# Resume

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## Educational Qualification

Ph. D. in Engineering, March 2007
Department: Electronics and Telecommunication Engineering, Jadavpur University
BE (Hon's) in Electronics and Telecommunication Engineering, Jadavpur University, 1998

## Awards & Honors

- National award of Young IT Professional in 2003, Awarded by Computer Society of India (CSI)
- National award of "TI DSP Challenge" in 1997, Awarded by Texas Instruments (TI), India
- Fellow ofJapan Society for the Promotion of Science(2010)

## Research Areas

**Outcome based Curriculum development with 21st century pedagogy:** Since 2009**,** CET, IIT Kharagpur has been in the forefront of the project "Developing Suitable Pedagogical Methods for Various Classes, Intellectual Calibres and Research in E-learning", a flagship project under the NMEICT, sponsored by the MHRD. In addition to being the Anchor Institution, IIT Kharagpur developed a collaborative web based tool for developing, monitoring, sharing and administering Outcome-based Curricula.

**Speech based technology development for e-learning:**

**Computer Assisted Spoken Language Learning:** Develop a Computer Assisted Spoken Language Learning tools with correct language pedagogy for faster accusation of second language speaking

**Accent Conversion:** Transform the regional/foreign accent of a source speaker to have similar characteristics to that of another accent

**Ongoing Sponsored Projects**

**[1] Project Title**: Setting up of Teaching Learning Centre for Pedagogy Design & Research

**Co-Principal Investigator**: Dr. Shyamal Kr. Das Mandal
**Sponsor by**: Ministry of Human Resource Development, Government of India

**[2] Project Title:** CENTRAL SECTOR SCHEME FOR MOOC COMPLIANT E-CONTENT CREATION

**Co-Principal Investigator**: Dr. Shyamal Kr. Das Mandal
**Sponsor by**: Ministry of Human Resource Development, Government of India

**[3] Project Title:** Development of ERP System for IIPE under IIT KGP - IIPE MOU & Productization of Frame work
**Co-Principal Investigator**: Dr. Shyamal Kr. Das Mandal

**Completed Sponsored Projects**

**[1] Project Title**: Developing suitable pedagogical methods for various classes, intellectual calibers and research in e-learning (Main Phase)
**Principal Investigator**: Dr. Shyamal Kr. Das Mandal

**Sponsor by:** Ministry of Human Resource Development, Government of India

**[2] Project Title**: Creation of Integrated Development Environment (IDE) for Generation of Pronunciation Lexicon for Indian Languages (PL-IL) in W3C Pronunciation Lexicon Standard (PLS) and Example lexicon in Hindi and Bangla Languages

**Principal Investigator**: Dr. Shyamal Kr. Das Mandal
**Sponsor by**: Ministry of Electronics and Information Technology, Government of India

**[3] Project Title**: W3C SSML and SGRS Standard for Indic Languages: An Investigation and Evaluation based on Bengali, Hindi & Punjabi

**Principal Investigator**: Dr. Shyamal Kr. Das Mandal
**Sponsor by**: Ministry of Electronics and Information Technology, Government of India

**[4] Project Title**: Speech based Access of Agricultural Commodity Prices and Weather Information 12 Indian Languages / Dialects. Automatic Speech Recognition (ASR) Consortium - PHASE II

**Co-Principal Investigator**: Dr. Shyamal Kr. Das Mandal
**Sponsor by**: Ministry of Electronics and Information Technology, Government of India

**Short-term courses**

**2017-18**

2 Number of Faculty Induction Program, under TEQIP-III

**2016-17**

4 Number of Faculty Induction Program, under TEQIP-II

**2015-16**

5 Number of Faculty Induction Program, under TEQIP-II

**2014-15**

3 Number of Faculty Induction Program, under TEQIP-II

## Invited Lectures

***2017-2018***

[1] Outcome based Education for effective teaching -National Seminar on Setting Technological Standards and Strategy for Higher Education (1-2-18 to 2-2-18) at Christ University, Bangalore

[2] Key Note speech on Outcome based Education; AICTE sponsored Pedagogical Training on OBE, at G. V. P. COLLEGE OF ENGINEERING (on 26-12-17)

[3] e-Shikhsan: An outcome based educational framework for effective teaching; Understanding ICT for Professional Development in Education, Jadavpur University (on 1st December 2017)

