

Hema Arunachalam Murthy

(A) Personal:

Present Occupation : April, 2006, Professor,
Dept. of Computer Science and Engg.,
IIT, Madras.

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Communication IIT, Madras - 600 036, India.

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Date of Birth : 23rd April 1958

(B) Academic:

1. Ph.D (Computer Science and Engineering), Indian Institute of Technology, Madras, July, 1992.
2. M.Eng. (Electrical and Computer Engineering), McMaster University, Hamilton, Ontario, Canada, December, 1985.
3. B.E. (Electronics and Communication Engineering), Osmania University, Hyderabad, June, 1980, I class(Distinction).

(C) Professional Experience:

1. **Nov'79 - Jul'80**: Worked as a student trainee at D.L.R.L. Hyderabad. Designed and implemented a microprogrammed emulator of the 8080 CPU using AM2900 series bit-slice processor and sequencer.
2. **Sept'80-Aug'83**: Worked as a Scientific Officer(SO/SC) in the Speech and Digital Systems Group of T.I.F.R., Bombay. Designed and implemented (i) a three dimensional graphics system GRASP in Pascal (ii) an editor for drafting circuit layout.
3. **Sept'83-Dec'85**: Worked as a Teaching assistant(10 hours a week) at McMaster University, Canada, during Fall and Winter Sessions from Sept, 1983-Dec.,1985.
4. **Jan'86-Apr'86**: Research Assistant and part-time Graduate Student in Communications Research Laboratory, McMaster University, Canada.
5. **Jul'86-Aug'88**: Research Scholar (Full-time), Dept. of Computer Science and Engg., IIT, Madras.
6. **Aug'88 - Jul'92**: Lecturer (and part-time research scholar), Department of Computer Science and Engineering, IIT Madras - 600 036.
7. **Jul'92-Feb'93**: Lecturer, Department of Computer Science and Engineering, IIT, Madras - 600 036.
8. **Feb'93-Sept'00**: Asst. Professor, Department of Computer Science and Engineering, IIT, Madras - 600 036.

9. *Sept'00–Apr'06*: Associate Professor, Department of Computer Science and Engineering, IIT, Madras - 600 036.
10. *Apr'06–Current*: Professor, Department of Computer Science and Engineering, IIT, Madras - 600 036. uah
11. *Jun'95–Jun'96*: International Fellow, STAR Laboratory, SRI International, 333, Ravenswood Avenue, Menlo Park, CA 94025 (on leave from IIT, Madras), USA.
12. *Jun'98–Jul'98 (six weeks)*: Visitor at TIFR Bombay
13. *Jun'02–Aug'02*: International Fellow, STAR Laboratory, SRI International, 333, Ravenswood Avenue, Menlo Park, CA 94025 (on leave from IIT, Madras), USA.
14. *May'2016 – June'2016 (one month)*: Visitor as part of Computation Brain Research, Sur Lab, MIT, Cambridge, USA.
15. *May'2017 – June'2017 (one month)*: Visitor as part of Computation Brain Research, Sur Lab, MIT, Cambridge, USA.
16. *May'2019 – June'2019 (2 weeks)*: Visitor as part of Computation Brain Research, Sur Lab, MIT, Cambridge, USA.
17. *May'2019 (1 weeks)*: Visitor, Center for Neuroscience, CMU, Pittsburgh, USA.

(D) Publications:

In Journals

1. Mari Ganesh Kumar, Shrikanth Narayanan, Mriganka Sur and Hema A Murthy, “Evidence of Task-Independent Person-Specific Signatures in EEG using Subspace Techniques,” accepted for publication IEEE Trans. Information Forensics and Security, 2021.
2. Jilt Sebastian, Mriganka Sur, Hema A Murthy, and Mathew Magimai Doss, “Signal-to-signal neural networks for improved spike estimation from calcium imaging data,” accepted for publication PLOS Computational Biology, 2021.
3. Mari Ganesh Kumar, “Functional parcellation of mouse visual cortex using statistical techniques reveals response-dependent clustering of cortical processing,” accepted for publication PLOS Computational Biology, 2021.
4. Nauman Dawalatabad, M R Srikanth, C Chandra Sekhar and Hema A Murthy, “Novel Architectures for Unsupervised Information Bottleneck based Speaker Diarization of Meetings,” accepted for publication IEEE Trans. ASLP, Oct 2020.
5. R. A. Sharon, S. S. Narayanan, M. Sur and A. H. Murthy, “Neural Speech Decoding During Audition, Imagination and Production,” in IEEE Access, vol. 8, pp. 149714-149729, 2020, doi: 10.1109/ACCESS.2020.3016756.
6. Arun Baby, Jeena J Prakash, Aswin Shanmugam, and Hema A Murthy, “Significance of Spectral Cues in Automatic Speech Segmentation for Indian Language Speech Synthesizers,” Vol 123, pp.10-25, Speech Communication, Elsevier, 2020.

7. Viraraghavan, Venkata Subramanian and Pal, Arpan and Aravind, Rangarajan and Murthy, Hema A., "Data-driven measurement of precision of components of pitch curves in Carnatic music," *The Journal of the Acoustical Society of America*, Vol 147, No. 5, pp.3657-3666, 2020, doi:10.1121/10.0001313.
8. Ashish Mishra, Hema A Murthy and A Pandey, "Zero-shot Learning for Action Recognition using Synthesized features," *Neurocomputing*, 23 January 2020.
9. Jeena J Prakash and Hema A Murthy, "Analysis of Inter-Pausal Units in Indian Languages and its Application to Text-to-Speech Synthesis," *IEEE Trans. on Acoustics Speech and Language Processing*, Vol 27, Issue 10, pp.1616-1628, June 2019.
10. Jeena J Prakash, Golda Brunet and Hema A Murthy, "Importance of signal processing cues in transcription correction for low resource Indian languages," *ACM Trans. on Asian and low Resource Language Information Processing*, Vol. 19, Issue 1, pp.1-26, October 2019.
11. J. Sebastian, M. G. Kumar, V. S. Viraraghavan, M. Sur and H. A. Murthy, "Spike Estimation From Fluorescence Signals Using High-Resolution Property of Group Delay," in *IEEE Transactions on Signal Processing*, vol. 67, no. 11, pp. 2923-2936, 1 June 1, 2019. doi: 10.1109/TSP.2019.2908913
12. Padi Sarala and Hema A Murthy, "Segmentation of Continuous Audio Recordings of Carnatic Music Concerts into Items for Archival," *Sādhanā*, Vol. 43(10): 154, Aug 2018. <https://doi.org/10.1007/s120>
13. Golda Brunet Rajan and Hema A Murthy, "Transcription Correction Using Group Delay Processing for Continuous Speech Recognition," *Circuits Systems Signal Processing*, Vol. 37, pp.1177-1202, Jan 2018. <https://doi.org/10.1007/s00034-017-0598-2>
14. Saranya M.S., Padmanabhan R., Hema A. Murthy, "Feature-switching: Dynamic feature selection for an i-vector based speaker verification system," *Speech Communication*, Vol. 93, pp 53-62, ISSN 0167-6393, Aug 2017, <https://doi.org/10.1016/j.specom.2017.08.004>.
15. Rajeev Rajan and Hema A Murthy, "Two-pitch tracking in co-channel speech using modified group delay functions," Vol 89, pp.37-46, *Speech Communication*, Feb 2017. <https://doi.org/10.1016/j.s>
16. Rajeev Rajan, Manaswi Mishra and Hema A Murthy, "Melody extraction from music signals using modified group delay functions," Vol 20, pp.185-204, *Int. J of Speech Technology*, Jan 2017.
17. Jilt Sebastian, P A Manoj Kumar and Hema A Murthy, "An analysis of the high resolution property of group delay function with applications to audio signal processing," *Speech Communication*, Elsevier, Vol 81, pp.42-53, July 2016.
18. Saad Y Sait, Akshay Bhandari, Shreya Khare, Cyriac James and Hema A Murthy, "Multi-level anomaly detection: Relevance of Big Data Analytics in Networks," Vol 40, Issue 6, pp.1737-1767, *Sādhanā*, Springer-Verlag.
19. Srikanth Madikeri, Asha Talambedu and Hema A Murthy, "Modified Group Delay Feature based Total Variability Space modelling for Speaker Recognition," *International Journal of Speech Technology*, Springer-Verlag, *Int J Speech Technol* (2015) 18:1723 DOI 10.1007/s10772-014-9243-7.

