A Semester Course on

SPEECH AND LANGUAGE TECHNOLOGIES USING
ARTIFICIAL INTELLIGENCE AND DEEP LEARNING (SLT-20)

(Course Code: NERTU/SC/78)

(MON-SAT, 21ST SEPTEMBER 2020 – 07TH NOVEMBER 2020) Online Mode

07.30AM – 09.00AM (Regular Lectures) & 6.00PM-8.00PM (Expert Guest Lectures and Tutorials on Selected Dates)

ABOUT SPEECH AND LANGUAGE TECHNOLOGIES FOR MAN-MACHINE COMMUNICATION:

Communication through Speech is unique and the primary communication mode for human beings. Communication with Machines through Speech was a dream for long time to the scientists and engineers. The techniques and algorithms of Speech Signal Processing, Natural Language Processing using stochastic models like HMMs, GMMs and Deep Learning have made us this dream a reality. Development of Speech-To-Speech interface (S2S) for Man-Machine communication requires the basics of Speech Signal Processing, Natural Language Processing, Deep Learning and Technologies like Automatic Speech Recognition (ASR), Speaker Identification (SI), Language Identification (LI), Chatbot, Text-To-Speech Synthesis (TTS) and processing signals at Real time. Though outstanding work in ASR and TTS has produced the commercial speech recognition systems for voice-driven computing and word-processing systems in English and European Languages, Speech Technologies are in the introductory stage in the market. Therefore, it is expected to have lot of demand for development of ASR, TTS, SI, and Chatbot systems for all Indian Languages and their applications. Of course, all these technologies are very much useful for machine translation systems where many languages are spoken in India.

ABOUT NERTU: The Research and Training Unit for Navigational Electronics (NERTU) is established in 1982 to do research and develop manpower in the areas of signal processing, communication and navigation, since its inception. It is the focal point for research and training in the areas of Electronic Navigation in India. Since its inception, NERTU has been conducting almost three to four short term courses per year in the areas of signal processing, communication and navigation. It has conducted 77 short term courses / workshops / conferences on various topics of signal processing, communications, and navigation. NERTU has conducted exclusively courses on ASR and TTS for almost every year since 2008. Scientists, engineers, academicians, and research scholars from many organisations have participated and benefited from these courses. NERTU has successfully executed 61 sponsored and consultancy projects funded by DRDO, ISRO, DST, MIT, ECIL, HAL, BEL, AICTE and ASL. At NERTU, we have developed an ASR system for transcribing Telugu broadcast news in real time, and further it will monitor the appearance of given keywords in the speech or news in real time. At present, we are developing Speech-To-Speech Interface for Humanoid for Gaganyaan Programme for Hindi and Indian Accent English.

ABOUT COURSE: The main objective of the course is to give the basic concepts and hands on practice to get the confidence to build or develop the speech technologies required for Speech-To-Speech Interface for Man-Machine Communication. The course is designed with a Lecture, daily in the morning and intensive hands on practice at home by giving assignments to participants. Similarly, the course is also planned to have few Expert Guest Lectures in the evenings on the topics related trends in the development of Speech Technologies, Natural Language Processing, and Machine Learning Techniques. Engineers, scientists, academicians, and research scholars, already working or deciding to work for development of applications of Machine Learning using stochastic techniques and DNNs, are encouraged to register for the school. Participants are expected to have the UG level knowledge in Probability Theory, Linear Algebra and programming language like Python. The participants should have their own laptop or desktop PC for participating in the school to practice and solve the programming assignments. The broad area of topics to be covered in the Lectures are: Basics of Speech Signal Processing, Natural Language Processing, Deep Learning, Automatic Speech Recognition, Speaker Recognition, Language Identification, Chatbot and Text-To-Speech Synthesis (which are required for Man-Machine communication) using open source tools. More details of topics, faculty and speakers are given separately in the schedule.

