2705-2718 (SCI)
15. S. Shilpa Kamath, P. Aparna, Abhilash Antony, "Gradient-oriented directional predictor for HEVC planar and angular intra prediction modes to enhance lossless compression", *AEU - International Journal of Electronics and Communications*, Elsevier Publishers, Vol 95, October 2018, Pages 73-81, <https://doi.org/10.1016/j.aeue.2018.07.037>. (SCI & SCIE Indexed)
16. L Srinidhi, C., Aparna, P. & Rajan,J , "A visual attention guided unsupervised feature learning for robust vessel delineation in retinal images", *Journal Of Biomedical Signal Processing and Control*, Elsevier Publishers, Vol 44, July 2018, Pages 110-126b, <https://doi.org/10.1016/j.bspc.2018.04.016> (SCIE Indexed)
17. L Srinidhi, C., Aparna, P. & Rajan,J, "Recent Advancements in Retinal Vessel Segmentation", *Journal of Medical Systems*, Springer, April 2017, 2017,41:70, doi:10.1007/s10916-017-0719-2. (SCIE indexed).
18. Chandrika B.K., Aparna P., Sumam David S., " Perceptually Lossless Coder for Volumetric Medical Image Data", *Journal of Visual Communication and Image Representation*, Elsevier Publishers, Vol 46, July 2017,pp 23-32, doi.org/10.1016/j.jvcir.2017.03.006, (SCIE Indexed)
19. Chandrika B.K., Aparna P., Sumam David S., "Visually Lossless Coder for Volumetric MRI and CT Image Data using Wavelet Transform", *International Journal of Computational Vision and Robotics*, Vol. 7, No. 6, 2017, Inderscience Publishers. (Scopus Indexed)
20. D. Sai Parameshwari, Aparna P. "An efficient framework for segmentation and identification of tumours in brain MR images", *Int. J. Advanced Media and Communication*, Vol. 6, Nos. 2/3/4, 2016. (Scopus Indexed)
21. Chandrika B.K., Aparna P., Sumam David S., Analysis and Comparison of Symmetry based Lossless and Perceptually Lossless Algorithms for Volumetric Compression of Medical Images, *Journal of Medical Informatics and Technologies*, Vol. 24, pp. 147-154, 2015.
22. Aparna P. and Sumam David, "Low Complexity Distributed Video Coding with Golay Codes," *International Journal of Machine Learning and Computing* vol. 2, no. 4, pp. 466-470, 2012.
23. Aparna, P. and David, S. (2011) 'Efficient Distributed Video Coding based on principle of syndrome coding', *International Journal of Signal and Imaging Systems Engineering* 2011 - Vol. 4, No.4 pp. 212 - 219, DOI: 10.1504/IJSISE.2011.044533.(Scopus indexed)
24. Aparna P, Sivaprakash Reddy, Sumam David, "Distributed video coding using LDPC codes for wireless video", *Journal on Wireless Sensor Networks*, Scientific Research Publishing, Inc. USA, 2009, 1, 334-339

#### **List of Papers Published in Conferences:**

1. Barre Uma Prasanna Vishnu, Venkateswarlu Poluboina, Sushma B., Aparna Pulikala, Speech Intelligibility Enhancement for Cochlear Implant using Multi-Objective Deep Denoising Autoencoder", 2023 IEEE – INDICON, 14-17 DEC 2023, CMRIT HYDERABAD (INDIA)
2. P. S. Rao and A. Pulikala, "Hardware-Optimized Deep Learning Model for FPGA-Based Character Recognition," *TENCON 2023 - 2023 IEEE Region 10 Conference (TENCON)*, Chiang Mai, Thailand, 2023, pp. 238-242, doi: 10.1109/TENCON58879.2023.10322427.
3. Katteboina Lavanya, Aparna P., "Multi-class Classification of Wireless Capsule Endoscopy Images By Using the Fusion of Pre-trained Networks and Fusion Residual Block", *International Conference on Systems, Control and Automation(ICSCA-2023)* May 12-13, 2023, NATIONAL INSTITUTE OF TECHNOLOGY, KURUSKHETRA.