20. Padi Sarala and Hema A Murthy, "Cent Filter-Banks and its Relevance to Identifying the Main Song in Carnatic Music," Sound, Music, and Motion - 10th International Symposium, CMMR 2013, Marseille, France, October 15-18, 2013. Revised Selected Papers, Springer Verlag (2014) (Book Chapter).
21. Sankalp Gulati, Ashwin Bellur, Justin Salamon, Vignesh Ishwar, Hema A Murthy and Xavier Serra, "Automatic tonic identification in Indian art music: Approaches and evaluation," Journal of New Music Research, Publisher: Taylor and Francis, Vol 43, No.1, pp.53-71. 2014.
22. Preeti Rao, Joe Cheri Ross, Kaustuv Kanti Ganguli, Vedhas Pandit, Vignesh Ishwar, Ashwin Bellur and Hema Murthy, "Melodic Motivic Analysis of Indian Music," Journal of New Music Research, Publisher: Taylor and Francis, Vol 43, No.1, pp. 115-131, 2014.
23. Ranbir Sanasam Singh, Hema Murthy and Timothy Gonsalves, "Inference Based Query Expansion Using Real Time Implicit Feedback," in Communications in Computer and Information Science Series, Springer-Verlag, Second International Joint Conference, IC3K 2010, Valencia, Spain, October 25-28, 2010, Revised Selected Papers, pp.158-172 (Book Chapter).
24. Hema A Murthy and B Yegnanarayana, "Group delay functions and its application to speech technology," *Sādhanā, Indian Academy of Sciences*, Vol 36, No. 5, pp.745-782, November, 2011.
25. Angelos Marnerides, Cyriac James, Alberto Schaeffer-Filho, Saad Yunus Sait, Andreas Mauthe, Hema Murthy, "Multi-level network resilience: traffic analysis, anomaly detection and simulation," In: *ICTACT Journal on Communication Technology, Special Issue on Next Generation Wireless Networks and Applications*. Vol. 2, n. 2. 2011.
26. Santosh Kumar Chaudhari and Hema A Murthy, "Energy Aware Network: Bayesian Belief Networks based Decision Management System," *ICTACT Journal on Communication Technology (Special Issue on Next Generation Wireless Networks and Applications)*, 2011, vol. 2, issue 2, pp. 357-362.
27. Sreehari Krishnan, R Padmanabhan and Hema A Murthy, "Robustness of group delay representations for noisy speech signals," *International Journal of Speech Technology*, Vol.14, pp.361-368, Sept., 2011.
28. S Nagireddy, Hema A Murthy, S Kant, "Identification of encryption method for block ciphers using histogram method," *Journal of discrete mathematical sciences and cryptography*, Vol 13, No 4, August 2010, pp.319-328.
29. G L Sarada, A Lakshmi, Hema A Murthy and T Nagarajan, "Automatic Transcription of Continuous Speech into Syllable-like units for Indian Languages," *Sādhanā, Indian Academy of Sciences*, Vol. 34, Part 2, April 2009, pp. 221-233.
30. Rajesh M. Hegde, Hema A. Murthy and Venkata Ramana Rao Gadde, "Significance of Joint Features Derived from The Modified Group Delay Function in Speech Processing," *EURASIP Journal on Applied Signal Processing*, Vol.2007, Article ID 79032, 13 pages.
31. Rajesh M. Hegde, Hema A. Murthy and Venkata Ramana Rao Gadde, "Significance of The Modified Group Delay Function in Speech Recognition", *IEEE Transactions on Speech and Audio Processing*, Vol.15, Issue.1, Jan 2007, pp.190-202.
32. T Nagarajan and Hema A Murthy, "Language Identification using Acoustic Log-Likelihood of Syllable-like units," *Speech Communications*, Vol.48, pp.913-926, 2006.

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34. V. Kamakshi Prasad, T. Nagarajan and Hema A. Murthy, "Automatic segmentation of continuous speech using minimum phase group delay functions," *Speech Communications*, Elsevier, vol.42, pp.429-446, 2004.
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36. Hema A. Murthy, Francoise Beaufays, Larry P.Heck, Mitchel Weintraub, "Robust Text Independent Speaker Identification over Telephone Channels," *IEEE Trans. on Speech and Audio Processing*, Vol.7, No.5, pp.554-568, 1999.
37. M.Narendranath, Hema A.Murthy, S.Rajendran and B.Yegnanarayana, "Transformation of formants for voice conversion using artificial neural networks," *Speech Communication*, vol.16, no.2, pp.206-216, 1995.
38. B.Yegnanarayana and Hema A. Murthy, "Significance of Group Delay functions in Spectrum estimation," *IEEE Trans. on Signal Processing*, Vol.40, No.9, pp.2281-2289, Sep. 1992.
39. Hema A. Murthy and B. Yegnanarayana "Formant extraction from group delay function," *Speech Communication*, Vol.10, pp.209-221, Aug., 1991.
40. Hema A. Murthy and B. Yegnanarayana, "Speech processing using Group delay functions," *Signal Processing*, Vol.22, pp.259-267, March, 1991.
41. Hema A. Murthy, K.V. Madhu Murthy and B. Yegnanarayana, "Formant extraction from phase using weighted group delay function," *Electronics letters*, 9th Nov., 1989, Vol.25, No.23, pp.1609-1611.
42. Hema A. Murthy and Simon Haykin, "Bayesian classification of surface-based ice-radar images," *IEEE Journal of Oceanic Engineering*, Vol. OE-12, No.3, pp.493-501, July, 1987.
43. R.R. Joshi and Hema Arunachalam, "Multi-Level Picture Segmentation in the Graphics System GRASP," *Computers and Graphics*, Pergamon Press, Vol.8,No.2,pp.167-176,1984.
44. R.R. Joshi and Hema Arunachalam,"GRASP - A 3D Graphics System for Pascal Users," *Computers and Graphics*, Pergamon Press, Vol.8,No.1,pp.93-102, 1984.
45. B.Yegnanarayana, K.V. Madhu Murthy and Hema A. Murthy, "Applications of Group Delay Functions in speech processing," *JIETE Special issue on Speech processing*, Jan 1988.

In Books:

1. S R Singh, Hema A Murthy and T A Gonsalves, "Inference based query expansion using user's real time implicit feedback," *Knowledge Discovery, Knowledge Engineering and Knowledge management*, Vol 272, pp.158-172, 2013.
2. Hema A Murthy, Francoise Beaufays, Larry P Heck and Mitchel Weintraub, "Issues in Speaker Identification over Telephone Channels," *invited paper in Speech Technology, Issues and Implications in Indian Languages*, Ed. K Nagamma Reddy, Dravidian Linguistics Association, International School of Dravidian Linguistics, Thiruvananthapuram, Kerala, 2000.

In Refereed International Conferences:

1. Nauman Dawalatabad, Srikanth Madikeri, C Chandra Sekhar and Hema A Murthy, "NOVEL ARCHITECTURES FOR UNSUPERVISED INFORMATION BOTTLENECK BASED SPEAKER DIARIZATION OF MEETINGS," accepted ICASSP 2021.
2. Mano Ranjith Kumar, Sudhanshu Srivastava, Anusha Prakash and Hema Murthy, "A Hybrid HMM-Waveglow based Text-to-speech synthesizer using Histogram Equalization for low-resource Indian languages," accepted INTERSPEECH 2020.
3. Anusha Prakash and Hema Murthy, "Generic Indic Text-to-speech Synthesizers with Rapid Adaptation in an End-to-end Framework," INTERSPEECH 2020.
4. Karthik Pandia D S, Anusha Prakash, Mano Ranjith Kumar and Hema Murthy, "Exploration of End-to-end Synthesizers for Zero Resource Speech Challenge 2020," INTERSPEECH 2020.
5. Rini A Sharon, Hema A Murthy, "The "Sound of Silence" in EEG - Cognitive voice activity detection," INTERSPEECH 2020.
6. Venkatasubramanian Viraraghavan, Arpan Pal, Hema Murthy, R Aravind, "STATE-BASED TRANSCRIPTION OF COMPONENTS OF CARnatic Music," accepted for presentation at ICASSP 2020.
7. M. G. Kumar, S. R. Kumar, S. M. S, B. Bharathi and H. A. Murthy, "Spoof Detection Using Time-Delay Shallow Neural Network and Feature Switching," 2019 IEEE Automatic Speech Recognition and Understanding Workshop (ASRU), SG, Singapore, 2019, pp. 1011-1017, doi: 10.1109/ASRU46091.2019.9003824.
8. Anusha Prakash, Anju Leela Thomas, Umesh S and Hema A Murthy, "Building Multilingual End-to-End Speech Synthesizers for In-dian Languages", presented at SSW 10, Vienna, Satellite workshop of INTERSPEECH Sept 20-22, 2019.
9. Karthik Pandia and Hema A Murthy, "Zero resource speech synthesis using transcripts derived from perceptual acoustic units," accepted for presentation at INTERSPEECH 2019, Graz, Austria.
10. Venkatasubramanian Viraraghavan, Rahul Gavas, Hema A Murthy and R Aravind, "Visualizing Carnatic music as projectile motion in a uniform gravitational field," SMM 2019 Satellite workshop INTERSPEECH 2019, Vienna September 14 2019
11. M. G. Kumar, M. Saranya, S. Narayanan, M. Sur and H. A. Murthy, "Subspace techniques for task-independent EEG person identification," 2019 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Berlin, Germany, 2019, pp. 4545-4548, doi: 10.1109/EMBC.2019.8857426.
12. Rini A Sharon, Sidharth Aggarwal, Purvi goel, Raviraj Joshi, Mriganka Sur, Hema Murthy, Sri-ram Ganapathy, "Level-wise Subject adaptation to improve classification of motor and mental EEG tasks," 2019 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Berlin, Germany, 2019, pp. 6172-6175, doi: 10.1109/EMBC.2019.8857584.
13. S. Maruthachalam, M. G. Kumar and H. A. Murthy, "Time Warping Solutions for Classifying Artifacts in EEG," 2019 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Berlin, Germany, 2019, pp. 4537-4540, doi: 10.1109/EMBC.2019.8856669.