[4] Outcome based Education; FDP on Outcome based Education T K R College of Engineering & Technology Hyderabad (13-11-2017 to 14-11-2017)

[5] Outcome based Education; FDP on Outcome based Education Sri Vasavi College of Engineering, Hyderabad (13-10-2017

***2016-2017***

[1] Outcome based Education for effective teaching at NIT Trichy, India (27-04-2016 to 28-04-2016)

[2] Outcome based Education at Narula Institute of Technology, India (28-10-2016 to 28-10-2016)

[3] Outcome based Curiculum Development at BIT Mesra, India (20-04-2016 to 22-04-2016)

[4] Outcome based Educational Framework at BITS Pilani, India (30-09-2016 to 30-09-2016)

[5] Attributes of Good Teaching Learning Style and Learning approaches at Coimbatore Institute of Technology, India (03-11-2016 to 07-11-2016)

[6] Outcome based Education and Accreditation Parameters at NIT Patna, India (07-03-2017 to 07-03-2017)

[7] Assessment and Evaluation and Outcome based Education at Thiagarajar college of Engineering Madurai, India (16-03-2017 to 18-03-2017)

## Publication

### Publication: 2017-18

**[1] T Bhowmik, SKD Mandal (2018) Manner of Articulation based Bengali Phoneme Classification, Accepted for publication in International Journal of Speech Technology**

[2] S. Das, S. K. Das Mandal, A. Basu, (2018) Identifying the cognitive level of a Learning Material based on Information Type, The Future of Learning Conference 2018

[3] Shyamal Kr. Das Mandal,(2017). Outcome Based Education with 21st Century Pedagogy, Indo-Global Education Summit & Expo, Kolkata

[4] Tanmay Bhowmik and Shyamal Kumar Das Mandal, (2017). INCLUSION OF MANNER OF ARTICULATION TO ACHIEVE IMPROVED PHONEME CLASSIFICATION ACCURACY FOR BENGALI CONTINUOUS SPEECH, in Proceedings of Oriental COCOSDA–2016, Seoul-Korea

[5] Shambhu Nath Saha and Shyamal Kumar Das Mandal, "PHONOLOGICAL REALIZATION OF ENGLISH LEXICAL STRESS PLACEMENT BY NATIVE (L1) BENGALI SPEAKERS" in Proceedings of Oriental COCOSDA–2016, Seoul-Korea

[6] T Bhowmik, SKD Mandal, (2017). Detection and classification of place and manner of articulation for Bengali continuous speech, 2017 4th International Conference on Signal Processing and Integrated Networks (SPIN), 578-583

### Publication: 2016-17

**[1] Saha, S. N., & Mandal, S. K. D. (2017). Phonetic realization of English lexical stress by native (L1) Bengali speakers compared to native (L1) English speakers. *Computer Speech & Language 47(2017), 1-15*.**

**[2] Saha, S. N., & Mandal, S. K. D. (2017). Discourse prosody planning in native (L1) and nonnative (L2)(L1-Bengali) English: a comparative study. *International Journal of Speech Technology*, *20*(2), 305-326.**

[3] Bhowmik, T., & Mandal, S. K. D. (2016, October). Deep neural network based phonological feature extraction for Bengali continuous speech. In *Signal and Information Processing (IConSIP), International Conference on* (pp. 1-5). IEEE.

[4] Bhowmik, T., Das Mandal, S. K., (2016). Recognition of Bengali Phoneme from Unconstrained Speech using Stacked Denoising Autoencoder, in Proceedings of Oriental COCOSDA–2016, Bali, Indonesia.

[5] Saha, S. N., & Mandal, S. K. D. (2016). Phonological Realization of English Lexical Stress Placement by Native (L1) Bengali Speaker , in Proceedings of Oriental COCOSDA–2016, Bali, Indonesia

[6] Bhowmik, T., Dalapati, K. D., & Mandal, S. K. D. (2016, September). A comparative study on phonological feature detection from continuous speech with respect to variable corpus size. In *Technology Symposium (TechSym), 2016 IEEE Students'* (pp. 311-316). IEEE.

