

# RitSpee Generator: An Intraoral Speech Generating Device-Short Communication

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## ABSTRACT

All persons do communicate in some ways; however, the effectiveness and efficiency of this communication vary with a number of individual and environmental factors. People with severe speech or language problems rely on augmented and alternative Communication to supplement existing speech or replace speech that is not functional. This may increase social interaction, school performance, and feelings of self-worth. This article presents a design and concept of RitSpee generator, an intraoral speech-generating device that could help people who are unable to produce sound or speech and live in the society with full dignity. The RitSpee generator would be having two components, one is intraoral and another external, both of which connected via wire-free communication and the sound would simulate the natural sound coming out of the mouth without any external physical component.

**Key-words:** Alternative, Augmentative communication Disability, Intra oral device, Hawley's retainer, Morse code, Speech generating device

## INTRODUCTION

All persons do communicate in one or other way; however, for communication to be effective and efficient, it varies with a number of individual and environmental factors <sup>[1]</sup>. People who are having severe speech or language problems may use augmented and alternative Communication methods and devices to supplement existing speech or replace speech that is not functional. This would certainly help them in social interaction, school performance, and increasing their feelings of self-worth. Augmentative and alternative communication includes all forms of communications (other than oral speech) that are used to express thoughts, needs, wants, and ideas <sup>[2]</sup>. We all use Augmentative and alternative communication in our daily life when we make facial expressions or gestures,

use symbols or pictures, or write. When children or adults cannot use speech to communicate effectively in all situations, there are options. These unaided communication systems depend upon the user's body to convey messages. Examples include gestures, body language, and/or sign language. Aided communication systems require the use of tools or equipment in addition to the user's body. Aided communication methods can range from paper and pencil to communication books or boards to devices that produce voice output (speech generating devices) and/or written output <sup>[3]</sup>. Electronic communication aids allow the user to use picture symbols, letters, and/or words and phrases to create messages <sup>[4]</sup>. Some devices can be programmed to produce different spoken languages.

Speech-generating devices, also known as voice output communication aids, are electronic augmentative and alternative communication systems used to supplement or replace speech or writing for individuals with severe speech impairments, enabling them to verbally communicate their needs <sup>[5]</sup>. Speech-generating devices are important for people who have limited means of interacting verbally, as they allow individuals to become

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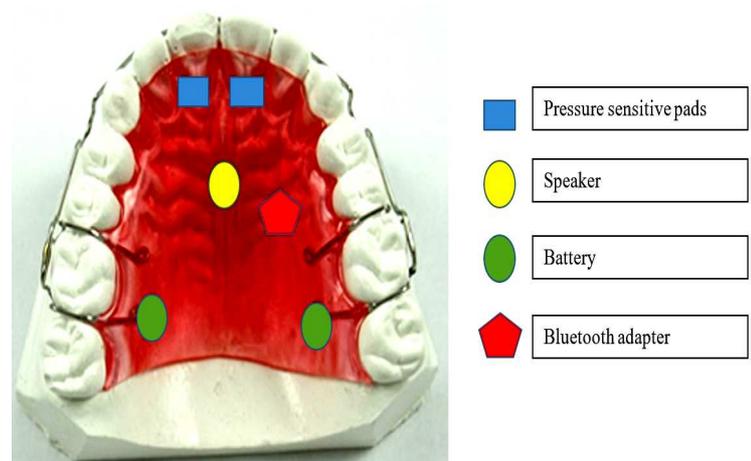