14. R. A. Sharon, S. Narayanan, M. Sur and H. A. Murthy, "An Empirical Study of Speech Processing in the Brain by Analyzing the Temporal Syllable Structure in Speech-input Induced EEG," ICASSP 2019 - 2019 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Brighton, United Kingdom, 2019, pp. 4090-4094. doi: 10.1109/ICASSP.2019.8683572
15. N. Dawalatabad, S. Madikeri, C. C. Sekhar and H. A. Murthy, "Incremental Transfer Learning in Two-pass Information Bottleneck Based Speaker Diarization System for Meetings," ICASSP 2019 - 2019 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Brighton, United Kingdom, 2019, pp. 6291-6295. doi: 10.1109/ICASSP.2019.8683114
16. Raviraj Joshi, Purvi Goel, Mriganka Sur and Hema Murthy, "Single Trial P300 Classification Using Convolutional LSTM and Deep Learning Ensembles Method," IHCI, Allahabad, Springer Link, pp. 3-15, Dec 2018.
17. Purvi Goel, Raviraj Joshi, Mriganka Sur, and Hema A. Murthy, "A Common Spatial Pattern approach for classification of mental counting and motor execution EEG," IHCI, Allahabad, Springer Link, pp.26-35, Dec 2018.
18. Venkatasubramanian Viraraghavan, Hema A Murthy and R Aravind, "Precision of sung notes in Carnatic music," ISMIR, Paris, France, 2018 (accepted).
19. Arun Baby, Karthik Pandia D S, and Hema A Murthy, "Signal Processing Cues to Improve Automatic Speech Recognition for Low Resource Indian Languages," 6th international workshop on Spoken Language Technologies for Under-resourced languages(SLTU'18), New Delhi, India, 29-31 August 2018.
20. Vinothkumar D, Mari Ganesh Kumar, Abhishek Kumar, Hitesh Gupta, Saranya Ms, Mriganka Sur and Hema Murthy, "Task-Independent EEG based Subject Identification using Auditory Stimulus," *Speech Music and Mind - satellite workshop of Interspeech*, pp. 26-30, India, 2018. DOI: 10.21437/SMM.2018-6.
21. Venkatasubramanian Viraraghavan, Arpan Pal, Hema Murthy and R Aravind, "A component-based approach to study the impact of Indian music on emotions," *Speech Music and Mind - satellite workshop of Interspeech*, pp. 31-35, Hyderabad, India, 2018.
22. G Kasthuri, Namita Jacob, Anil Prabhakar, Prabha, and Hema A Murthy, "Early Vocabulary Development Through Picture-based Software Solutions," *Proc. Interspeech*, pp. 1487-1488, Hyderabad, India, 2018.
23. Gayathri Sekharan, N Mohana, Radhika Pal and Hema A Murthy, "Mobile application for learning languages for the unlettered," *Proc. Interspeech*, pp. 552-553, Hyderabad, India, 2018.
24. Srihari Maruthachalam, Sidharth Agarwal, Mari Ganesh Kumar, Mriganka Sur and Hema A Murthy, "Brain computer interface using encephalogram signatures of eye blinks," *Proc. Interspeech*, pp. 1059-1060, Hyderabad, India, 2018.
25. Mahesh M, Jeena J Prakash and Hema A Murthy, "Resyllabification in Indian languages and its implication in text to speech synthesis," *Proc. Interspeech*, pp. 212-216, Hyderabad, India, 2018.
26. Anju Leela Thomas, Anusha Prakash, Arun Baby and Hema A Murthy, "Code Switching in Indic speech synthesizers," *Proc. Interspeech*, pp. 1948-1952, Hyderabad, India, 2018.

27. Jeena J Prakash, Golda Brunet Rajan and Hema A Murthy, "Transcription correction of Indian languages using acoustic signatures," *Proc. Interspeech*, pp. 3177-3181, Hyderabad, India, 2018.
28. Nauman Dawalatabad, Jom Kuriakose, C Chandra Sekhar and Hema A Murthy, "Information bottleneck based percussion instrument diarization system for taniavartanam segments of Carnatic music concerts," *Proc. Interspeech*, pp. 1215-1219, Hyderabad, India, 2018.
29. Saranya M S and Hema A Murthy, "Decision level feature switching as a paradigm for replay attack detection," *Proc. Interspeech*, pp. 686-690, Hyderabad, India, 2018.
30. Jilt Sebastian, Manoj Kumar, Pavan Kumar D S, Mathew Magimai Doss, Hema A Murthy, Shrikanth Narayanan, "De-noising and raw-waveform networks for weakly supervised gender identification on noisy speech," *Proc. Interspeech*, pp. 292-296, Hyderabad, India, 2018, DOI: 10.21437/Interspeech.2018-2321.
31. Manish Jain, M S Saranya and Hema A Murthy, "An SVD based approach for spoken language identification," *Proc. SPCOM*, pp. 312-316, IISc Bangalore, India, 2018.
32. M S Saranya and Hema A Murthy, "Replay attack detection in speaker verification using non-voiced segments and decision level feature switching," *Proc. SPCOM*, pp. 332-336, IISc Bangalore, India, 2018.
33. Jilt Sebastian and Hema A Murthy, "Onset Detection in Composition Items of Carnatic Music," *Proc. ISMIR*, pp.560-567, Suzhou, China, October 23-27, 2017 .
34. Venkatasubramanian Viraraghavan, R Aravind and Hema A Murthy, "A Statistical Analysis of Gamakas in Carnatic Music," *Proc. ISMIR*, pp. 243-249, Suzhou, China, October 23-27, 2017.
35. Sakshi Verma, K L Prateek, Karthik Pandia, Nauman Daulatabad, Jitendra Sharma, Rogier Lander, Mriganka Sur and Hema A Murthy, "Discovering Language in Marmoset Vocalization," *Proc. Interspeech*, pp.2426-2430, Stockholm, Sweden, August 20-24, 2017.
36. Atish Shankar Ghone, Rachana Nerpagar, Pranaw Kumar, Arun Baby, S. Aswin Shanmugam, Sasikumar M., Hema A. Murthy, "TBT (Toolkit to Build TTS): A High Performance Framework to Build Multiple Language HTS Voice," *Proc. Interspeech*, pp.3427-3428, Stockholm, Sweden, August 20-24, 2017.
37. Arun Baby, Jeena J Prakash, Rupak Viswanathan, and Hema A Murthy, "Deep Learning Techniques in Tandem with Signal Processing Cues for Phonetic Segmentation for Text to Speech Synthesis in Indian Languages," *Proc. Interspeech*, pp.3817-3821, Stockholm, Sweden, August 20-24, 2017.
38. Jilt Sebastian, Mari Ganesh Kumar, Y S Sreekar, Rajeev Vijay Rikye, Mriganka Sur and Hema A Murthy, "GDSPIKE: An accurate spike estimation algorithm from noisy Calcium fluorescence signals," *Proc. ICASSP*, pp.1043-1047, New Orleans, USA, March 5-9, 2017.
39. Saad Y Sait, Hema A Murthy and S Krishnamoorthy Sivalingam, "Organization-level control of excessive Internet downloads," *Proc. IEEE Conference on LCN*, pp.184-187, Dubai, United Arab Emirates, November 7-10, 2016.
40. Anusha Prakash and Hema A Murthy, "Improvement of Continuous Dysarthric Speech Quality," *Proc. SLPAT*, pp. 43-49, San Francisco, USA, September 2016.

41. Nauman Dawalatabad, Srikanth Madikeri, C Chandra Sekhar and Hema A Murthy, "Two-Pass IB based Speaker Diarization System using Meeting-Specific ANN based Features," *Proc. Interspeech*, pp.2199-2203, San Francisco, USA, September 2016.
42. Anusha Prakash, Jeena J Prakash and Hema A Murthy, "Acoustic Analysis of Syllables across Indian languages," *Proc. Interspeech*, pp. 327-331, San Francisco, USA, September 2016.
43. Arun Baby, N L Nishanthi, Anju Thomas and Hema A Murthy, "A unified parser for developing Indian language text to speech synthesizers," *Proc. Text, Speech, and Dialogue*, pp. 514-521, Czech Republic, September 12-16, 2016.
44. Jilt Sebastian and Hema A Murthy, "Group delay based music source separation using deep recurrent neural networks," *Proc. SPCOM*, Bangalore, India 2016, doi: 10.1109/SPCOM.2016.7746672
45. Karthik Pandia and Hema A Murthy, "A Fast Query-by-Example Spoken Term Detection for Zero Resource Languages," *Proc. SPCOM*, Bangalore, India 2016, doi: 10.1109/SPCOM.2016.7746600
46. Jeena J Prakash and Hema A Murthy, "An analysis of the distribution of syllables in prosodic phrases of stress-timed and syllable-timed languages," *Proc. Speech Prosody*, pp.49-53, Boston, USA 2016. DOI: 10.21437/SpeechProsody.2016-11
47. Shreya Khare, Akshay Bhandari and Hema A Murthy, "Eigen and Multimodal Analysis for Localizing Moving Sounding Objects," *Proc. ICASSP*, pp.2757-2761, Shangai, China, March 20-25, 2016.
48. Rupak Vignesh Viswanathan, Aswin S Shanmugham and Hema A Murthy, "Significance of Pseudo-Syllables in Building Better Acoustic Models for Indian English TTS," *Proc. ICASSP 2016*, pp. 5620-5624, Shangai, China, March 20-25, 2016.
49. Shrey Dutta, P V Krishna Raj and Hema A Murthy, "Raga Verification in Carnatic Music Using Longest Common Segment Set," *Proc. ISMIR*, pp.605-611, Malaga, Spain 2015.
50. Swapnil Gupta, Ajay Srinivasamurthy, Manoj Kumar, Hema A Murthy and Xavier Serra, "Discovery of Syllabic Percussion Patterns in Tabla Solo Recordings," *Proc. ISMIR*, pp.385-391, Malaga, Spain 2015.
51. Sridharan Sankaran, P V Krishna Raj and Hema A Murthy, "Automatic Segmentation of Composition in Carnatic Music Using Time-Frequency CFCC Templates," *Proc. CMMR*, pp. , Plymouth, UK.
52. Angelos K Marnerides, Akshay Bhandari, Hema A Murthy and Andreas U Mauthe, "A multi-level resilience framework for unified networked environments," *Proc. 2015 IFIP/IEEE International Symposium on Integrated Network Management (IM)*, pp.1369-1372, 2015.
53. Akshay Bhandari and Shreya Khare and Hema A Murthy "Systematic Downloading: Analysis and Detection," *Proc. ICSPCS2014*, pp.1-9, Gold Coast, Australia, 2014.
54. Shrey Dutta and Hema A Murthy, "DISCOVERING TYPICAL MOTIFS OF A RAGA FROM ONE-LINERS OF SONGS IN CARNATIC MUSIC," *ISMIR 2014*, pp.397-402.
55. S Aswin Shanmugam and Hema A Murthy, "A Hybrid Approach to Segmentation of Speech Using Group Delay Processing and HMM Based Embedded Reestimation," *Proc. Interspeech 2014*, pp.1648-1652, Singapore.