**Publication: 2015-16**

**[1] Saha, S. N., & Mandal, S. K. D. (2016). English lexical stress produced by native (L1) Bengali speakers compared to native (L1) English speakers: an acoustic study. *International Journal of Speech Technology*, *19*(4), 827-840.**

**[2] Kumar, V., Mukherjee, J., & Mandal, S. K. D. (2016). Image Inpainting Through Metric Labeling via Guided Patch Mixing. *IEEE Transactions on Image Processing*, *25*(11), 5212-5226.**

**[3] Saha, S. N., & Mandal, S. K. D. (2015). Study of Acoustic Correlates of English Lexical Stress Produced by Native (L1) Bengali Speakers Compared to Native (L1) English Speakers. In Sixteenth Annual Conference of the International Speech Communication Association, 815-819 (INTERSPEECH-2015)**

[4] Kumar, V., Mukhopadhyay, J., & Mandal, S. K. D. (2015). Modified Exemplar-Based Image Inpainting via Primal-Dual Optimization. In International Conference on Pattern Recognition and Machine Intelligence, 9124, 116-125. Springer International Publishing.

[5] Saha, S. N., & Mandal, S. K. D. (2015). Acoustic analysis of English lexical stress produced by native (L1) Bengali speakers compared to native (L1) English speakers. In Oriental COCOSDA held jointly with 2015 Conference on Asian Spoken Language Research and Evaluation (O-COCOSDA/CASLRE), 2015 International Conference, 107-112, IEEE.

[6] Bhowmik, T., Mukherjee, S., Mandal, D., & Kumar, S. (2015), "Detection of attributes for Bengali phoneme in continuous speech using deep neural network" In Proceedings of Signal Processing and Integrated Networks (SPIN), pp. 103-108, IEEE Conference

[7] Kumar, V., Mukherjee, J., & Mandal, S. K. D. (2015). Combinatorial Exemplar-Based Image Inpainting. In International Workshop on Combinatorial Image Analysis (pp. 284-298). Springer International Publishing.

[8] Acharya, S., & Mandal, S. K. D. (2015). Automatic Extraction of Fujisaki Model Parameters for Bangla Language. In Oriental COCOSDA held jointly with 2015 Conference on Asian Spoken Language Research and Evaluation (O-COCOSDA/CASLRE), 2015 International Conference, 107-112, IEEE.

[9] Kumar, V., Mukherjee, J., & Mandal, S. K. D. (2015, November). Combinatorial Exemplar-Based Image Inpainting. In International Workshop on Combinatorial Image Analysis (pp. 284-298). Springer International Publishing.

[10] Saha, S. N., & Mandal, S. K. D. (2015). Analysis of Influence of L2 English Speakers' Fluency on Occurrence and Duration of Sentence-medial Pauses in English Readout Speech. In Proceedings of International Conference on Natural Language Processing (ICON) (pp.31-40).

[11] Bhowmik, T., Mandal D, Kumar, S. (2015). Deep Neural Network based phonological feature detection: A case study for Bengali continuous speech. In Proceedings of the International Symposium Frontiers of Research on Speech and Music (FRSM- 2015)

[12] Saha, S. N., & Das Mandal, S. K. (2015). Phonetic Problem of Native Bengali Speakers English Pronunciation - Analyzed by Automatic Phoneme Alignment Using HTK. In Proceedings of Phonology of Contemporary English (PAC) (pp. 1-6).

**Publications: 2014 – 2015**

[1] Mukherjee, S., & Mandal, S. K. D. (2014). F0 contour generation and synthesis using Bengali Hmm-based speech synthesis system, International Journal of Speech Technology 18(1), 25-36

**[2] Saha, S. N., & Das Mandal, S. K. (2014). Analysis of L2 English (L1 Bengali) Speech by Automatic Annotation Using HTK. In Proceedings of International Conference on Natural Language Processing (ICON) (pp.111-117). (Best Student Paper).**

**[3] Mukherjee, S., & Mandal, S. K. D. (2014). Generation of F0 Contour Using Deep Boltzmann Machine and Twin Gaussian Process Hybrid Model for Bengali Language. In *Fifteenth Annual Conference of the International Speech Communication Association*, 2445-2449 (INTERSPEECH-2014)**

[4] Sudipta Acharya, Shyamal Kr.Das Mandal and Pragati Dhang "TTS Duration Modeling For Bangla Language Using Prosodic Structure ", COCOSDA 2014, September 10-12, 2014 at Phuket Island, Thailand,IEEE conference

[5] Saha, S. N., & Mandal, S. K. D. (2014). Phonetic and phonological interference of English pronunciation by native Bengali (L1-Bengali, L2-English) speakers. In Co-ordination and Standardization of Speech Databases and Assessment Techniques (COCOSDA), 2014 International Conference, 1-6, IEEE.