For queries or details contact Co-Coordinators

Anil Kumar: 8897089638; Sai Vineeth: 7981803345

Santosh: 8374115817 or nertu.courses@osmania.ac.in

Coordinators:

Mr. G. Jaya Krishna: 9704315600,

Mr. Bittu Kumar : 8541826949

Prof. P. Laxminarayana, Director, NERTU, Ph.9490805486, laxminarayana@osmania.ac.in

Interested candidates can visit www.osmania.ac.in or http://www.uceou.edu for more details like faculty, schedule and registration form. Register for the course by sending the filled registration form along with receipt of online payment to nertu.courses@osmania.ac.in and copied to Co-Coordinators.

Registration Fee (INR): 18% GST will be extra.

(Includes Lectures, Lab and Course Material)

Full Time Students	: Rs. 8,000/-
Faculty from Private Academic Institutions	: Rs. 8,000/-
Faculty from Government Funded Institutions	: Rs. 12,000/-
Scientists/Engineers from R&D, Industry & Commercial Organizations	: Rs. 20,000/-

DD/Cheque should be drawn in favor of "The Director, NERTU, OU" or online payment through NEFT to The Director, Eqpt. Maint., NERTU, OU; A/C No.: 52198270713; IFSC Code: SBIN0020071, Osmania University Branch, State Bank of India

Last Date for Registration	: 15th September 2020
Preparation in Basics and Programming	: 16th - 20th, September 2020

TENTATIVE SCHEDULE OF REGULAR LECTURES AND FACULTY

Date (Morning 7.30AM-9.00AM)	Topic	Faculty
		Prof.P.Laxminarayana
Monday, September 21, 2020	Speech Production Mechanism	Prof.K.Anithasheela
Tuesday, September 22, 2020	Introduction to Artificial Neural Networks	G.Jaya Krishna
Wednesday, September 23, 2020	Introduction to NLP & Pre-processing the data	Prof.P.Laxminarayana
Thursday, September 24, 2020	Hearing and Perception of Speech and Audio	Prof.K.Anithasheela
Friday, September 25, 2020	Backpropagation Algorithm	G.Jaya Krishna
Saturday, September 26, 2020	Feature Engineering Techniques for NLP	Prof.P.Laxminarayana
Monday, September 28, 2020	Time Domain Analysis of Speech	Dr.A.V.Ramana
Tuesday, September 29, 2020	Introduction to Deep Neural Networks	G.Jaya Krishna
Wednesday, September 30, 2020	Advanced Feature Engineering Techniques	Prof.P.Laxminarayana
Thursday, October 01, 2020	Frequency Domain Analysis of Speech	Dr.A.V.Ramana
Friday, October 02, 2020	CNNs and TDNNs	G.Jaya Krishna
Saturday, October 03, 2020	Rule based systems for NLP	Dr.A.V.Ramana
Monday, October 05, 2020	Speech Coding Techniques and Standards	Dr.A.V.Ramana
Tuesday, October 06, 2020	DBMs and LSTM	G.Jaya Krishna
Wednesday, October 07, 2020	Machine Learning based systems for NLP	Prof.P.Laxminarayana
Thursday, October 08, 2020	Feature Extraction for Speech Technologies (ASR, TTS, SR and SI)	Dr.A.V.Ramana
Friday, October 09, 2020	Advances in Deep Learning	G.Jaya Krishna
Saturday, October 10, 2020	Deep Learning based systems for NLP	Bittu & Dr.PLN
Monday, October 12, 2020	ASR: Pattern Recognition and Vector Quantization	Prof.P.Laxminarayana
Tuesday, October 13, 2020	TTS : Introduction	G.Jaya Krishna
Wednesday, October 14, 2020	Introduction of Chatbot & Steps to Build Chatbot	Prof.P.Laxminarayana
Thursday, October 15, 2020	ASR: Dyanmic Time Warping	Prof.P.Laxminarayana
Friday, October 16, 2020	TTS : Text Pre Processing	Prof.P.Laxminarayana
Saturday, October 17, 2020	ASR : Hidden Markov Models	G.Jaya Krishna
Monday, October 19, 2020	Building Rule based Chatbot	Prof.P.Laxminarayana
Tuesday, October 20, 2020	TTS : Waveform Generation	Mythilisharan
Wednesday, October 21, 2020	ASR : Hidden Markov Models, CI, CD, Tied and Untied States etc.	Prof.P.Laxminarayana
Thursday, October 22, 2020	TTS : Extraction of Parameters for Waveform Synthesis	Mythilisharan
Friday, October 23, 2020	TTS : Extraction of Parameters for Waveform Synthesis - Festival	G.Jaya Krishna
Tuesday, October 27, 2020	Building a Retrieval Based Chatbot	Mythilisharan
Wednesday, October 28, 2020	ASR : HMMs and GMMs	Dr.A.V.Ramana
Thursday, October 29, 2020	TTS : DNNs	Mythilisharan
Friday, October 30, 2020	ASR : Language Modelling	G.Jaya Krishna
Saturday, October 31, 2020	Building a Generative Chatbot	Mythilisharan
Sunday, November 01, 2020	ASR : DNNs	Mythilisharan
Tuesday, November 03, 2020	Speaker Recognition	Mythilisharan
Wednesday, November 04, 2020	Speaker Recognition	
Thursday, November 05, 2020	Discussion	
Friday, November 06, 2020	Language Identification	Mythilisharan
Saturday, November 07, 2020	Valedictory and Feedback	Prof.P.Laxminarayana