4. S. Biradher and P. Aparna, "Classification of Wireless Capsule Endoscopy Bleeding Images using Deep Neural Network," *2022 IEEE Delhi Section Conference (DELCON)*, 11-13 Feb, 2022, pp. 1-4, doi: 10.1109/DELCON54057.2022.9753487.
5. Sushma. B and Aparna. P, "Effect of Different Color Spaces on Deep Image Segmentation," *2021 IEEE International Women in Engineering (WIE) Conference on Electrical and Computer Engineering (WIECON-ECE)*, 2021, pp. 1-4, doi: 10.1109/WIECON-ECE54711.2021.9829655. 4-5 December 2021
6. S. Biradher and A. P., "Classification of Capsule Endoscopy Images based on Feature Concatenation of Deep Neural Networks," *2021 Fourth International Conference on Electrical, Computer and Communication Technologies (ICECCT)*, 2021, 24 – 26, February 2021. pp. 1-4, doi: 10.1109/ICECCT52121.2021.9616920.
7. Cochlear acoustic model that improves the speech perception in noise by encoding TFS, 4th International Conference on VLSI, Communication and Signal Processing 24-26 SEPTEMBER 2021 MNNIT ALLAHABAD, PRAYAGRAJ, Springer.
8. Lakshmi, Aparna P, "Efficient architectures for planar and DC modes of intra prediction in HEVC", 7th International Conference on Signal Processing and Integrated Networks, SPIN 2020 (2020), 27-28 Feb 2020, Amity University, Delhi.
9. Sushma B and Aparna P, "Texture Classification based Efficient Image Compression Algorithm for Wireless Capsule Endoscopy", 5<sup>th</sup> Intl. Conference ICCED 2019 April 11<sup>th</sup> to 13<sup>th</sup> 2019, at Singapore
10. Garivi, Haritha., Aparna P, Pathipati Srihari, and Gnane Swarnadh Satapathi, "Analysis of real-time tracking\_filters implementation in FPGA. In 2018 IEEE Distributed Computing", VLSI, Electrical Circuits and Robotics (DISCOVER) . IEEE, 13-14 August 2018.
11. Shilpa Kamath, Aparna P., Abhilash Antony, "Sample-based DC Prediction Strategy for HEVC Lossless Intra Prediction Mode", 2017 Fourth IEEE ICIIP, 21<sup>st</sup>-23<sup>rd</sup> December 2017, Jaypee University of Information Technology, Shimla, Himachal Pradesh, INDIA
12. Seema K., Aparna P., "A Feasible QRS Detection Algorithm for Arrhythmia Diagnosis", International Conference on Advances in Electrical, Electronic and Systems Engineering (ICAEESE 2016), 14-16 November 2016 in Putrajaya, Malaysia.
13. Hari Sankar S., Suraj B., Jayadev K., Aparna P., "A comprehensive solution to road traffic accident detection and ambulance management", International Conference on Advances in Electrical, Electronic and Systems Engineering (ICAEESE 2016), 14-16 November, 2016 in Putrajaya, Malaysia
14. Chandrika B.K., Aparna P., Sumam David S., "Irreversible wavelet compression of radiological images based on visual threshold", IEEE International Women in Engineering Conference on Electrical and Computer Engineering, 19-20 December 2015, Dhaka, Bangladesh.
15. Chandrika B.K., Aparna P., Sumam David, "Symmetry Based Perceptually Lossless Compression of 3D Medical Images in Spatial Domain", International Conference on Computer, Communication, and Control Technology (I4CT, 2014), Malaysia, September 2014.
16. Parameshwari,D.S., Aparna P., "An efficient algorithm for textural feature extraction and detection of tumors for a class of brain MR imaging applications", 19th International Conference on Digital Signal Processing (DSP), 2014, Hong Kong, Publication Year: 2014 , Page(s): 339 – 344
17. Aparna P, Shreyas S Hanchinal, Preetham N, Kishore Subramanian B, "Comparative study of Canny Edge Detection Algorithm for Diagnosis of Retinopathy of Prematurity", International Engineering Symposium (IES-2013), Kumamoto University, Japan, 4 - 6 March, 2013.
18. Ashwini V R and Aparna P, " A Nearest Neighbor Based Approach for Classifying Epileptic form EEG Using NonLinear DWT Features", International Conference on Signal Processing and Communications, Indian Institute of Science, Bangalore, July 22-25 2012.