56. Asha T, Saranya M S, Karthik Pandia, Srikanth Madikeri and Hema A Murthy, "Feature switching in the i-Vector framework for speaker verification," *Proc. Interspeech 2014*, pp.1125-1129, Singapore.
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Invited Paper at International and National Conferences, Workshops

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2. Vignesh Ishwar, Ashwin Bellur and Hema A Murthy, "Motivic Analysis and its relevance to *rAga* identification in Carnatic Music," 2nd CompMusic Workshop, Istanbul, Turkey, July 12-13, 2012

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5. Hema A Murthy, "Participatory design approach for distance education in rural India," International Workshop on Global Software Collaborative Practices and Collaborative Technologies, Oct 28-30, Copenhagen, Denmark, 2010.
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In Refereed National Conferences

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3. Krishna Chaitanya Gogineni, Jom Kuriacose and Hema A Murthy, "Mridangam Artist Identification from Taniavartanam Audio," accepted for presentation at NCC 2018.
4. Rajeev Rajan and Hema A Murthy, "Music Genre Classification by Fusion of Modified Group Delay and Melodic Features," accepted for presentation at NCC 2017.
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6. P V Krishna Raj, Venkatasubramanian Viraraghavan, Sridharan Sankaran and Hema A Murthy, "An Approach to Transcription of Varnams in Carnatic Music Using Hidden Markov Models," accepted for presentation at NCC 2017.
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27. Subhadeep Dey and Rajeev Rajan, Padmanabhan, R., and Murthy, H.A., "Feature diversity for emotion, language and speaker verification," *Communications (NCC)*, 2011 National Conference on , vol., no., pp.1,5, 28-30 Jan. 2011, doi: 10.1109/NCC.2011.5734774
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29. Kumar, J.C, Janakiraman, R. and Murthy, H.A., "KL divergence based feature switching in the linguistic search space for automatic speech recognition," *Communications (NCC)*, 2010 National Conference on , vol., no., pp.1-5, 29-31 Jan. 2010
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37. P G Deivapalan, Mukhund Jha, Rakesh Guttikonta and Hema A Murthy, "DONLabel: An automatic labeling tool for Indian languages," *Proceedings NCC-2008*, pp.263–267.
38. P G Deivapalan and Hema A Murthy, "A syllable-based isolated word recogniser in Tamil handling OOV words," *Proceedings NCC-2008*, pp.268–271.
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41. R Padmanabhan, P Sreehari Krishnan and Hema A Murthy, "A pattern recognition approach to VAD using modified group delay," *Proceedings NCC-2008*, pp.432–436.
42. Y R Venugopalakrishna, P Sreehari Krishnan, Samuel Thomas, Karthik Bommepally, Karthik Jayanthi, Suket Murarka, Hemant Raghavan and Hema A Murthy, "Design and development of text-to-speech synthesis systems for Indian Languages," *Proceedings NCC-2008*, pp.259–262.
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44. P Manohar, Hema A Murthy and T A Gonsalves "An Application Independent Multimodal interface for the Computer," *Proc. NCC-2006*, pp.275-279, Jan 27-29, 2006, IIT Delhi.
45. P.Sowjanya, K.Vijayalakshmi, G.Vijay Prakash, Kasi Rajan, M.S.Vidhya, T.Nagarajan, Srinivas Chakravarthy, N.S.Narayanaswamy and Hema A.Murthy, "Hand Writing Interface enabled Tamil Search Engine", In *Proc. 11'th National Conference on Communications*, pp 661-665, Jan 28-31, 2005, IIT Kharagpur
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47. Krishanu Bhattacharya, N. Usha Rani, Timothy A. Gonsalves and Hema A. Murthy, "An Efficient Algorithm for Root Cause Analysis", *Proc. NCC-2005, IIT Kharagpur*, Jan 05, pp. 447-451.
48. R. Deepak, N. Usha Rani, Timothy A. Gonsalves and Hema A. Murthy, "Network Security Management for a National ISP", *Proc. NCC-2005, IIT Kharagpur*, Jan 05, pp. 565-568.
49. S.Thomas, H. Murthy and C. Chandra Sekhar, "Distributed speech synthesis for embedded systems - an analysis," *NCC-2005, IIT Kharagpur, India, Jan 2005*, pp 273-276.
50. M. Nageshwara Rao, S. Thomas, T. Nagarajan and H. Murthy, "Text-to-speech synthesis using syllable-like units," *NCC-2005, IIT Kharagpur, India, Jan 2005*, pp 277-280.

51. N. Hemalatha, G. L. Sarada, T.Nagarajan, Hema A. Murthy, "Connected Digit Recognition using Unsupervised and Incremental HMMs", NCC-2005, pp. 296-299, January, Kharagpur.
52. T Nagarajan and Hema A Murthy, "An Approach to Segmentation and Labeling of Continuous Speech without Bootstrapping," presentation at *Proceedings NCC-2004*), IISc, Bangalore, January, 2004.
53. M A Saifulla, Hema A Murthy and Timothy A. Gonsalves, "Vector Quantization for Internet Traffic," *Proc. NCC-2003*, pp.511-515, Chennai, 2003.
54. T. Nagarajan and Hema A Murthy, "Pairwise Multiple Codebook based Language Identification," *Proc. Workshop on Spoken Language Processing*, pp.101-108, TIFR, Bombay, January 10-11, 2003.
55. Hema A Murthy, Bhaskar Ramamurthi, Timothy A.Gonsalves, K.Balamurugan, Shubha Augustine & Ch. Vijyalakshmi "CygPlan-An Installation Planning Tool," *Proc. NCC-2002*, pp. 433-437, Bombay, India, January, 2002.
56. Hema A Murthy, T.A. Gonsalves, Rolland Enoch, G.Sirisha, Valli Kannu, M.Mahesh, G.Geetha, Saravanan , Raghu Kishore "A DSP Virtual Machine,"*Proc. NCC-2002*, pp. 200-203, Bombay, India, January, 2002.
57. T. Nagarajan, V K Prasad and Hema A Murthy, "The Minimum Phase Property of the Magnitude Spectrum and its Application to Speech Segmentation," *Proc. SPCOM-01* pp. 95-101, July 2001, Bangalore, India.
58. Hema A Murthy, T A Gonsalves, B Madhavi, K Gupta, H Solanki, B Ramamurthi and Ashok JhunJhunwala, "CygPlan: An Installation Planner for Telecom Access Networks," *Proc. NCC-2000*, pp. 17-20, Delhi, 2000.
59. T A Gonsalves, Ashok JhunJhunwala, Hema A Murthy, Hari Selvarajan, D N Rajan, R Siddappa, N Jayaprakash, Prakash Chandra, A Ramasamy, J Joseph, Vaishali P Mane and R Srinivasan, "CygNet: An Integrated Management for Modern Telecom Networks," *Proc.NCC-2000*, Delhi, 2000, pp. 103-106.
60. A Ramasamy, Hema A Murthy and T A Gonsalves, "Linear Prediction for Network Management," *Proc. NCC-2000*, pp.199-202, Delhi, 2000.
61. V. Kamakshi Prasad, Hema A Murthy and C Chandra Sekhar, "Connected Digit Recognition Using Minimum Phase Group Delay Functions," *Proc.IRIL-99*, Hyderabad, pp. 15-1, November 12-14, 1999.
62. Jyotsana Balledda and Hema A Murthy, "Spoken Language Identification System for Indian Languages" *Proc.IRIL-99*, Hyderabad, pp. 20-1, November 12-14, 1999.
63. Jyotsana Balledda, S.Vela and Hema A Murthy, "A New Model for Speaker Identification using Affine Transformation," *Proc. SPCOM-99*, IISc, Bangalore, India, pp.121-124, July 21-24, 1999.
64. Hema A Murthy, Jyotsana Balledda and C Chandra Sekhar, "Identifying the location of Digits in a Connected Digit Sequence Using Minimum Phase Group Delay Functions," *Proc.NCC-99*, Kharagpur, pp.157-162, Jan 29-31, 1999.