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active participants in communication interactions<sup>[6]</sup>. The first known SGD was prototyped in the mid-1970s and rapid progress in hardware and software development has meant that SGD capabilities can now be integrated into devices like smartphones. Notable users of SGDs include Stephen Hawking, Roger Ebert, and Tony Proudfoot. The first such aid was a sip-and-puff typewriter controller named the patient operated selector mechanism (POSSUM) prototyped by RegMaling in the United Kingdom in 1960<sup>[7]</sup>. POSSUM scanned through a set of symbols on an illuminated display<sup>[7]</sup>. Researchers at Delft University in the Netherlands had created the light spot operated typewriter (LOT) in 1970, which made use of small movements of the head to point a small spot of light at a matrix of characters, each equipped with a photoelectric cell. Although it was commercially unsuccessful, the LOT was well received by its users. Toby Churchill founded Toby Churchill Ltd in 1973, after losing his speech following encephalitis<sup>[8]</sup>. In the US, Dynavox (then known as Sentient Systems Technology) grew out of a student project at Carnegie-Mellon University, created in 1982 to help a young woman with cerebral palsy to communicate<sup>[9]</sup>. Beginning in the 1980s, improvements in technology led to a greatly increased number, variety, and performance of commercially available communication devices and a reduction in their size and price. Alternative methods of access such as eye pointing, where the movement of a user's eyes is used to direct an SGD, and scanning, in which alternatives are presented to the user sequentially, became available on communication devices<sup>[10]</sup>. Speech output possibilities included both digitized and synthesized speech. Rapid progress in hardware and software development continued, including projects funded by the European Community. The first commercially available dynamic screen speech generating devices were developed in the 1990s. Software programs were developed that allowed the computer-based production of communication boards. High-tech devices have continued to become smaller and lighter while increasing accessibility and capability; communication devices can be accessed using eye-tracking systems, perform as a computer for word-processing and internet use, and as an environmental control device for independent access to other equipment such as TV, radio, and telephones.

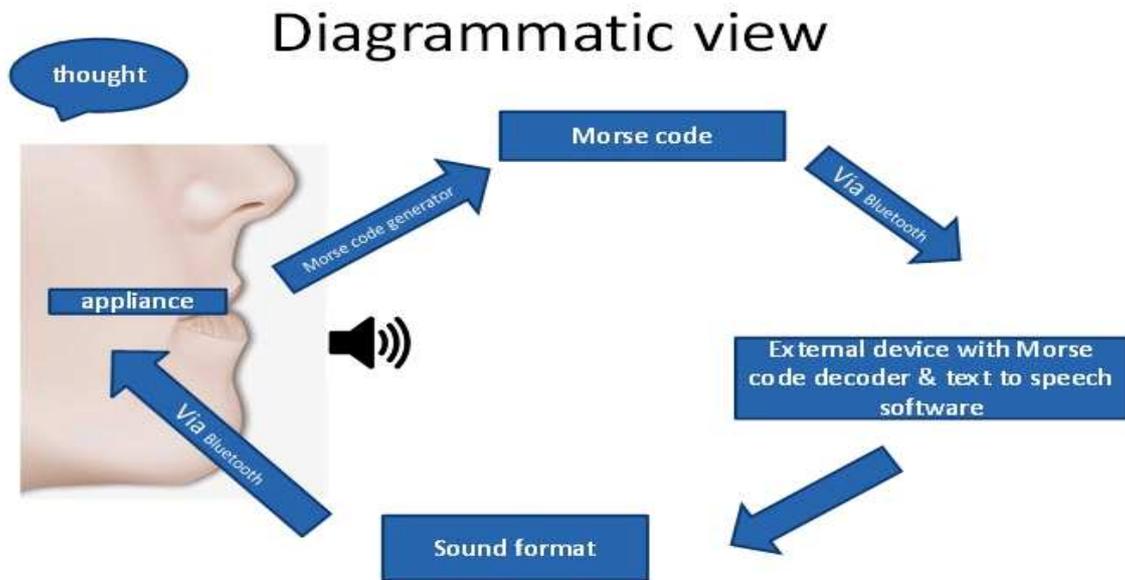
**RitSpee generator system-** This speech-generating device is based on the Morse code technology. In Morse code technology, all the alphabets of any language are depicted by a certain sequence of dot and dashes. For example, a DOT DASH and DOT shows an SOS signal. Likewise, any word can be formed by changing the sequence. A prerequisite for this device is that patient be intellectually normal, literate and have good control over his tongue musculature.

**How it works-** An intraoral device would be fabricated using a high-quality resin having Hawley's retainers for incorporating the Morse code generating circuit on flexible printed circuit board along with two pressure sensitive pads, Bluetooth adaptor, button cells, and speaker. It would be connected to an extraoral electronic device having Morse code decoding software, text to speech software and Bluetooth adaptor (Fig. 1).