[6] Mukherjee, S., & Mandal, S. K. D. (2014). F0 modeling in HMM-based speech synthesis system using Deep Belief Network. In Co-ordination and Standardization of Speech Databases and Assessment Techniques (COCOSDA), 2014, 1-5, IEEE.

**Publications: 2013 – 2014**

**[1] Mukherjee, S., & Mandal, S. K. D. (2013). PL-ILT: A web tool for creation of pronunciation lexicon in Indian languages. In Oriental COCOSDA held jointly with 2013 Conference on Asian Spoken Language Research and Evaluation (O-COCOSDA/CASLRE), 2013 International Conference (pp. 1-4). IEEE. (Best Student Paper)**

[2] Saha, S. N., & Mandal, S. K. D. (2013, November). Analysis of occurrence probability and duration of sentence-medial pauses in English readout speech for L2 English speakers compared to L1 English speakers. In *Oriental COCOSDA held jointly with 2013 Conference on Asian Spoken Language Research and Evaluation (O-COCOSDA/CASLRE), 2013 International Conference* (pp. 1-6). IEEE.

[3] Acharya, S., & Mandal, S. K. D. (2013, November). Prosodic word and phrase boundary detection based on F 0 contour analysis using empirical mode decomposition. In Oriental COCOSDA held jointly with 2013 Conference on Asian Spoken Language Research and Evaluation (O-COCOSDA/CASLRE), 2013 International Conference (pp. 1-5). IEEE.

[4] Acharya, S., & Mandal, S. K. D. (2013). Prosody modeling: A review report on Indian language. In Mining Intelligence and Knowledge Exploration (pp. 831-842). Springer International Publishing.

[5] Saha, S. N., & Mandal, S. K. D. (2013). L1 Bengali Phonological Interference on L2 English-Analysis of Bengali AESOP Corpus. In Mining Intelligence and Knowledge Exploration (pp. 790-798). Springer International Publishing.

[6] Mukherjee, S., & Mandal, S. K. D. (2013, December). Bengali parts-of-speech tagging using global linear model. In India Conference (INDICON), 2013 Annual IEEE (pp. 1-4). IEEE.

**Publications: 2012 – 2013**

[1] Mukherjee, S., & Mandal, S. K. D. (2012). A Bengali speech synthesizer on Android OS. In Proceedings of the 1st Workshop on Speech and Multimodal Interaction in Assistive Environments (pp. 43-46). Association for Computational Linguistics.

[2] Acharya, S., & Mandal, S. K. D. (2012). Occurrence and duration modeling of sentence medial pause for Bangla text reading at different speech rate. In Speech Database and Assessments (Oriental COCOSDA), 2012 International Conference on (pp. 62-67). IEEE.

[3] Saha, S. N., & Mandal, S. K. D. (2012). A comparative study of native (L1) and Nonnative (L2) English speech strategy for discourse prosodic organization. In Intelligent Human Computer Interaction (IHCI), 2012 4th International Conference on (pp. 1-6). IEEE.

[4] Acharya, S., & Mandal, S. K. D. (2012). The intonation of Bangla sentences: Declarative, Wh-questions and yes/no by using Empirical Mode of Decomposition. In Intelligent Human Computer Interaction (IHCI), 2012 4th International Conference on (pp. 265-269). IEEE.

**Publications: 2011 – 2012**

**[1] Mandal, S. K. D., Chandra, S., Lata, S., & Datta, A. K. (2011). Places and manner of articulation of bangla consonants: An epg based study. In Twelfth Annual Conference of the International Speech Communication Association. pp. 3149-3152 (NTERSPEECH-2011)**

[2] Acharya, S., & Mandal, S. K. D., Fujisaki H. (2011). Effect of Word Order change in Bangla Declarative Sentence Intonation. Proc. Of FRSM-CMMR 2011, Bhubaneswar, pp-175-179.

[3] Acharya, S., Mandal, D., & Kumar, S. (2011). Prosodic word boundary detection for Bangla based on empirical mode decomposition of F0 contour. In *Proceedings of Oriental COCOSDA International Conference on Speech Database and Assessments* (pp. 1-5).

