

## Design and Development of a Hybrid Text to Speech (TTS) Synthesis Technique



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**Keywords:** Concatenative, Articulatory, Formant, Phonemes

**Abstract:**

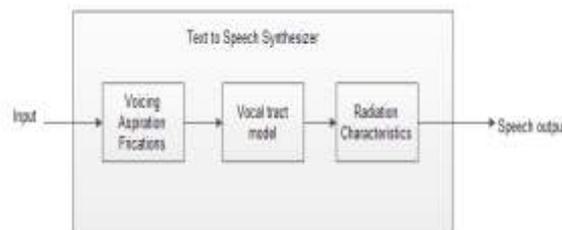
Humans express thoughts, feelings and ideas orally to one other in a series of complex movements of basic tone. Speech is a voiced form of human communication. Speech processing technology has been a mainstream area of research for more than 50 years. The main goal of the speech synthesis is to design the systems that produce the speech which should be understood by human and also inturn initiate human to machine interactions. There are various methods in speech synthesis, namely concatenative, formant, articulatory etc. Two important aspects in speech synthesis are intelligibility and naturalness. Formant synthesis lacks intelligibility and naturalness. So the hybrid method which includes both acoustic and articulatory can be a solution to this problem.

This project aims in developing Hybrid formant articulatory TTS. Emphasizing on formant synthesis and using few of the articulatory synthesis features for text to a speech system is designed. Design is developed and code is implemented in MATLAB/Simulink. Thus the designed Simulink model facilitates to generate C code with the help of embedded target TMS320C6713 DSP processor. Code Composer Studio IDE is used to interface between the developed C code and DSP board. Hence from the generated C code which is implemented on DSP processor, speech output is obtained.

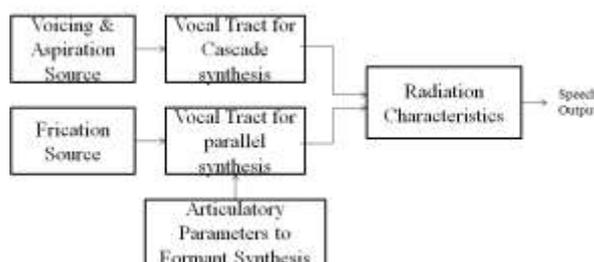
The developed TTS system has been tested for various conditions and demonstrated for its functionality. Results obtained for the MATLAB/Simulink implementation shows that speech sounds are obtained for vowel phonemes without any noise and distortions. Similarly the system is tested for few consonant phonemes but could not reach enough expectations since the speech is less clear to distinguish between the phonemes. Similar results are achieved when it is implemented on processor. Future work suggestions can be made by extending the work to create the words or phrases using the obtained phonemes. Also system can be made more user friendly by developing the speech in female and children voices for different age group, since the developed system is of male voice.



**Hardware implementation of the TTS system**



**Top level diagram of TTS system**



**Block diagram of TTS system**