Development of Computer Based Speech Therapy Software in Tamil: For people having Speech Disorders and Language Disorders

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***Abstract*— This presents the development of computer based speech therapy software in Tamil Language to assist patients affecting from speech and language difficulties. The reasons for this problem are due to some medical problem like cerebral Palsy, Autism, Stroke etc. Speech Therapy in Tamil is very essential where there are more people are affecting speech disorders in the state of Tamilnadu, mainly in the rural areas. The system design is like a game based system with beautiful graphical user interface with various screens. That will attract the youngsters and adults to use the system repeatedly to improve from their speech difficulties. The patient condition will be improved after getting training with the speech therapy software.**

Keywords — *Speech Therapy Software, Speech Disorder in Tamil, Computer Based Speech tool.*

I. INTRODUCTION

Speech disorder is a major problem in the developing countries where millions of people suffer with this problem. Affected people cannot speak properly and difficult to attend school or hold a good job. It is difficult to them to cooperate with the social life. They will be isolated from the society, they will live with shame, pain and heart ache. For most of the patient doctors will advice to go for speech therapy after the main stream treatments. In India there is a shortage in speech therapists and mainly there are no good software tools available in Tamil language for this. It will be difficult for the patients to travel long distances to get the speech therapy support. Hence the system addresses the above problems. The system will run on mobile platform as well as on the desktop computers. Patients can use this system from their home and get benefited with the treatment.

II. SPEECH DISORDERS

Speech disorders will change the way someone generates sounds to make words. Some kind of voice irregularities can also be measured as speech disorders.[8]
One of the most usually seen speech disorders is stuttering. Some other type of speech disorders also there like apraxia and dysarthria.
Apraxia is connected with brain, it is a motor speech problem caused by some parts of the brain linked to verbal communication.

Dysarthria is a motor related speech problem. In this, the muscles of the oral cavity, face, or respiratory system may become weak or have complication in moving.
Some patients with speech problems are conscious about what they would like to speak but not capable to expressive their thoughts. This will create depression and confidence issues.

Speech problems can affect kids and younger peoples. Early medical management can solve these circumstances. Speech communication problems have an effect on the vocal cords, muscles, nerves and additional structures inside the throat.

Reasons that are affecting this problem are:

- In different age condition like Strokes, polyps, vocal cord damage, brain damage, muscle weakness, respiratory weakness or nodules on the vocal cords, vocal cord paralysis are reason for this..
- Patients those have some medical troubles or developmental state of affairs may also have speech problems. Some of the general situations that can create speech disorders are:
- Attention deficit hyperactivity disorder, Autism, strokes, mouth cancer, laryngeal cancer, Huntington‟s disease, dementia, amyotrophic lateral sclerosis.
- There are some reasons such as hereditary condition is a reason for speech disorders.

Depends up on the reason of the speech problem, there are several symptoms may be shown. Following are some of the symptoms affected by people.
Several times generating same sounds. This problem is generally seen in patients have stutter, Sometimes generates additional sounds, Elongating words, generating jerky actions while talking, usually with head, visible disturbance when doing to communicate, flashing numerous times while chatting, stopping when talking, distorting sounds while speaking, hoarseness, or talking with a rough or gravelly sounding accent.

There are several types of [1] Speech problems:

Articulation Problems- difficulties making sounds in syllables or saying language incorrectly to the point that spectators can't recognize.

Fluency Problems - Troubles such as stuttering, where the stream of talking is broken up by irregular stoppages, partial character or word repetition ("ca-ca-cat"), or prolonging sounds and syllables (ssssssuper).
Resonance or voice Problems - Troubles with the sound pitch, level of sound, or quality of the voice that distract spectators. These types of problems may also grounds hurting or pain for the patient when talking.

Language problems are –

Receptive problems - difficulties understanding otherwise processing language.
Expressive problems - trouble in joining words mutually, imperfect language usage, or incapacity to use language in a publicly suitable way.
Cognitive-communication problems - trouble with communication skills which engage remembrance, concentration, perception, association, regulation, and difficulty solving.

III. AIM AND OBJECTIVE OF THE SYSTEM

To develop a computer based language therapy software in TAMIL language for speech and language disorder patients.
To assess the effectiveness of this language based therapy software in improving the language and functional communication skills when given along with conventional language and speech therapy for the patients suffering from language and speech disorders.

IV. SYSTEM

In the system can work on mobile based platform or independent desktop platform. Patient or assistant can start the software. The software will be designed with good Graphical User Interface like game. This will enable the patient to spend more time on the software as they feel it is not a therapy but playing a game.
They can select therapy methods configured by the speech therapist online particularly for each patient. By pressing the button on the software it will display different object and its corresponding voice. The animated video will be played with correct head movement to speak a particular Tamil word.
For example, the software will display images of a particular object say, umbrella, and will produce the sound in Tamil language („Ku-tai‟) very slowly and will show how to move the head up –down or right – left while pronouncing that word. The patient sound will be recorded and will be uploaded to the web data server for analyzing.
Speech therapist will analyze the uploaded sound waves and update the score of that particular patient. Like the patient treatment will be given for specific period and will check the improvement. The Speech therapist will change the teaching pattern online based on the improvements of the patient. It will be very cost effective and local language based and time saving software. Hope it will be useful for the Indian medical industry.

V. TECHNIQUES USED IN THE SYSTEM

Electronic "talkers" - TAMIL

The system will talk to the patient in tamil language with various tones and record their response. The system will show different animation on the screen. Patient will move their head and lips according to the animation and will try to talk. This is one of the good treatment methods to solve the speech problem.