**Publications: 2010 – 2011**

**[1] Mandal, S. K. D., Saha, A., Basu, T., Hirose, K., & Fujisaki, H. (2010). Modeling of sentence-medial pauses in bangla readout speech: occurrence and duration. In *INTERSPEECH-2010* (pp. 1764-1767).**

[2] Mandal, S. D., Warsi, A. H., Basu, T., Hirose, K., & Fujisaki, H. (2010). Analysis and Synthesis of F0 contours for Bangla readout speech. In Proc. of Oriental COCOSDA 2010, Kathmandu, Nepal, 2010

[3] Mandal, S. K. D., Basu T. (2010). Indian Language Phonemes and Creation of Pronunciation Lexicon in W3C Framework. Proc. of WWW: TSIC 2010, New Delhi.

[4] S. Das Mandal, S. Chandra, S. Lata, "Use of Part Of Speech (POS) and morphological information for resolving Multiple Pronunciations in Pronunciation Lexicon Specification (PLS) for Indian Languages – Bengali as a Case Study", Workshop on Conversational Applications — Use Cases and Requirements for New Models of Human Language to Support Mobile Conversational Systems accepted for presentation during June 18-19 2010, Somerset, NJ, US.

**Publications: 2009 – 2010**

[1] Basu, J., Basu, T., Mitra, M., & Mandal, S. K. D. (2009, August). Grapheme to Phoneme (G2P) conversion for Bangla. In Speech Database and Assessments, 2009 Oriental COCOSDA International Conference on (pp. 66-71). IEEE.

**Publications: 2008 – 2009**

[1] Roy, R., Basu, T., Saha, A., Basu, J., & Mandal, S. D. (2008). Duration modeling for Bangla text to speech synthesis system. In International conference on Asian Language Processing, Chiang Mai.

[2] Chandrima Roy, TulikaBasu, Arup Saha, Shyamal Kr Das Mandal & A. K Datta, "Studies on Duration of Steady states and transitions in V-V Combination in Bangla Words", Year of Pub. (2008), Proc. of FRSM-2008, Jadavpur University, Kolkata, pp. 157 – 160.

[3] Rajib Roy, TulikaBasu, Arup Saha, JoyantaBasu, Shyamal Kr Das Mandal, "Duration Modeling for Bangla Text to Speech Synthesis System", Year of Pub. (2008), Proc. of IALP-2008, Chiang Mai, Thailand.

**Publications: 2007 – 2008**

**[1] Mandal, S. K. D., Gupta, B., & Datta, A. K. (2007). Word boundary detection based on suprasegmental features: A case study on Bangla speech. International Journal of Speech Technology, 9(1-2), 17-28.**

[2] Das Mandal, S.K., Datta, A.K. and Gupta, B, (2007) "Manner based labeling and pseudo word generation for Bangla speech recognition system," Proc. of Frontiers of Research on Speech and Music (FRSM-2007), pp.255-262.

[3] Rajib Roy, TulikaBasu, JoyantaBasu, Arup Saha, "Study of Nucleus Vowel Duration and its Role in Prosody of Bangla", Year of Pub. (2007), Proc. of Oriental COCOSDA-2007, Hanoi, Vietnam, pp. 181 – 184.

[4] Arup Saha, Shyamal Kr Das Mandal & A. K Datta, "Semi-Automatic Speech annotation System", Year of Pub. (2007), Proc. of Oriental COCOSDA-2007, Hanoi, Vietnam, pp. 13-16.

[5] Shyamal Kr Das Mandal, A. K Datta, "Epoch Synchronous Non-Over Lapping Add (ESNOLA) Method Based Concatenative Synthesis System for Bangla", Year of Pub. (2007), Proc. of 6th ISCA Speech synthesis workshop, 2007, University of Bonn, Germany, pp. 351-355

[6] Joyanta Basu, Soma Khan, Shyamal Kr Das Mandal, "A Statistical Model based Continuous Digit Recognition System in Bangla", Year of Pub. (2007), Proc. of FRSM-2007, AIISH-Mysore, pp. 242 – 248

**Publications: 2006 – 2007**

[1] Das Mandal Shyamal Kr, Gupta B, Datta Asoke Kumar, (2006) "Study of Time Domain Shape Parameter and Comparison with Mel Frequency Cepstrum Coefficients Parameter for recognition of Bangla Vowel" Young Horizon – Computing and Informatics, Vol. 1, No. 1, pp 15-21.

[2] Shyamal Kr. Das Mandal, Arup Saha, Asoke Kumar Datta,(2006) "A Semi-Automatic speech signal annotation system," Proceeding of Frontiers of Research on Speech and Music (FRSM-2006), pp 157-164.

