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(57) Abstract:

Communication is a fundamental human need, yet many individuals with severe communication deficits face significant challenges in expressing their thoughts, needs, and emotions. Augmentative and Alternative Communication (AAC) systems offer a lifeline to nonverbal individuals and those with multiple disabilities, including deafness, autism, paralysis, dyslexia, and more. However, the existing AAC solutions in India are often costly and imported, limiting their accessibility. Our innovative Augmentative and Alternative Communication (AAC) device, aptly named SAHYOG, combination of hardware and software revolutionizes assistive technology by addressing the diverse needs of individuals with communication disabilities. SAHYOG's design embodies inclusivity and functionality, offering a comprehensive solution for effective communication and interaction so that the communication gap in specially abled lives can be bridged including enhancing the quality of life for users. It will be the first ever device in this AAC Technology that is going to be manufactured in India, as currently these devices are imported from foreign countries at very high cost.

Title of Invention: SAHYOG

Customizable Hi-Tech Augmentative and Alternative Communication Device

Abstract

Communication is a fundamental human need, yet many individuals with severe communication deficits face significant challenges in expressing their thoughts, needs, and emotions. Augmentative and Alternative Communication (AAC) systems offer a lifeline to nonverbal individuals and those with multiple disabilities, including deafness, autism, paralysis, dyslexia, and more. However, the existing AAC solutions in India are often costly and imported, limiting their accessibility. Our innovative Augmentative and Alternative Communication (AAC) device, aptly named **SAHYOG**, combination of hardware and software revolutionizes assistive technology by addressing the diverse needs of individuals with communication disabilities. SAHYOG's design embodies inclusivity and functionality, offering a comprehensive solution for effective communication and interaction so that the communication gap in specially abled lives can be bridged including enhancing the quality of life for users. It will be the first ever device in this AAC Technology that is going to be manufactured in India, as currently these devices are imported from foreign countries at very high cost.

Key features of SAHYOG include:

- **Touch Intuitive Display** for easy communication purposes
 - Innovative use of **assistive technology**, providing unique interfaces tailored to specific disability categories.
 - Collective interfaces **accommodating multiple disability categories**, ensuring inclusivity and accessibility for all users.
 - **Gesture-based model** catering to users with motor coordination disabilities, enabling intuitive interaction.
 - **Multilingual support in both Indian and Foreign context**, allowing users to communicate in their preferred language effortlessly.
 - Integration of an **Emergency Need Help Buzzer**, providing immediate assistance in critical situations.
- **Portability and affordability**, making SAHYOG accessible to a wide range of users.

- ***One modal solution for various communication deficits***, streamlining the user experience.
- ***Customizability***, allowing users to personalize their communication interface according to their needs.
- ***Virtual Vision feature for blind and visually impaired users***, facilitating interaction with the world.
- ***Purchase model offering customized devices tailored to individual requirements***, ensuring optimal functionality and user satisfaction.

SAHYOG represents a significant advancement in assistive technology, offering a device that is handed to people with disabilities. Its user-centric design, advanced functionality, and scalability make a pioneering AAC device with the potential to transform the lives of millions worldwide.

Therefore, SAHYOG stands as a testament to the power of innovation and inclusivity in creating positive change for individuals with communication disabilities. By filing a patent for SAHYOG, we aim to protect our intellectual property rights and ensure that this revolutionary technology reaches those who need it most, fostering independence, empowerment, and meaningful connections in the community.