Signing or typing – TAMIL

Sing the song in TAMIL Language. On the first stage it will use simple songs, with very slow rhythm. As the stages improving the speed of the song will increase. The lip movements and head movements will also show on the animated screen. Typing TAMIL characters will also improve their ability. System will show one by one character on the screen and the patient will type the correct characters on the virtual keyboard.

By means of picture boards with words, which is recognized as picture exchange communication systems that start out using pictures rather than words to help a youngster or adult to learn conversation.

By means of sounds to which a person is over- or under-sensitive to enlarge and reduce speech sounds.

Massaging methods

This required a assistant to give massage on the patient lips or facial muscles. Where to massage, how much time to massage etc, will be instructed by the software.

System will ask the patient to completely sing a song alone and record. This will be analyzed by speech therapist and will check the regularity, stress, and flow of words and sentences.

VI. RESULTS

With the system, expect the patient Speech therapy can get better overall communication. It is a good system for autism patient to improve their ability to form relationship with others and manage day to day functions. Also, other aims are,

Articulate sentences and words healthy, speak nonverbally and verbally, figure out verbal and nonverbal communication, understanding surrounding people intentions within a set range, kick off communication without initiating by others, be acquainted with the suitable time and place to communicate, build up conversational ability, swap thoughts, Communicate in ways to build up dealings, take pleasure in communicating, playing, and interacting with others, become skilled at self-regulation

Since the speech therapy software and mobile apps are becomes increasingly popular, patients are presented with hundreds of ways to make the most of their perform time. The software also assess how this technology is being integrated into patient daily routines, and how important patient think it is.

To develop the system there are more involvement of speech-language pathologists (SLPs) are required. That is to find out what patients should believe during the software-selection procedure. How the correct use of software can guide to improvements in self-expression and what the medical factors to be measured etc are.

Some Speech therapy survey says that with the assistance of software for the speech and language therapy the improvement will be 74 % compared to normal speech therapy treatment.

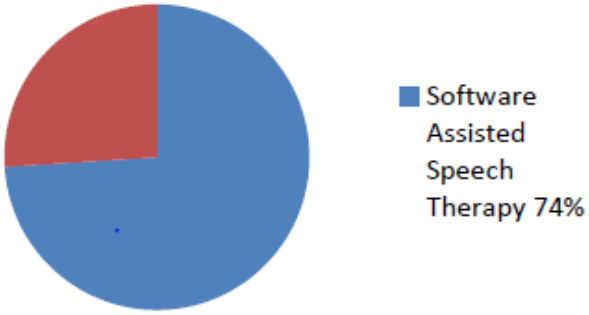
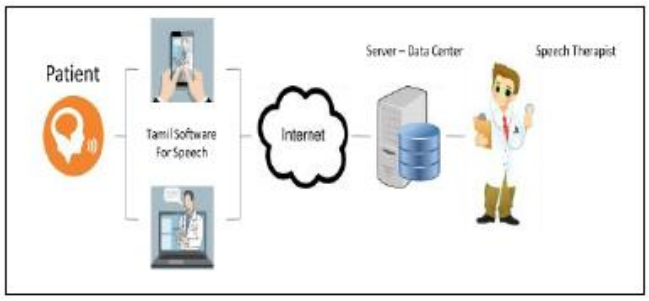


Fig. 1. Comparison with Software assisted Speech Therapy with normal Speech Therapy

Fig. 2.

VII. SYSTEM DIAGRAM

As shown in the following diagram the Tamil Therapy Speech Software will help the patient, how to speak and the sound of the instruction will be produced to the patient. Patient will reproduce the voice and this voice will be recorded by the system. This data will be synchronized with the server data.



The recorded voice will be assessed by the speech therapist and give the marks. Based on the scores for a particular period the software will change the sequences of the images and the corresponding Tamil pronunciation. Based on the improvement on the patient the Tamil words will be changed to Tamil Sentences and will assess the improvement.

VIII. ADVANTAGES

There is no speech therapy software developed in TAMIL language to assist the patient. It will be more useful for the patients. It will reduce the travelling time from patient home to hospital. If the patient is not ambulant then this kind of system will be easy for both patient and hospital staff. The easy TAMIL software will definitely help the patient to use the system and solve their speech and language difficulties. The software can run on mobile and desktop platforms. The same software can be used for stroke patients to improve their speech difficulty.

IX. DISADVANTAGES

Internet connectivity is required (But now internet is available everywhere). Patient should have a smart phone or a Desktop computer. Should have minimum knowledge to operate the software.

X. CONCLUSION

The Tamil speech therapy software will be very useful software for speech therapy treatment for the affected people. There is no known well defined Tamil speech therapy software is developed for the patient in mobile and desktop platforms. It will be very useful for the patient who cannot travel to the hospital from their residence. Also it will reduce the cost of treatment that will be more helpful for the rural patients. It can make more impact on the Indian medical field as the system is very cheap and useful for more people.

BIOGRAPHY

Dr. T. Arumuga Maria Devi Received B.E. Degree in Electronics & Communication Engineering from Manonmaniam Sundaranar University, Tirunelveli India in 2003, M.Tech degree in Computer & Information Technology from Manonmaniam Sundaranar University, Tirunelveli, India in 2005 and Worked as Lecturer in department of Electronics & Communication Engineering in Sardar Raja College of Engineering and also received Ph.D Degree in Information Technology – Computer Science and Engineering from Manonmaniam Sundaranar University, Tirunelveli , India in 2012 and also the Assistant Professor of Centre for Information Technology and Engineering of Manonmaniam Sundaranar University since November 2005 onwards. Her research interests include Signal and

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