65. Hema A. Murthy, Francoise Beaufays, Larry P Heck and Mitchel Weintraub “Feature Extraction for Speaker Identification,” *Proc. SPCOM-97*, Bangalore, India, pp.43-50, July 16-19, 1997.
66. Hema A. Murthy, “The Real Root Cepstrum and its Application to Speech Processing,” *Proc.NCC-97*, pp.180-183, Madras, India.
67. S.R.Rajesh Kumar, V.R.Ramachandran, A.S.Madhukumar, Hema A. Murthy and B.Yegnanarayana, “A text-to-speech system for Indian languages,” presented at the Seminar on Common Phonetic Matrix for Indian Languages, CIIL, Mysore, India, March, 1990.
68. Hema Arunachalam and S. Pannageshwari and P. Vijaykumar, “Emulation of 8080 CPU - a bit-slice approach,” Student paper presented at CSI Convention, Delhi, March 1981.

In non-Refereed Indian Conferences

- S.R.Rajesh Kumar, V.R.Ramachandran, A.S.Madhukumar, Hema A. Murthy and B.Yegnanarayana, “A text-to-speech system for Indian languages,” presented at the Seminar on Common Phonetic Matrix for Indian Languages, CIIL, Mysore, India, March, 1990.

M.Eng thesis (by research):

Title: Statistical Classification of Sea-Ice
 Advisor: Simon Haykin, Director, Communications Research
 Laboratory, McMaster University, Hamilton,
 Ontario, Canada.

Ph.D Thesis:

Title: Algorithms for processing Fourier transform
 phase of Signals
 Advisor: B. Yegnanarayana, Professor, Department of
 Computer Science and Engineering,
 IIT, Madras, India.

(E) Research Interests :

Speech signal processing for synthesis, recognition, speaker verification, language recognition, time series models computer networks, machine learning for speech, data networks and text mining.

(F) Research Scholars (Completed):

1. Anju Leela Thomas, “Code Switching in Indic Speech Synthesisers,” MS Thesis, submitted May 2020.
2. Srihari Maruthachalam, ” Artifacts analysis in EEG and its applications in building brain-computer interfaces,” MS Thesis, submitted Feb 2020.
3. Jeena J Prakash, ”Transcription correction and rhythm analysis for applications in text to speech synthesis for Indian languages,” PhD Thesis, 2020.

4. M S Saranya, "Feature Switching a new paradigm for speaker recognition and spoof detection," (Reports Received), PhD Thesis, 2020. [i/LIi](#)
5. Jilt Sebastian, "Novel methods for Time Event Detection and Source Separation," PhD Thesis, 2019.
6. P V Krishnaraj Sekhar, "Technology assisted archival and learning of varnams in Carnatic music," MS Thesis, 2019.
7. Arun Baby, "A unified approach to speech synthesis in Indian languages," MS Thesis 2019.
8. Golda Brunet Rajan, "Transcription correction using signal processing and its application to continuous speech recognition," PhD Thesis 2018.
9. Sridharan Sankaran, "Segmentation of musical items: A computational perspective," MS Thesis 2017.
10. Rajeev Rajan, "Estimation of Pitch in Speech and Music Signals Using Modified Group Delay Functions," PhD Thesis, IIT Madras, 2017.
11. Saad Y Sait, "Organizational level control of abusive traffic," (co-Guide: S Krishna Sivalingam), PhD Thesis, IIT Madras, 2017.
12. Anusha Prakash, "Cross-lingual Speech Synthesis and Enhancement of Dysarthric Speech," (co-Guide, Prof. Ramasubba Reddy, Applied Mechanics), MS Thesis IIT Madras, 2017.
13. Shreya Khare, "Multimedia Content Analysis And Its Application For Sound Source Localisation," M S Thesis, IIT Madras, 2017.
14. Asha T, "Relevance of front-end processing in Speaker Recognition," MS Thesis, IIT Madras, 2016.
15. Shrey Dutta, "Analysis of Motifs in Carnatic Music: A Computational Perspective," M S Thesis, IIT Madras, 2016.
16. Akshay Bhandari, "Feature extraction for anomaly detection," M S Thesis, IIT Madras, 2016.
17. Aswin S Shanmugam, "A Hybrid Approach to Segmentation of Speech Using Signal Processing Cues and Hidden Markov Models," M S Thesis, IIT Madras, 2016.
18. Raghava Krishnan, "Prosodic Analysis of Indian Languages and its Applications to Speech Synthesis," M S Thesis, IIT Madras, 2016 (co-guide: Prof. S. Umesh, Dept. of EE, IIT Madras)
19. Padi Sarala, "Applause identification and its application to archival of Carnatic Music," April 2015.
20. M R Srikanth, "Speaker Verification and Keyword Spotting Systems for Forensic Applications," PhD Thesis, 2013.
21. Ashwin Bellur, "Automatic Tonic identification Indian classical music," MS Thesis, 2014 (Co-guide, Prof. R Aravind, Dept. of EE)
22. Chaitanya Kumar, "Information theoretic measures to incorporate multiple feature streams in the linguistic search space for automatic speech recognition," MS Thesis, 2013 (Co-guide: Prof. C Chandra Sekhar, Dept. of CS&E).

23. Subhadeep Dey, "Universal syllable models for language identification," MS Thesis, IIT Madras, 2013.
24. Santosh Kumar Chaudhari, "Green IT: Energy efficient techniques for network management for core networks and data centers," MS Thesis, IIT Madras, 2013.
25. Cyriac James, "Relevance of time series in network traffic modeling: In the context of TCP SYN DOS attacks," M S Thesis, IIT Madras, 2012.
26. R Padmanabhan, "Studies on voice activity detection and feature diversity for Speaker Recognition," Ph.D Thesis, IIT Madras, 2012.
27. Rajesh Janakiraman, "Syllable Section and its Application to Syllable-centric Continuous Speech Recognition," M.S Thesis, IIT Madras, 2012 (Co-guide: Prof. C Chandra Sekhar).
28. Sanasam Ranbir Singh, "On the importance of Crawling, Text Clustering Realtime Implicit Feedback in Web Search Engines," (Co-guide, Prof. T A Gonsalves, Dept. of CS&E, IIT Madras) Ph.d Thesis IIT Madras, 2010.
29. Nikhil Ranjan, "GARCH Models for TCP based Denial of Service Attacks," (Co-guide: Prof. T A Gonsalves, Dept. of CS&E, IIT Madras) MS Thesis, 2010.
30. Y R Venugopalakrishna, "Methods for Improving the Quality of Syllable-Based Speech Synthesis for Indian Languages," (Co-guide: Prof. C.S Ramalingam, EE, Dept) MS Thesis, IIT Madras, 2009.
31. P R Ramya, "Incorporating acoustic feature diversity in linguistic search space for speech recognition," (Co-guide: Prof. C.S Ramalingam, EE, Dept) MS Thesis, IIT Madras, 2009.
32. Sadhana Chevireddy, "A syllable-based segment vocoder," (Co-guide: Prof. C Chandra Sekhar, Dept. of CS&E), MS Thesis, 2009
33. P G Deivapalan, "A Segmented Syllable-based, Isolated Word Recognizer for Indian Languages," M S Thesis, IIT Madras, 2009.
34. Pranav Hammabhadkar, "Pattern Recognition and Synthesis of Materials Microstructures," (Co-guide: Prof. K Balasubramanian, Director, NFTDC, Hyderabad) MS Thesis, IIT Madras, 2009.
35. Sreenivasulu Nagireddy, "A Pattern Recognition Approach to Block Cipher Identification," (Co-guide: Prof. C Chandra Sekhar, Dept. of CS&E), MS Thesis, IIT Madras, 2009.
36. M Kasirajan, "Patram: A unified word processing system for handwritten character recognition in Indian languages," (Co-guide: Prof. Srinivasa Chakravarthy, Dept of BT), MS Thesis, IIT Madras, 2008.
37. P Sreehari Krishnan, "Voice activity detection using group delay functions," M S Thesis, IIT, Madras, 2007.
38. A Lakshmi, "A Syllable-based approach to continuous speech recognition in Indian languages," (Co-guide, Prof. C S Ramalingam, Dept. of EE) M S Thesis, IIT, Madras, 2007.
39. Samuel Thomas, "Natural sounding Text-to-speech synthesis based on syllable-like units," (Co-guide: Prof. C Chandra Sekhar, Dept. of CS&E) M S Thesis, IIT, Madras, 2007.