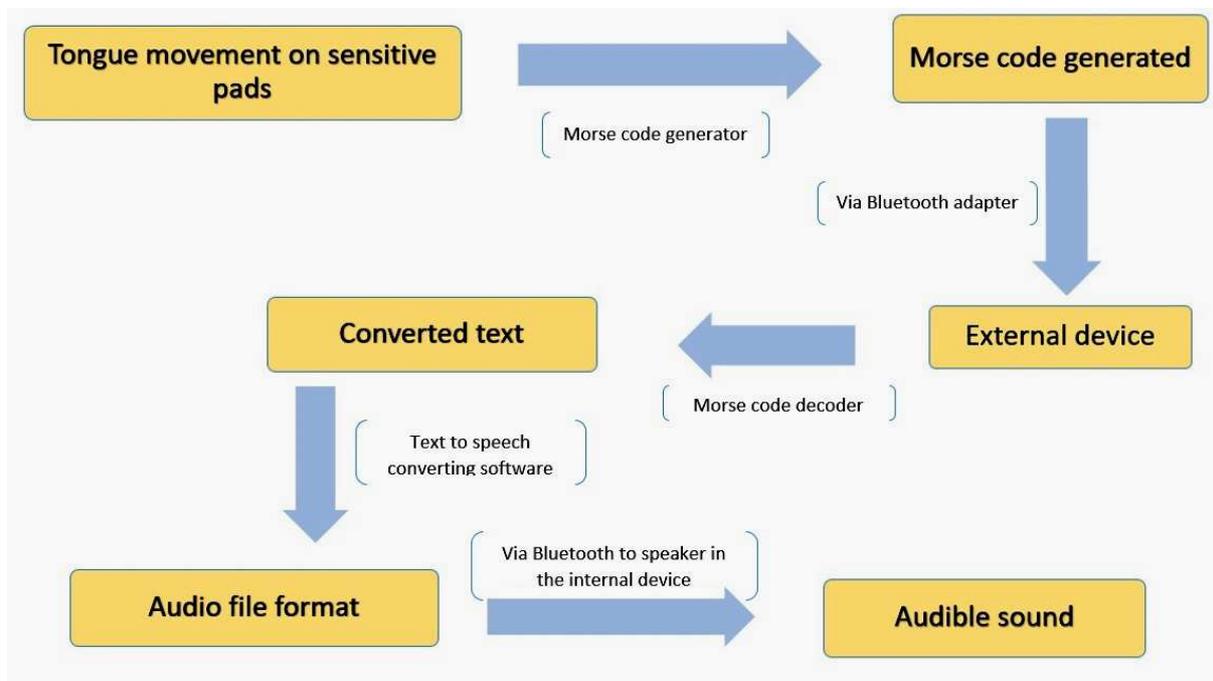


**Fig. 1: Intraoral view of RitSpee generator**

The patient can generate words in the form of Morse code by using his tongue movements and tapping on the pressure sensitive pads. The Morse code generated would be sent to an external device having decoding software, it would convert it into text form and then text to speech software would convert it into the sound format. This sound file would be sent to intraoral device via Bluetooth and would be played by the speaker present in the device, simulating original sound coming out of the mouth. The diagrammatic and flowchart of working of RitSpee generator is shown in Fig. 2 & Fig. 3 respectively.



**Fig. 2: Diagrammatic View of Working of Device**



**Fig. 3: Flow Chart of Working of Device**

**Clinical consideration-** As the first component is intraoral and its fabrication needs to be done by a dentist. He will make sure about the perfect fitting of the Hawley’s retainer. An electronic engineer would be required for the setup of the electronic circuit and for the proper functioning of the device. A speech therapist would be required to assist and teach the patient about the tongue movement required in this device.

**Patient care-** The basis of the success of this device depends upon the patient’s motivation. Therefore, the

patient has to work hard and maintain his /her oral hygiene and cooperate with others and works as a team.

**CONCLUSIONS**

Ritspee speech generating device would help patients with speech problems to improve their quality of life with speech enhancement and no more engagement of hands for making gestures and writing to communicate. In addition, it would simulate natural voice generation through mouth and hence camouflaging the limitation. This would improve the productivity of the disabled person as well as community and country as a whole.

Apart from integrating the old known technology of Morse code, this device would encourage and stimulate further innovation and improvement in rehabilitation methods for the disabled persons.

### CONTRIBUTION OF AUTHORS

Author has equally contributed in this paper.

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