Badri N. Patro

Delta Lab, CC-202
IIT Kanpur-208016
(+91) 9076237295
badri@iitk.ac.in
patrobadri.iitb@gmail.com

Research Interests: Computer Vision, Natural language Processing, Machine Learning and AI, Speech & Image Signal processing, Deep Neural Networks.

Education

2016–Present **Doctor of Philosophy in Electrical Engineering**, *Indian Institute of Technology, Kanpur, India*, Specialized in Communication & Signal processing, *GPA – 8.00*.

2009–2012 **Masters of Technology in Electrical Engineering**, *Indian Institute of Technology, Bombay, India*, Specialized in Communication & Signal processing, *GPA – 8.33*.

2003–2007 **Bachelor of Technology in Electronic & Tele Commnunication Engineering**, *National Institute of Science and Technology*, Brahmapur, Orissa, *GPA – 8.31*.

Conference Publication

2018 **Badri N. Patro, Sandeep Kumar, Vinod K. Kurmi, Vinay P. Namboodiri**,"Multimodal Differential Network for Visual Question Generation", Conference on Empirical Methods in Natural Language Processing (EMNLP),Brussels, Belgium, 2018.

2018 **Badri N. Patro*, Vinod K. Kurmi*, Sandeep Kumar*, Vinay P. Namboodiri**,"Learning Semantic Sentence Embeddings using Pair-wise Discriminator", Proceedings of 27th International Conference on Computational Linguistics (COLING 2018), Santa Fe, New Mexico, USA, 2018.

2018 **Badri N. Patro, Vinay P. Namboodiri**,"Differential Attention for Visual Question Answering", Proceedings of IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Salt Lake City, Utah, USA, 2018.

2014 **Badri N. Patro**,"Design and implementation of novel image segmentation and BLOB detection algorithm for real-time video surveillance using DaVinci processor", International Conference on Advances in Computing,Communications and Informatics ICACCI, pp. 1909-1915, India,Sept 2014.

Work Experience

2013–2015 **Samsung R&D Institute, Delhi**, *Lead Engineer*, Audio Processing and Multimedia on Tizen D2TV, Delhi, India.

- Design & developed audio processing modules for Visual Impaired people in IPTV.
- Designed subtitle, teletext and caption modules for MPEG-2 TS & rendered in D2TV.
- Worked on audio and language modules for IPTV at Samsung Electronics, **South Korea**.

2012–2013 **Harman International Limited**, *Associate Software Engineer*, Multimedia and Audio Processing, Pune, India.

- Design and implemented audio post processing algorithms (Parametric Equalizer, Doppler Effect, DRC and SRC) for car audio acoustic system using OMAP3530 processor.

2007–2009 **Larsen & Toubro EmSyS Ltd, Mysore**, *Assistant Software Engineer*, DC to DC and AC to DC Power Converter Designer .

- Design and developed a end-to-end hardware module for universal input AC-DC Power Converter using Fly back Topology.
- Design and developed a end-to-end hardware modules for DC- DC converter using Active Clamp Technology. Also, also controlled(PD,PID) all the dc-dc modules by generating PWM signal using CPLD.

Teaching Experience

2018 **Tutor**, *for the course Introduction to Electronics*, ESC201, Autumn,IIT Kanpur .

2018 **Teaching Assistant**, *Introduction to Electronics*, ESC201, Winter,IIT Kanpur .

2017 **Teaching Assistant**, *Introduction to Electronics*, ESC201, Autumn, IIT Kanpur.

2017 **Teaching Assistant**, *Introduction to Electronics*, ESC201, Summer,IIT Kanpur .

2017 **Teaching Assistant**, *Digital Signal processing*, EE301A, Winter,IIT Kanpur.

2016 **Teaching Assistant**, *Image Signal processing*, EE601A, Autumn,IIT Kanpur.

2012 **Research Assistant**, *Texas Instrument-Digital Signal processing Lab*, IIT Bombay.

PhD Research Work

Title **Multimodal Conversation systems using Encoder-Decoder based approaches**.
Supervisors -:Prof. Vinay P. Namboodiri.

Description **The Details of my work are as follows**, .