Tutorial and Demonstration for Hands on Practice will be taken daily on above dates between 7.00PM-8.00PM.

Expert guest lectures between 6.00PM-7.00PM, are under planning and will be announced after confirmation.

RESEARCH AND TRAINING UNIT FOR NAVIGATIONAL ELECTRONICS
OSMANIA UNIVERSITY, HYDERABAD

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REGISTRATION FORM

1. Name	
2. Designation	
3. Educational Qualifications	
4. Email	
5. Phone	
6. Organization with Address	

7. Professional Experience
   a. Teaching
   b. Research/Industry	

8. Registration fee
   a. Amount in (INR) including GST
   b. Details of DD/Cheque/Online Transfer
	8000+1440(GST) / 12000+2160(GST) / 20000+3600(GST)

9. Signature of the Candidate	

Dr./Mr./Ms. .... is sponsored to attend the semester course on "Speech and Language Technologies using Artificial Intelligence and Deep Learning (SLT-20)", to be held from 21st September- 7th November, 2020.

Place:

Date:

<div align="center">Signature
(Sponsoring Authority)</div>

The filled form along with receipt of online payment should be sent, before 15th September, 2020, by email to nertu.course@osmania.ac.in and copied to Co-coordinators (given below) Or hard copy with DD/Cheque to "The Coordinator, SLT-20, Research and Training Unit for Navigational Electronics (NERTU), Osmania University, Hyderabad 500007".

<div align="center">

Email Ids/Phone Numbers Coordinators or Co-Coordinators for correspondence:

Prof. P. Laxminarayana, Director, Ph. 09490805486, laxminarayana@osmania.ac.in

Gutha Jaya Krishna, Ph. 09704315600, krishna.gutha@gmail.com

Bittu Kumar, Ph. 08541826949, kumarbittu135@gmail.com

Chevella Anil Kumar, Ph. 08897089638, chevellaanilkumar@gmail.com

S. Sai Vineeth, Ph. 07981803345, ssvjs716@gmail.com

Santosh Kumar, Ph.08374115817, ksantoshkumar.kumar8@gmail.com

or nertu.courses@osmania.ac.in

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Registration Fee (INR): 18%GST will be extra. (Includes Lectures, Lab and Course Material)

	Registration Fee	GST	Total
Full Time Students	8,000	1,440	9,940
Faculty from Private Academic Institutions	8,000	1,440	9,940
Faculty from Government Funded Institutions	12,000	2,160	14,160
Scientists and Engineers from R & D, Industries and Commercial Organizations	20,000	3,600	23,600

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