19. Aparna P, Sumam David," Low complexity distributed video coding with Golay codes" 2011 3rd International Conference on Machine Learning and Computing (ICMLC 2011), Singapore, February 26-28, 2011.
20. Aparna P, Sumam David," Multilevel Coset coding of video with Golay codes", IEEE Symposium on Computer and Informatics (ISCI 2011), Kuala Lumpur, Malaysia, March 20-22, 2011.
21. Sivaprakash Reddy, Aparna P & Sumam David, "Syndrome coding of Video with LDPC codes", 9<sup>th</sup> International Conference on Signal Processing, Beijing, China, 24-29 October 2008.
22. Aparna P, Sumam David S," Efficient Compression of video using distributed source coding", National Conference on Computer Vision, Pattern Recognition Image Processing & Graphics, NCVPRIPG08 DAIICT Gandhinagar, Jan 11-13, 2008.
23. Aparna P and Sumam David, Adaptive Local Cosine transform for Seismic Image Compression, *ADCOM 2006*, NITK, Surathkal Dec 20-23, 2006.
24. Aparna P. and Sumam David, *Seismic Data Compression using fast wavelets*, PGFEST 2006, NMAMIT, Nitte.

### **Workshops Organized:**

1. Five Days Short-term Training program (STTP) on "Speech, Audio and Music Processing (SAMP 2020)", during January 28<sup>th</sup> – February 1<sup>st</sup>, 2020 under NITK DJY 2019-20 funding.
2. Five Days short-term training programs (STTP) on "Algorithms and Architectures for High Efficient Video Processing Systems" from August 20-24, 2018 under TEQIP-III.
3. Two-days workshop on "Embedded Systems Development" for the faculty and students of NITK and faculty of other Engineering colleges. During April 12<sup>th</sup> and 13<sup>th</sup> 2013, sponsored by TEQIP-II in EC Seminar Hall.
4. One Day workshop was organized for UG Students on "Cypress Programmable Systems on Chip" on 26<sup>th</sup> July 2012, in EC Seminar Hall
5. Two days workshop on "Project Development using Intel Atom Processor", at NITK, on 6<sup>th</sup> and 7<sup>th</sup> Jan 2012.
6. Two Days workshop on ARM Architecture and Applications on March 9<sup>th</sup> and 10<sup>th</sup> 2009.

### **Workshops Attended:**

1. 4th Indian Workshop on Applied Deep Learning", at BITS Pilani, GOA Campus, from June 12-16, 2023
2. Summer school on "Speaker recognition and Diarization", at DA-IICT Gandhinagar during July 6<sup>th</sup> to 10<sup>th</sup>, 2019.
3. Short term course on Advanced DSP design techniques during July 10-14, 2017 at IITKGP
4. Short course on Electromagnetic Waves by Dr. P. Subbanna Bhat. Oct 8-12 2015, EC Dept NITK.
5. Mathematical Morphology and its applications in Image Processing during July 14 – 25, 2015, sponsored by TEQIP-II in EC Dept NITK.
6. Faculty Workshop on Teaching DSP Hands-on at IIT Hyderabad, 20-21 May, 2015
7. Workshop on Digital Video Analytics and Processing at IITM on 21-22 December, 2012
8. Indo-U.S. Symposium on Women in engineering entitled 'Women Engineers Leading Global Innovation', 29<sup>th</sup> to 31<sup>st</sup> August, 2012, in Bangalore.
9. 2012 Intel Embedded Research & Education Summit- in Chandler, Arizona, USA, February, 22-24 2012
10. Intel-IISc Embedded Curriculum Initiative – Authors Workshop, at IISc, Bangalore, on 20<sup>th</sup> and 21<sup>st</sup> October 2011.
11. IEEE Symposium on Computer and Informatics (ISCI 2011), Kuala Lumpur, Malaysia, March 20-22, 2011.
12. Two day workshop on Xilinx Embedded Design Flow workshop, at NITK, 5<sup>th</sup> & 6<sup>th</sup> February, 2010.

13. Two day workshop on FPGA System Design using Altera Tools, at NITK, 22<sup>nd</sup> & 23<sup>rd</sup> August 2009.
14. Faculty Training Program on Instructional Design & Delivery by NITTTR, at NITK, Surathkal, Aug 22-24 2008.
15. One day workshop on Signal Processing on Stretch Configurable Processor at MDN, Manipal, on July 5<sup>th</sup>.
16. Induction training for fresh teachers in technical institution, at NITK on June 9, 2008.