40. Dinil Mon Divakaran, "Traffic Modeling and Analysis," (Co-guide: Prof. TA Gonsalves, Dept. of CS&E) M S Thesis, IIT, Madras, 2007.
41. P Manohar, "The Multimodal Interaction for the Computer: An Application independent Approach," M.S Thesis, IIT Madras, 2006.
42. Vinod J, "Low cost Data Communication network for Rural Telecom Management," (Co-Guide: Prof. T.A. Gonsalves, Dept. CS&E, IIT Madras) M S Thesis, IIT Madras, 2006.
43. G L Sarada, "Automatic Transcription of Continuous Speech into Syllable-like Units," M.S Thesis, IIT Madras, 2006.
44. Rajesh Hegde, "The Modified Group Delay feature and its application to Speech Recognition," Ph.d Thesis, IIT Madras, 2005.
45. R Deepak, "Distributed Intrusion Detection System," (Co-Guide: Prof. T.A.Gonsalves, Dept. CS&E, IIT Madras), M S Thesis, IIT Madras, 2005.
46. Veena Desai, "Distributed Speech Recognition," (Co-guide: Prof.T A Gonsalves, Dept. of CS&E, IIT Madras), M.S Thesis, IIT Madras, 2005.
47. T. Nagarajan, "Implicit Spoken Language Identification Systems," Ph.d Thesis, IIT Madras, 2004.
48. G.Sirisha, "A DSP Virtual Machine," M S Thesis, IIT Madras, 2004 (Co-Guide: Prof. T.A.Gonsalves, Dept. CS&E, IIT Madras)
49. N Sridhar Krishna, "Multilingual Text-to Speech Synthesis," M S Thesis IIT Madras, 2004 (Co-Guide: Prof. T.A.Gonsalves, Dept. CS&E, IIT Madras)
50. M Balamurugan, "An Access Network Planner," M S Thesis, IIT Madras, 2004 (Co-Guide: Prof. T.A.Gonsalves, Dept. CS&E, IIT Madras)
51. M. A. Saifulla, "A Pattern Matching Approach to Classifying Network Traffic," M.S Thesis, IIT Madras, 2003, (Co-Guide: Prof. T.A.Gonsalves, Dept. of CS&E).
52. V Kamakshi Prasad, "Segmentation and Recognition of Continuous Speech," Ph.D Thesis, IIT Madras, 2002.
53. A Ramasamy, "LP Based Traffic Modelling and a Framework for Control," M.S.Thesis, IIT Madras, 2002 (Co-Guide: Prof.T.A.Gonsalves, Dept. of CS&E).
54. B Jyotsana, "A Spoken Language Identification System for Indian Languages," M.S. Thesis, IIT Madras, 2001.
55. S Vela, "A New Model of Speaker Identification based on Statistical Similarity and an Object Oriented Framework for Online Speaker Identification," M.S.Thesis, IIT Madras, 1999.
56. J Srichand, "Word Boundary Detection in Indian Languages and its Application to Keyword Spotting," M.S.Thesis, IIT Madras, 1999 (Co-guide:Prof.G.V.Ramana Rao).
57. M Narendranath, "Transformation of Vocal Tract Characteristics for Voice Conversion using Artificial Neural Networks," M.S. Thesis, IIT Madras, 1995 (Co-Guide: Prof.B.Yegnanarayana, Dept. of CS&E).

Research Scholars (Current):

1. R Gowri Prasad (PhD) *Music Analysis*
2. T Anand (PhD) *Area: Computational Brain Research* (0.5 year)
3. Sridharan Sankaran *Area: Music Processing* (1 year) (CMI, co-guide: K V Subramanian)
4. Anusha Prakash (PhD) *Area: Speech Technology* (2 year) (EE Dept, co-guide: Umesh S)
5. Siddharth Agarwal (MS) *Area: Computational Brain Research* (1.5 year)
6. M Srihari (MS) *Area: Computational Brain Research* (2 year)
7. Venkatasubramanian Veeraraghavan (PhD) *Area: Music Analysis* (2.5 year) (EE Dept, co-guide: R Aravind)
8. Rini Evangelina Anand (PhD) *Area: Computational Brain Research* (3 years) (EE Dept, co-guide: Umesh S)
9. Mari Ganesh Kumar (PhD) *Area: Computational Brain Research* (3.5 years)
10. Jom Kuriacose (PhD) *Area: Music information retrieval* (6 years)
11. Nauman Daulatabad (PhD) *Area: Speaker Diarization* (5.5 years)
12. Karthik Pandia (PhD) *Area: Keyword spotting* (6.5 years)

M. Tech Students (Completed):

1. Ambika Devi Amma T., *A Multilingual Speech Oriented Learning System for the Hearing Impaired*, M.Tech Thesis, IIT Madras, 1994.
2. Anurag Dave, *Curve Based Font Generation of Indian Languages*, M.Tech Thesis, IIT Madras, 1995.
3. Suriyan Narayanan R, *Devanagari Script Processor and Image Handler*, M.Tech Thesis, IIT Madras, 1995.
4. J Radha, *Distributed Orchestrated Multimedia Presentation*, M.Tech Thesis, IIT Madras, 1995.
5. S. Jagadish, *Surface Reconstruction from Planar Contours Extracted From MRI Images*, M Tech Thesis, IIT Madras, 1998 (Co-Guide: Sukhendu Das, Dept. of CS&E, IIT Madras).
6. Ravindranathan K R, *Unsupervised Texture Segmentation Using Gabor Filters*, M Tech Thesis, IIT Madras, 1998 (Co-Guide: Sukhendu Das, Dept. of CS&E, IIT Madras).
7. S B Herlekar, *Speaker Independent Data Collection of a) Connected Digit Database, (b) Acoustic Phonetic Corpus for Continuous Speech*, M Tech Thesis, IIT Madras, 1998.
8. Sai Arul, *Rendering of Surfaces by Texture Mapping*, M Tech Thesis, IIT Madras, 1998.
9. M Ravi Kumar, *Combining Solids Using Boolean Operations*, M Tech Thesis, IIT Madras, 1998.
10. G Sriram, *A New Approach to Fractal Image Compression based on Enveloped Domain Search*, M Tech Thesis, IIT Madras, 1998.

11. Hanumandla Sreedhar, *Block based Fractal Image Compression: An Adaptive Enveloped Domain Search*, M Tech Thesis, IIT Madras, 1999 (Co-Guide: Prof. R. Aravind, Dept. of EE, IIT Madras).
12. M Ramkoteswara Rao, *Solid Modeling Using Regularised Boolean Expressions: A Voxel Based Approach*, M Tech Thesis, IIT Madras, 1999.
13. Jyoti Prakash Kurmi, *ML_Solsh - A Visual Aid for the Hearing Impaired*, M Tech Thesis, IIT Madras, 1999.
14. Rajesh Kumar, *WebSpeak: A Web Browser for the Visually Impaired*, M Tech Thesis, IIT Madras, 1999.
15. D. Rajanikanth, *Design of Agent Software for Network Monitoring and Control*, M Tech Thesis, IIT Madras, 2000.
16. S G Anand, *Enhancement of Network QoS Support and Traffic Control in Linux*, M Tech Thesis, IIT Madras, 2000.
17. Ashok Kumar, *Speaker-Independent Client Server based Web Browser for the Visually Impaired*, M Tech Thesis, IIT Madras, 2000.
18. Ajay Arora, *Performance Evaluation of IITM Campus Network Using CygNet*, M Tech Thesis, IIT Madras, 2001.
19. G T Nadiyan Selvam, *DSP Virtual Machine: VML to Target Translator*, M Tech Thesis, IIT Madras, 2001.
20. Saraph A P, *DSP Virtual Machine: VML to VML Optimisation*, M Tech Thesis, IIT Madras, 2001.
21. V S Sheno, *X Window based Indian Language Support for Linux Operating System*, M Tech Thesis, IIT Madras, 2001.
22. K Ratheesh *Console based Indian Language Support for Linux Operating System*, M Tech Thesis, IIT Madras, 2001.
23. Sanghamitra Biswas *Indian Language Interface to Database for Linux Operating System*, M Tech Thesis, IIT Madras, 2002 (Co-Guide: T A Gonsalves, Dept. of CS&E, IIT Madras).
24. Anup Banskota, *SpreadSheet Implementation with Multilanguage Support*, M Tech Thesis, IIT Madras, 2002 (Co-Guide: T A Gonsalves, Dept. of CS&E, IIT Madras).
25. M Backialakshmi, *PRI Interleaving Using VML*, M Tech Thesis, IIT Madras, 2002 (Co-Guide: K B Venkaratraman, DARE, DRDO, Bangalore).
26. N Raghu Kishore *CODEC Application in DSP Virtual Machine Language* M Tech Thesis, IIT Madras, 2002 (Co-Guide: T A Gonsalves, Dept. of CS&E, IIT Madras).
27. P Saravanan, *DSPVM Simulator*, M Tech Thesis, IIT Madras, 2002 (Co-Guide: T A Gonsalves, Dept. of CS&E, IIT Madras).
28. M Mahesh *Digital Signal Processor Virtual Machine Input-Output*, M Tech Thesis, IIT Madras, 2002 (Co-Guide: T A Gonsalves, Dept. of CS&E, IIT Madras).

29. K Geetha, *Graphical User Interface Development for DSP Virtual Machine*, M Tech Thesis, IIT Madras, 2002 (Co-Guide: T A Gonsalves, Dept. of CS&E, IIT Madras).
30. Dukman, *Ping based Network Management System*, M Tech Thesis, IIT Madras, 2002 (Co-Guide: T A Gonsalves, Dept. of CS&E, IIT Madras).
31. Anitha Nalluri, *Convertor Across Different Indian Languages and Fonts*, M Tech Thesis, IIT Madras, 2003.
32. Adinarayana Gupta, *Blackfin Assembly Translator for ADSP 218X DSP Processor*, M Tech Thesis, IIT Madras, 2003 (Co-Guides: C S Ramalingam, Dept. EE, IIT Madras, Srinivas K, Analog Devices, Pvt. Ltd., Bangalore).
33. Subodh Gupta, *Network Traffic Analysis Using Linear Prediction*, M Tech Thesis, IIT Madras, 2004.
34. Ch. V Phani Kumar, *Network Security Scanning*, M Tech Thesis, IIT Madras, 2004.
35. M Krishna Kumar, *Communication and Control Software for an Automated Teller Machine*, M Tech Thesis, IIT Madras, 2004.
36. Deepak Agarwal, *Gaussian Mixture Models and Network Traffic Analysis*, M Tech Thesis, IIT Madras, 2004.
37. K Nagendra Prasad, *TMS320C54x to ADSP-21535 Program Translator*, M Tech Thesis, IIT Madras, 2004.
38. K Santosh *C to VML Translator*, M Tech Thesis, IIT Madras, 2005.
39. Sita Reddy *DSR using PO/PR protocol and measuring the QoS characteristics*, M Tech Thesis, IIT Madras, 2005.
40. P Devi *Client side implementation of distributed speech recognition on an embedded device*, M Tech Thesis, IIT Madras, 2005.
41. Sandhya Reddy *Detection of anomalous network traffic*, M Tech Thesis, IIT Madras, 2005.
42. Shameem Unnisa *Multilingual search engine interfaced with Morph analyzer*, M Tech Thesis, IIT Madras, 2005.
43. Amit Dangwal *Tool for organising data associated with online tutorials*, M Tech Thesis, IIT Madras, 2005
44. Vikas Luthra, *Implementing online teaching-learning strategies in interactive education*, M Tech Thesis, IIT Madras, 2005
45. Vijay Katoch, *Speech Synthesis in Spoken English Tool Kit*, M Tech Thesis, IIT Madras, 2006.
46. G Bhaskar, *Spoken English Tool kit*, M Tech Thesis, IIT Madras, 2006.
47. G Philip, *Grammar models for Spoken English Tool Kit*, M Tech Thesis, IIT Madras, 2006.
48. Dhananjaya, *Traffic Analysis and Modeling*, M Tech Thesis, IIT Madras, 2007.

