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# A Novel Methodology of Detecting Mouth Gestures Using Supralaryngeal Speech Organs

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**ABSTRACT**: In this paper we are proposing a new methodology to detect each and every word that we pronounce in our day to day life using our mouth which we are terming here as "MOUTH GESTURES". Biologically our internal mouth parts has a peculiar movement and each word has a uniqueness in arrangements in our mouth. So we are going to detect the mouth gestures of words by providing a uniqueness to it. The differenting parameters are **lip movements(both horizontal and vertical)**, **tongue movement, side jaws contraction and expansion, stress and strain of that word, vocal cord vibrations.** And we are using the IPA(International Phonetic Alphabet)chart and articulatory phonetics (linguistic type approach)for the illustrations for our approach. In our methodology first we are going to record some samples for some words by using some subjects and we are testing our methodology by making the same subjects to repeat the same words.

**KEYWORDS**: 1.Lip movements 2.tongue movement 3.gesture detection 4.vocal cord vibration 5.IPA 6. Articulatory phonetics.

## I.INTRODUCTION

Gestures are generally actions or poses that we produce by any part of our body. Basically each and every words that we pronounce in daily life has a peculiar uniqueness in our internal mouth parts. The actions or movements made by the internal mouth parts for the production of sound are termed here as "MOUTH GESTURES". Technically these gestures are present in our mouth and we can see it when using MRI or sensor methods. But in our method we are providing differentiation for every word by considering the following parameters of that particular word pronounced. 1.Lip movement of that word pronounced Eg.for vowels the upper and lower lips won't be connected 2. Tongue movements while pronouncing the word, for these we considering the articulatural quadrilateral positions of the various sounds of IPA chart and it also shows how the tongue moves inside the mouth. 3. The side jaws contraction and expansion calculation which will be useful for our system in which it can differentiate some same sounded words so that it will be a useful parameter for providing uniqueness. 4. The vibrations caused in the vocal cord will differ for each and every word that we pronounce so it is also considered as one of the important parameter to be measured for. Also we are going to provide a uniqueness to each word by differentiating the laryngeal and supralaryngeal speech actions.

## II. RELATED WORK

In the earlier works the hand gestures were taken as samples and recorded and then compared again with the same one[1]. This results of the databases, methods of hand gestures, feature extraction. Another work in the linguistic type which focuses on the translation methodology of the classical speech therapy in the form of decisional trees for the implementation of the threapautic software for correcting speech[2]. Survey work on hand gesture recognition which discusses about different methodologies and results indicating the feasibility of the specified classifiers for faster implementation for real time processing[3]. A review work of these hand gesture towards the mouth gesture recognition has been an initiative for our proposal. In this review the mouth gestures were recorded using kinect cam and were stored and comparative study for the same words were done[4]. The research efforts of implementing an application that employs vision algorithm and gesture recognition techniques which in turn realizes in developing a low cost interface devices for interacting with objects in virtual environment using hand gestures[5]. Another work of gesture recognition research to create system which can identify specific human gestures for the control the traffic signals and mouse[6] and this is a basic project that deals with the human hand gesture recognition and the input will

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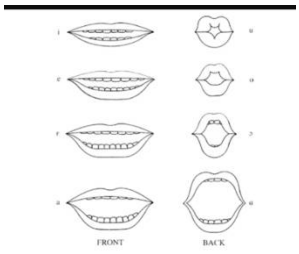
be sent to the device control to provide the necessary signal. This will be very usefull in the heavy traffic areas where the police can simply use his hands to change the signals. In human computer interaction a paper deals with the hand gesture recognition using the segmentation of the palm and finger and finally a rule classifier is used to find the label of the gesture[7]. The cost effective real time working system of cursor control by hand gesture recognition using webcam, GUI(Graphical User Interface), API(Application Programming Interface)[8]

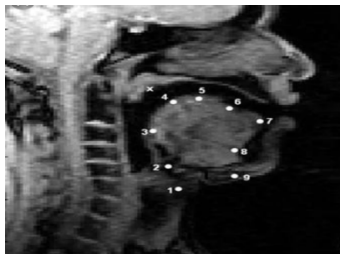
## III. PROPOSED METHODOLOGY

### *A. GESTURE DETECTION PARAMETER CONSIDERATION*

In our proposed methodology we are considering the following parameters for to provide the uniqueness to each word so that we can detect the word easily with these variations
1.Initially the lip movement has to be detected whether the words pronounced where vowels or not.
2. Tongue movement detection of the letter or word inside the mouth using IPA
3. side jaws contration and expansion detection for that word.
4. measurements of the vocal cord vibrations of word. This provide a great feature of detecting the tone of the word.



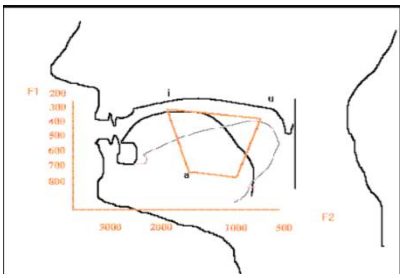

1Illustration 1: lip movements



tongue movements image (MRI)

### *B. DESCRIPITION OF PROPOSED METHODOLOGY*

In our proposed methodology the above paremeters have been recorded. The recording methodology may varies according to the parametric measurements. After measurement of these parameters for some word or letters inside the PC. The same subject is made to repeat the same words with proper pronounciation. These were compared with the already recorded gestures. If these matches the voice output for that word can be produced.




this image shows how the words are detected and also the IPA quadrilateral clearly defines how the word is arranged inside mouth.

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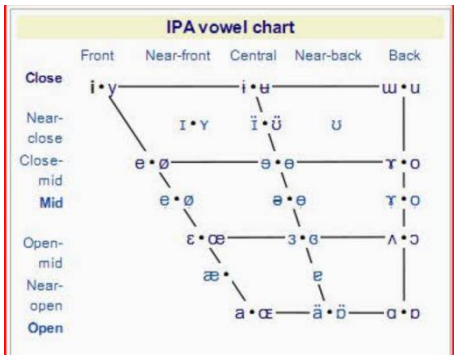


**illustratiion 2**

the above chart shows the positions of supralaryngeal organ(tongue) inside the mouth. This also shows the positions of the different sounded words.

The main purpose of our methodology is to diffenetiate the words between laryngeal and supralaryngeal actions. The larynx controls the pitch of the speech, it can also act as a articulator producing /h/ and the glottal stop. The detection process has to get the input which shows about that larynx provides a source of sound and supralaryngeal speech organs(tongue,teeth,lips, velum)alter that sound source by changing the shape of the oral cavities resulting in resonances.

## IV. CONCLUSION

Our methodology is possible for all kinds of languages and word except some of the same sounded words having vibrational variations. At this stage our methodology provides 92% efficiency in detecting the mouth gestures of all standardized words.

**FUTURE WORK:** In our future improvements we can apply this methodology to speech processing and can be applied to provide automatic customer care, voice search for local languages etc.,

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