- Working on conversation system which is relay on Image based Question Answering module, question geration module (VQG) and describe the Image at final round of question answering (Visual Dialog).
- Analysisng Uncertainty in Visual Question Geration module (VQG).
- Understanding epistemic and aleatoric uncertainty in Visual Dialog.
- Explaining answer module in Visual Dialog Module.

Github

2018 **Multimodal Differential Network for Visual Question Generation**, *The project page for this paper is available here:*.

- `https://badripatro.github.io/MDN-VQG/`.

2018 **Learning Semantic Sentence Embeddings using Pair-wise Discriminator**, *The project page for this paper is available here:* .

- `https://badripatro.github.io/Question-Paraphrases/`.

2018 **Differential Attention for Visual Question Answering**, *The project page for this paper is available here:* .

- `https://badripatro.github.io/DVQA/`.

Technical Course Projects

2016 Visual Question Answering.(Computer Vision)

2016 Object Recognition and Localization.(Selected Topics of Image Processing)

2016 Direction of Arrival Based Spatial Co-variance Model For Blind Source Separation.(Speech Signal Processing)

2016 Robust Video Stabilization Based on Particle Filter Tracking of Projected Camera Motion.(Video Processing)

2011 Run length encoding, Barrel Shifter, floating point adder & Bus behavior design Projects using VHDL and Verilog.(VLSI Design Lab)

2010 SENSE: Sensitive Encoding technique for Fast MRI using Back Projection.(Medical Image Processing)

2010 An Semi-Autonomous, External Command Reading White line Follower Robot.(Embedded System-Robotics)

2010 Adaptive Beam forming using microphone array for hands free Telephony with the help of generalized side lobe technique.(Adaptive Signal Processing)

2010 Detection of Duplicate Forgery in Handwritten Signature using Statistical DWT & EDM.(Wavelet Transform)

2009 Frequency Code(LFM) and Phase code(Barker code) Pulse Compression Techniques in Mono Pulse Radar.(Digital Signal Processing)

Industrial Workshop

2017 Summer school on advance computer vision using Deep learning(DL)(DL for vision and language(Caption, VQA), DL for videos, object detection, semantic segmentation,Domain Adaption, and advances in 3D(IIITH).

2017 Summer School on Machine Learning using Deep Learning(optimization for DL, GAN, VAE, DL for RL and game theory)(IIITH).

2016 Mysore Park Workshop on Vision, Language and AI(Video Caption, guided LSTM, GAN, Adversarial auto-encoders, reinforcement learning, deep contextual models)(VLAI 2016,Mysore).

2016 Summer School on computer vision using Deep Learning(CNN, RNN, Auto-encoder, optimization for DL, Symbolic deep learning & face, pose and Egocentric action recognition, model compression)(IIITH).

2012 Audio Engineering(Acoustics, Recording, Broadcasting Technology, Surround Sound,Microphones& Speakers) & Audio Post Processing(Harman International).

Technical skills

Deep learning Torch, Pytorch.

Language : Lua, Python, C, C++, VHDL, Verilog, MATLAB.

Processor : DM6437, DM6467, OMAP3530, C5510, MSP430, PIC, u8059.

Tools : Source Insight, LaTeX, Rhapsody, Perforce, Beyond Compare.

IDE : Code Composer Studio, Xilinx, GHDL, Icurus Verilog, Keil, Sublime.

Analyzer : Audacity, Praat audio analysis, Eagle, Pspice.

Awards

2018 Received Student Volunteer Award from EMNLP and Conference Travel Grant from Microsoft India for EMNLP 2018.

2018 Received Student Volunteer Award from CVF and Conference Travel Grant from Google India for CVPR 2018.

2018 Received Conference Travel Grant from IIT Kanpur for Coling 2018.

2017 Selected in Quiz competition in Deep learning summer school for vision, IIITH.

2017 Selected in Quiz competition in Deep learning summer school for ML, IIITH.

2014 Performed DhinChik BABA and RAVAN on Cultural Functions at Samsung, India.

2013 Played Salmon khan and BABA in dramas on Cultural Functions at Harman, India.

2012 Awarded Passing out Color for contribution in Cultural Activity H1, IITB,India

2010 Won 1st prize in Film Slim & 3rd prize in Gyration Competition, IIT Bombay,India

2010 Won 3rd prize in Uncut Movie Competition and Special Mention in IIT Bombay,India.