#### **Guest Lectures Given:**

1. Technical Talk on “Introduction to digital Signal Compression”, in Alva’s Institute Of Engineering and Technology on 14-05-2015.
2. Technical Talk on “Embedded Systems with ARM”, in National Conference on *Building Embedded Systems with ARM Cortex-M MCUs*, at Department of Electronics & Communication Engineering, University College of Engineering Kakinada (a), Jawaharlal Nehru Technological University, Kakinada on 18-12-2015
3. Invited speaker at St. Joseph College of Engineering, Mangalore on May 12<sup>th</sup> 2016 to deliver a talk on “Embedded Systems with ARM”.
4. Invited speaker at *Two Day workshop on Emerging Trends in Wireless Communication and Signal Processing*. organized by On 18<sup>th</sup> March 2017
5. Invited speaker at *International Conference on Recent Trends in Electrical Sciences and Medical Engineering (ICRITESME)* organized by Electrical stream Departments, Manipal Institute of Technology, Manipal on August 8<sup>th</sup> 2017.
6. Keynote Speaker in CSIR-DRDO-ISRO Sponsored XIV National Conference on Control Instrumentation System Conference (CISCON-2017) on 3<sup>rd</sup> November 2017 organized by The Department of Instrumentation and Control Engineering, MIT, Manipal. Topic “Role of Embedded systems in Instrumentation”

#### **Awards:**

1. Dr. Aparna P., Associate Professor from Dept. of ECE, received the Best Paper award in the IEEE Women in Engineering category at the TENCON 2023 International Conference held in Chiangmai, Thailand from 1st-3rd November 2023.
2. Best paper award IEEE Bangladesh section co-located conferences- WIECON-ECE 2021  
PID 01: Effect of Different color spaces on deep image segmentation.  
Track: signal processing, biomedical, communication, electronics, photonics, antenna  
Authored by Sushma B & Aparna P, at the 7th IEEE WIECON-ECE 2021 held during 4th-5th December, 2021.
3. Best Paper of the Track in IEEE WIECON--ECE 2015 Track Name: Multimedia and Signal Processing  
Irreversible Wavelet Compression of Radiological Images Based on Visual Threshold. *IEEE International Women in Engineering (WIE) Conference on Electrical and Computer Engineering (WIECON-ECE), 2021*
4. Best Paper Award' in the area of Information Processing and Automation for paper #1570297822 ('A comprehensive solution to road traffic accident detection and ambulance management' in ICAEES 2016, Malaysia

#### **Others:**

1. Chairing a session focusing on the "Signal Processing" Stream on December 19<sup>th</sup> 2023, in 4th International Conference on "VLSI, Signal Processing, Power Electronics, IoT, Communication, and Embedded Systems (VSPICE-2023)" on December 19th
2. Chaired a session, "**Computational applications**" in CSIR-DRDO-ISRO Sponsored XIV National Conference on Control Instrumentation System Conference (CISCON-2017) on 3<sup>rd</sup> November 2017 organized by The Department of Instrumentation and Control Engineering, MIT, Manipal.

### **Sponsored Research Projects:**

1. Under: Special Manpower Development Program for Chips to System design (SMDP3) (MCIT, Govt Of India).

**Title of the project:** Development and implementation of Photoplethysmography (PPG) and Electro Cardiogram (ECG) acquisition and processing system on a chip.

2. Sponsored research project submitted to Electronics & Radar Development Establishment (LRDE), DRDO, Bangalore. (9.63Lacs)

Title: Study of Sigma Delta Space Time Adaptive Processing Techniques for GMTI using AESA Radar

3. Title: Design and Development of Automated Software Tools for Early Forest Fire Detection and Burn Severity Analysis from Multi-sensor Satellite Imagery Data

Funded by: ISRO –DMSP Duration: 3 years, Amount 37.92 Lacs

### **Educational Materials developed:**

Development of Lab Manual for Microprocessor Lab for ARM7 boards.

Development of Embedded Systems Lab

### **Contribution to Departmental Activities:**

1. In charge of Departmental Library.
2. In charge of Microprocessor and Embedded systems Lab.
3. Time table Incharge from May2013 to May2015
4. Faculty Advisor 2011-2012, 2012-2013, 2013-2014 for 3years