49. J P Nirmala, *Multilingual Domain Name System for Indian Languages*, M Tech Thesis, IIT Madras, 2008.
50. Bhulakshmi, *Transliteration and Translation of web pages into Indian languages*, M Tech Thesis, IIT Madras, 2008.
51. D Swathi, *Analysis of Carnatic music: A signal processing perspective*, M Tech Thesis, IIT Madras, 2009.
52. Ankit Malpani *Personalised intelligent tutoring system*, M Tech Thesis, IIT Madras, 2009 (Co-guide: Prof. B Ravindran, Dept. of CS&E).
53. M Bhuvaneshwari *A framework for online subjective examinations*, M Tech Thesis, IIT Madras, 2010.
54. Jeena J Prakash, *Internet Traffic Analysis and Modeling of IITM Network*, M Tech Thesis, IIT Madras, 2010.
55. Glisa, *An Algorithm for Controlling IITM Network Traffic*, M Tech Thesis, IIT Madras, 2010.
56. Rahul, *Design of an SMS Lexicon for an Indian Language*, M Tech Thesis, IIT Madras, 2010.
57. M Sandeep Kumar, *Network User Behavior Modelling : Classifying User Behavior* M Tech Thesis, IIT Madras, 2011.
58. Raman Konna, *User Based Bandwidth Management Over Internet Access Link Using TCP Rate Control* M Tech Thesis, IIT Madras, 2011.
59. Subash Midhila, *Energy Aware Networking: Reducing Energy Consumption in Backbone Networks by turning off Under-Utilized Links*, M Tech Thesis, IIT Madras, 2011.
60. Anil Kumar, *Web Data classification using supervised feature extraction techniques*, M Tech Thesis, IIT Madras, 2011.
61. Arunkumar B, *Port-based Anomaly Detection in Network Traffic*, M Tech Thesis, IIT Madras, 2011.
62. Jyosna Chandu, *Dynamic Question Generation for Geometry in TeNeT Online TT Examination System*, M Tech Thesis, IIT Madras, 2011.
63. Kalpana Raman *Multilabel Classification of Web Documents Using Latent Semantic Analysis*, M Tech Thesis, IIT Madras, 2011.
64. Nikhil Sharma M, *Low-Rate DOS Attacks & Detection Mechanisms*, M Tech Thesis, IIT Madras, 2011.
65. Parth Joshi, *A study of multimodal video classification*, M Tech Thesis, IIT Madras, 2015.
66. G K Sudharshan, *Video event localization and identification*, M Tech Thesis, IIT Madras, 2015.
67. Abil N G, *Deep neural network toolkit and event spotting in video using DNN features*, IIT Madras 2015.
68. P A Manoj Kumar, *High resolution property of group delay functions its application to musical onset detection on Carnatic percussion instruments*, IIT Madras, 2015.

69. Ankit Vaidya, *Personalised recommender system for bollywood music*, IIT Madras, 2016.
70. Jyotsna Thapliyal, *Human action recognition using dense trajectories*, IIT Madras, 2016.
71. Padmasundari, *Music information retrieval: Raga identification using machine learning*, IIT Madras, 2016.
72. Y S Sreekar, *Machine learning and signal processing in computational neuroscience*, IIT Madras, 2016.
73. Athul Vijayan, *Motivic analysis of neuronal responses to visual stimuli*, IIT Madras, 2016.
74. Shantanu Gupta, *A Study of the Signal Processing Mechanisms in the Mouse Primary Visual Cortex*, IIT Madras, 2016.
75. Swetha Tanamala, *A Semi-Automatic Method for Transcription Error Correction for Indian Language TTS Systems*, IIT Madras, 2017.
76. Dheer Prashant Jain, *A Query by Example Spoken Term Detection System*, IIT Madras, 2017.
77. Poonam Thapar, *Feature based Stimulus Classification and Determining Receptive field of Visual Cortex Neurons*, IIT Madras, 2017.
78. Hardik Suthar, *Analysis of Visual Area Responses of Mice Using Machine Learning*, IIT Madras, 2017.
79. Sidharth Bafna, *Analysis and Modeling Neuronal Responses using Machine Learning*, IIT Madras, 2017.
80. Sakshi Verma, *Discovering Language in Marmoset Vocalization*, IIT Madras, 2017.
81. K L Prateek, *Speaker Diarization System for Meeting Data and Marmoset Vocalizations*, IIT Madras, 2017.
82. Krishna Chaitanya Gogineni, *PERCUSSION ARTIST IDENTIFICATION*, IIT Madras, 2017.
83. Aadhirai R, *Classification and Clustering of Visual Cortex Areas of Mouse Brain*, IIT Madras, 2017.
84. D Vinothkumar *Task-independent subject identification on EEG signal using UBM-GMM and i-vector frameworks* IIT Madras 2018.
85. Abhisek Kumar *Task-Independent Subject Identification from EEG signals using UBM-GMM super-vector based SVM*, IIT Madras 2018.
86. Hitesh Gupta, *Neural Networks based Task independent Subject Identification from EEG signals*, IIT Madras 2018.
87. Hardi Shah, *Analysis of EEG Signals for Imagined Speech and Different Genres of Audio Stimuli*, IIT Madras 2018.
88. Vaishal Tijoriwala *Identification and Analysis of Stimulus Specific Responses in Electroencephalography* IIT Madras 2018.

89. G Shiva Chaitanya, *A Recommendation System for Ilayaraja songs based on Melodic and Rhythmic cues*, IIT Madras 2018.
90. Purvi Goel, *Study of EEG Signals for Continuous Mental Activities*, IIT Madras 2018.
91. Raviraj Joshi, *The P300Wave : Analysis and Single Trial Classification*, IIT Madras 2018.

(G) Awards:

- Elected as a “Fellow of the Indian National Academy of Engineering,” Nov 2017.
- Elected to the board of the International Speech Communication Association (2017-2021).
- Manthan award (top 74 finalists), 2012.
- Indian Language text-to-speech synthesis systems integrated with screen readers, GE innovation award and first prize in research expo, Shaastara 2012.
- Prof. Rais Ahmed Memorial Lecture Award, Acoustical Society of India, 2012.
- IBM Faculty award, 2006.

(H) Technology Transfers:

1. Speaker Verification Software – Tata Power Corporation
2. SMS to Speech – DeitY, available as a freely downloadable app for 5 Indian languages
3. Indian language screen readers for Android – CDAC, DeitY
4. Indian language Screen readers for visually challenged – CDAC, DeitY, visually challenged community
5. Soft computing tools for decrypting messages – SAG, DRDO
6. Cygplan – Access Network Planner – Midas Technologies
7. Online Test and Tutorial – n-Logue Communications, Samvitt
8. DSP virtual machine – DACS, Bangalore
9. Launch and transfer (to OS Labs) of 9 language TTS technology by Hon’ble Minister of IT on Dec 28th 2015 as part of “good governance day.”

(I) Projects:

Sponsored Projects:

1. Project Title: Speech to Speech Machine Translation System (Pilot)
 Coordinators : Hema A Murthy and S Umesh
 Budget : 1.80 crores
 Duration : 1 year (March 2020 -- March 2021)
 Sponsor : PSA

2. Project title: Automatic Speech Recognition in Indian English, Tamil, Hindi, and Text to
 Coordinators : Hema A Murthy and S Umesh
 Budget : 92.02 lakhs
 Duration : 1 year (March 2020 -- March 2021)
 Sponsor : MeITY
3. Project title : Automatic Speech Recognition in Indian English, Tamil, Hindi, and Text to
 Coordinators : S Umesh and Hema A Murthy
 Budget : 2.35 crores
 Duration : 1 year (March 2020 -- March 2021)
 Sponsor : MeITY
4. Project title : Text to Speech Generation with Chosen Accent and Noise Profiles for Aero
 Coordinator : Hema A Murthy
 Budget : 22 lakhs
 Duration : 2 years (March 2019 -- 2021)
 Sponsor : Honeywell Technologies Pvt. Ltd
5. Project title : Text to Speech Generation with Chosen Accent and Noise Profiles for Aero
 Coordinator : Hema A Murthy
 Budget : 34.84 lakhs
 Duration : 2 years (March 2019 -- March 2021)
 Sponsor : DST
6. Project Title: Computational Aspects of Carnatic Music
 Coordinator : Hema A Murthy
 Budget : 9 lakhs
 Duration : 1 year March 2019 -- Aug 2020
 Sponsor : IIT Madras
7. Project Title: Integration of 13 Indian language TTS systems with
 screenreaders for Windows, Linux and Android platforms