**Publications: 2005 – 2006**

[1] Shyamal Kr. Das Mandal, Arup Saha, Asoke Kumar Datta, (2005). A Comparative Study Between MFCC & Shape Parameters for Vowel Recognition in Bangla. Proceeding of Frontiers of Research on Speech and Music (FRSM-2005), pp 174-178.

[2] Shyamal Kr. Das Mandal, Arup Saha, Indranil Sarkar Asoke Kumar Datta, (2005) Phonological, International & Prosodic Aspects of Concatenative Speech Synthesizer Development for Bangla. Proceeding of SIMPLE-05, pp 56-60.

**Publications: 2004 – 2005**

[1] Shyamal Das Mandal, Arup Saha, A.K.Datta “A Lexical Knowledge Driven Manner Based Speech Recognition Model” Vishwa Bharat vol. 16, pp27-33, January 2005.

[2] Shyamal Das Mandal, Arup Saha, A.K.Datta “A Technical Report on Epoch Synchronous Non-Over Lapping Add (ESNOLA) Approach Concatenative Text to Speech Synthesis” Vishwa Bharat vol. 16, pp35-40, January 2005.

[3] Shyamal Das Mandal, Arup Saha, A.K.Datta “Annotated Speech Corpora Development in Indian languages” Vishwa Bharat vol. 16, pp49-64, January 2005.

[4] Shyamal Kr. Das Mandal, Arup Saha, Asoke Kumar Datta, “A Comparative Study Between MFCC & Shape Parameters for Vowel Recognition in Bangla,” Proceeding of Frontiers of Research on Speech and Music (FRSM-2005), January 2005, pp 174-178.

[6] Shyamal Kr. Das Mandal, Arup Saha, Asoke Kumar Datta, “Lexical knowledge Driven Manner Based speech recognition model,” ICSLT-O-COCOSDA-2004, New Delhi, 17-19 Nov.20, iSTEPS Volume-II

[7] Shyamal Kr. Das Mandal, Indranil Sarkar, Arup Saha and Asoke Kumar Datta, “Creation of Speech Corpora for Speech Research and Speech Technology Development: An approach”, ICSLT-O-COCOSDA-2004, New Delhi, 17-19 Nov.20, iSTEPS Volume-II.

[8] Shyamal Kr. Das Mandal, A.K. Datta, “Annotated Speech Corpora Creation: An approach”, Frontiers of Research on Speech and Music (FRSM-2004), Annamali University, January, 2004

[9] Shyamal Kr. Das Mandal, B. Gupta, A.K. Datta, “Spectral Matching of Epoch Synchronous Non-Over Lapping Add (ESNPLA) Method Based Concatenative Synthesizer”, International Conference on Communications Devices and Intelligent System (CODIS-2004), Jadavpur University, January 8-10,2004, pp 729-732.

[10] Shyamal Kr. Das Mandal, A.K. Datta “Annotated Speech Corpora Creation: An approach” SIMPLE-4 IIT Kargapur, 2004.

**Publications: 2003 – 2004**

[1] Shyamal Kr. Das Mandal, Soumen Choudhuri, A.K.Datta “Speech Coding a New Approach”, IEEE TENCON-2003, Bangalore, 2003.

[2] Shyamal Kr. Das Mandal, B. Gupta, A.K.Datta “A Lexical Knowledge driven Manner Based Model (MBM) for Speech Recognition”, CSI National Convention, IIT DELHI December- 2003.

[3] Shyamal Kr. Das Mandal “Speech Technology for Information Disbursing to the Mass” Proc. of Inside the Computer, The Institution of Engineers (India), 2003.

[4] Shyamal Kr. Das Mandal, B. Pal, A. Bandhyapadhyay “Effect of pitch contours stylization and time scale modification on natural speech synthesis” Proc. SLP-03, Tata Institute of Fundamental Research, 2003

[5] Shyamal Kr. Das Mandal, B. Pal, A. Bandhyapadhyay “Implementation of Intonation Pattern in Bangla Text to Speech Synthesis, an approach”, Frontiers of Research on Speech and Music (FRSM-2003), IIT, Kanpur

[6] Shyamal Kr. Das Mandal, A.K.Datta, “Suprasegmental feature base word boundary detection”, Frontiers of Research on Speech and Music (FRSM-2003), IIT, Kanpur