 Coordinators: Hema A Murthy, C Chandra Sekhar, S Umesh
 Budget : 60 lakhs
 Duration : April 2018 -- June 2019.
 Sponsor : Meity, GoI
 Consortium partner : CDAC Mumbai
8. Project Title: Development of text/language independent speaker recognition,
 Language identification and keyword spotting system for passive interception
 systems in adverse environments
 Coordinators : Hema A Murthy, C Chandra Sekhar, S Umesh
 Total : 110 lakhs
 Duration : Sept 2013- Nov 2016.
 Sponsor : DRDO, India.
9. Project Title: Sched-Wireless (IUATC Project Phase II) Group 2

- Coordinators : S Krishnamoorthy Sivalingam, Gaurav Raina,
 Hema A Murthy, Devendra Jalihal.
 Total : 1.28 crores
 Duration : Nov 2012 -- March 2015
 Sponsor : DST, India
10. Project Title: Development of TEXT to SPEECH SYSTEM in Indian
 Languages: High quality text to speech synthesis and small footprint TTS
 (A twelve institute consortium effort)
 integrated with disability aids
 Coordinators : Hema A Murthy (Consortium lead)
 Total : 12.66 crores (consortium -- IIT Madras: 2.09 crores)
 Duration : April'2012-Sept 2016.
 Sponsor : DIT, India.
11. Project Title: Provision of services in the performance of the
 task described within the framework of the CompMusic European
 Project for the Analysis of the traditional Carnatic style
 of Music from India (4 Institute consortium project)
 Coordinator : Hema A Murthy
 Total : 125000 Euros
 Duration : Aug 1, 2011-July 31 2016
 Sponsor : University of Pompea Fabra, Spain
12. Project Title: Development of text to speech system for Indian languages (A six
 Institute Consortium effort)
 Coordinators : Hema A Murthy (Consortium lead)
 Total : 2.28 crores
 Duration : April'2009-Dec'2011.
 Sponsor : DIT, India.
13. Project Title :Text Transcription of Technical Video Lectures
 and Creation of Searchable
 Video Index, Metadata and Online Quizzes
 Coordinators : Mangala Sunder and Hema A Murthy
 Total : 3.45 crores
 Duration : Dec'2006-Dec' 2012
14. Project Title: IUATC Theme 4: Network security and resilience in NGNs
 Coordinators : T A Gonsalves, Hema A Murthy
 Total : 1 crore
 Duration : Oct 2009 - April 2012.
15. Project Title: DRDO MoC: Academic and research in communication and
 information technologies research program
 Coordinators : T A Gonsalves, Hema A Murthy, V Kamakoti
 Total : 2 crores
 Duration : June 2008 - Oct 2013.
 Sponsor : DRDO, India

16. Project Title: Automatic speech recognition for agricultural commodity prices in Indian languages (a consortium effort)
- Coordinators : S Umesh (Consortium lead), Hema A Murthy, C S Ramalingam, C Chandra Sekhar
- Total : 4.35 crores
- Duration : April 2010 - Mar 2012.
- Sponsor : DIT, India.
17. Project Title: Microsoft Windows Technologies Lab
- Coordinators : T A Gonsalves, V Kamakoti, B Ravindran, Hema A Murthy, Ashok Jhunjunwala, Devendra Jalihal
- Total : 93 lakhs
- Duration : Jun'2006-March 2012.
18. Project Title: Basic computers for visually challenged
- Coordinators : Hema A Murthy
- Total : 2.59 lakhs
- Sponsor : RUTAG, IIT Madras.
19. Project Title: Speech Synthesis in Indian Languages
- Coordinators : Hema A Murthy
- Total : 4.47 lakhs
- Duration : Dec'2006-Dec' 2008
- 20.
- Project Title: Soft Computing methods for Cipher System identification and key transformation
- Coordinators : C Chandra Sekhar and Hema A Murthy
- Total : 10 lakhs
- Duration : Sept'2005-Nov'2007
- Sponsor : DRDO
21. Project Title: Clustering techniques for key space reduction
- Coordinators : C Chandra Sekhar and Hema A Murthy
- Total : 5.88 lakhs
- Duration : Sept'2006-Nov'2007
- Sponsor : DRDO
22. Project Title:A Multimodal Interface Enabled Office Suite
- Coordinators : C S Ramalingam, Hema A Murthy, Srinivasa Chakravarthy, C Chandra Sekhar
- Total : 49 lakhs
- Duration : April'2005-Oct'2008
- Sponsor : Department of Science and Technology
23. Project Title: Communication Technology: Internal Development and Research Project
- Coordinators : Ashok Jhunjunwala, Hari Ramachandran, Hema A Murthy, C S Ramalingam

- Total : 60 lakhs
Duration : Oct'2004-Sep'2007
Sponsor : IIT Madras
24. Project Title: Translator across DSP Processors
Total : Rs. 6 lakhs
Coordinators : Hema A Murthy and Timothy A Gonsalves
Duration : Aug'2003-July'2006.
Sponsor : IsoftTech Software Solutions Private Limited
25. Project Title : Advanced Network Management Systems
Total :Rs.20 lakhs
Coordinators : Prof.Timothy A.Gonsalves, Hema A Murthy,
Prof.Ashok Jhunjunwala
Sponsor : NMSWorks, Madras
Duration : 8/2002-1/2009
26. Project Title : Network Management Software for NIOT Campus
Total : Rs.75,000/-
Coordinators : Dr.Hema A.Murthy, Prof.Timothy A.Gonsalves,
Prof.Ashok Jhunjunwala
Sponsor : NIOT, Madras
Duration : 8/99-11/2000
27. Project Title : Voice Conversion
Total : Rs.8.8 lakhs
Coordinators : Prof.B.Yegnanarayana, Hema A Murthy,
C Chandra Sekhar
Sponsor : DST
Duration : 1992-1995.
28. Project Title : Algorithms for Signal Reconstruction in
Acoustic Imaging
Total : Rs.9.741 lakhs
Coordinators : Prof.B.Yegnanarayana, Hema A Murthy
Sponsor : Department of Electronics
Duration : 1989-1991.

RBIC Projects:

1. Project Title: Speaker Verification and Speaker Statistics
Coordinators: Hema A Murthy
Budget : 30 lakhs
Duration : July 1 2018-June 30 2019
Sponsor : Honeywell Technology Solutions Pvt Ltd
2. Project Title: Speaker Identification (Phase II)
Coordinators : Hema A Murthy
Total : 15 lakhs
Duration : Jan 2010 - May 2013.
Sponsor : Tata Power Corporation (Strategic Elect. Division)

3. Project Title: Speaker Identification (Phase I)
 - Coordinators : Hema A Murthy and C Chandra Sekhar
 - Total : 9.96 lakhs
 - Duration : Nov'2007 - Jan 2010.
 - Sponsor : Tata Power Corporation (Strategic Elect. Division)

4. Project Title : Development of Software Tools for DSP Platforms
 - Total : 7.71 lakhs
 - Coordinators : C Chandra Sekhar
Hema A Murthy
 - Duration : Oct 1999 - Sept 2000.
 - Sponsor : DACS, Bangalore.

5. Project Title: Studies in Language Identification
 - Total :Rs.3.71 lakhs
 - Coordinators : Dr.Hema A Murthy
 - Duration : Jan. 2001, Dec. 2002
 - Sponsor : DACS, Bangalore.

6. Project Title: CygNet - Integrated Network Management System
 - Total: Rs.20 lakhs
 - Coordinators : Hema A Murthy, Ashok Jhunjunwala
 - Duration : Two years (2000-2002)
 - Sponsor : Polaris Software, Nilgiri Networks Pvt. Ltd.

7. Project Title: CygPlan - Integrated Access Network Planner
 - Total : Rs.2 lakh
 - Coordinators : Hema A Murthy, Ashok Jhunjunwala
 - Duration : Two years (2000-2002)
 - Sponsor : Nilgiri Networks Pvt. Ltd.

8. Project Title: Wireless in Local Loop
 - Coordinators : Bhaskar Ramamurthi, T A Gonsalves, Ashok
Jhunjunwala, Hema A Murthy, C Mathialagan
 - Total : Rs 9 crores
 - Duration : Mar'94-Mar'03 (I was a coinvestigator
from 1999-Mar'2003.)

9. Project Title: Direct Internet Access System
 - Coordinators : Ashok Jhunjunwala, Bhaskar Ramamurthi,
T A Gonsalves, Devendra Jalihal, R Arvind,
Hema A Murthy (I was a coinvestigator until
Mar'2003).
 - Total : Rs. 5 lakhs
 - Duration : 2001-2005.
 - Sponsor : Banyan Networks

10. Project Title: Ventureast TeNeT Fund
 - Coordinators : Ashok Jhunjunwala, Bhaskar Ramamurthi,
T A Gonsalves, Hema A Murthy,

Devendra Jalihal, R Arvind,
T G Venkatesh, A N Rajagopalan
Total : 2.4 lakhs
Duration : (2002-2006) 4 years

11. Project Title: Digital Internet Access Server

Coordinators : Ashok Jhunhunwala, Bhaskar Ramamurthi,
T A Gonsalves, Hema A Murthy
Total : 65.0 lakhs
Duration : Dec'2001-Mar'2003
Sponsor : HFCL, HTL, ARM, Shyam and Banyan