Description

SAHYOG offers a versatile solution catering to three distinct user categories:

1. Deaf or Hearing Impaired and Dumb or Speech Impaired Category:

- o SAHYOG provides three interfaces:
- i. ***Text-to-Speech Interface***: Users can select predefined text buttons or type their own messages for conversion into speech, facilitating communication.
- ii. ***Symbol-to-Speech Interface***: Users select symbols to convey messages, enhancing communication for limited literate users. Symbols or Images are collected from ARASAAC library.
- iii. ***Speech-to-Text Interface***: Converts spoken words into text for deaf or hearing impaired users. *Input control is via touch, making the device portable and handheld*

2. Paralytic or Motor Coordination Disabilities Category:

- o Similar to the first category, SAHYOG offers the same three interfaces.
- o Input control options include ***touch, eye movement, or one-finger movement control***, customizable according to user requirements.
- o SAHYOG is designed to be *portable and handheld for ease of use*.

3. Blind or Visually Impaired Category:

- SAHYOG provides **a wearable device** enabling users to *visualize the world through virtual eyes*.
- Capable of detecting objects, obstacles, and text, converting them into speech for user comprehension.
- Offers independence in navigation and information retrieval without reliance on others.
- Introduces a novel concept, departing from traditional braille keyboards.

SAHYOG's few other customizability features for making it user friendly includes:

- Sign Ups and Logins for each new or previous user respectively.
- Multilingual Chatbot for guide and help regarding the device.
- Community Groups and Foundations to connect with similar peoples.
- Change in font size and types for improved readability.
- Adjustable brightness levels for optimal visibility.
- Male, female, or kid voice selection for speech output.
- Support for multiple Indian and foreign languages, enhancing accessibility and Inclusivity, etc.

In summary, SAHYOG embodies innovation and accessibility, offering tailored solutions to them a tool to express their messages, feelings and being independent. Our goal is simple: to bridge the gap in communication for those who need it the most, right here in India. We're making AAC technology accessible and affordable to everyone who deserves a voice.

TECHNICAL FEATURES AND SPECIFICATIONS:

The Project is built using a touchscreen interface powered by a Raspberry Pi setup. The Raspberry Pi is integrated into a small device that includes various key features and hardware specifications. Below is an elaboration on the technical features:

1. **Raspberry Pi 4 4GB RAM:**

The device uses a Raspberry Pi 4, which features 4GB of RAM. This provides sufficient memory for handling multiple tasks and ensures the system can perform well with more demanding applications. The 4GB version of the Raspberry Pi is ideal for projects requiring moderate processing power, including multimedia applications and user interfaces.

2. **Raspberry Pi 3B Capacitive Display:**

The screen is a 3B Capacitive Touch Display, which allows for a smooth user experience. Capacitive touchscreens are more responsive and durable compared to resistive touchscreens, as they detect the electrical properties of the human body. This type of screen is ideal for creating interactive applications, allowing the user to interact directly with the interface by tapping or swiping.

3. **USB-C Port and Micro HDMI Connector:**

The device is equipped with a USB-C port, which is commonly used for power input and data transfer. The micro HDMI connector allows for external display options,

meaning the device can be connected to larger screens for presentations or additional interaction.

4. **Plug-in for Charging:**

The Raspberry Pi can be charged via the USB-C port. This makes it highly portable and convenient for on-the-go use, especially important in handheld devices designed for people with disabilities, such as those with hearing, speech, or motor impairments.

5. **Raspberry Pi Camera:**

The device also includes a Raspberry Pi Camera, which could be used for capturing images or video in various applications. This is useful for projects that require visual recognition, surveillance, or video communication.

6. **Application Interface:**

The device features an application interface with a graphical display. The interface is user-friendly, likely designed to allow easy navigation for individuals with disabilities. The touch interface makes it accessible for users to engage with the system intuitively.

7. **Design Considerations:**

The system is housed in an acrylic casing that is both durable and scratch-resistant. The transparent material ensures that the internal components are visible, adding to the aesthetics and functionality of the device. The dimensions of 6in x 6in make the device compact and portable, ideal for handheld use.

INTENDED USERS:

This device is designed to be easily used by people with hearing impairments, speech disorders, or motor disabilities. Its portability and touch interface make it suitable for handheld use, allowing users to interact with technology in an intuitive and accessible manner.

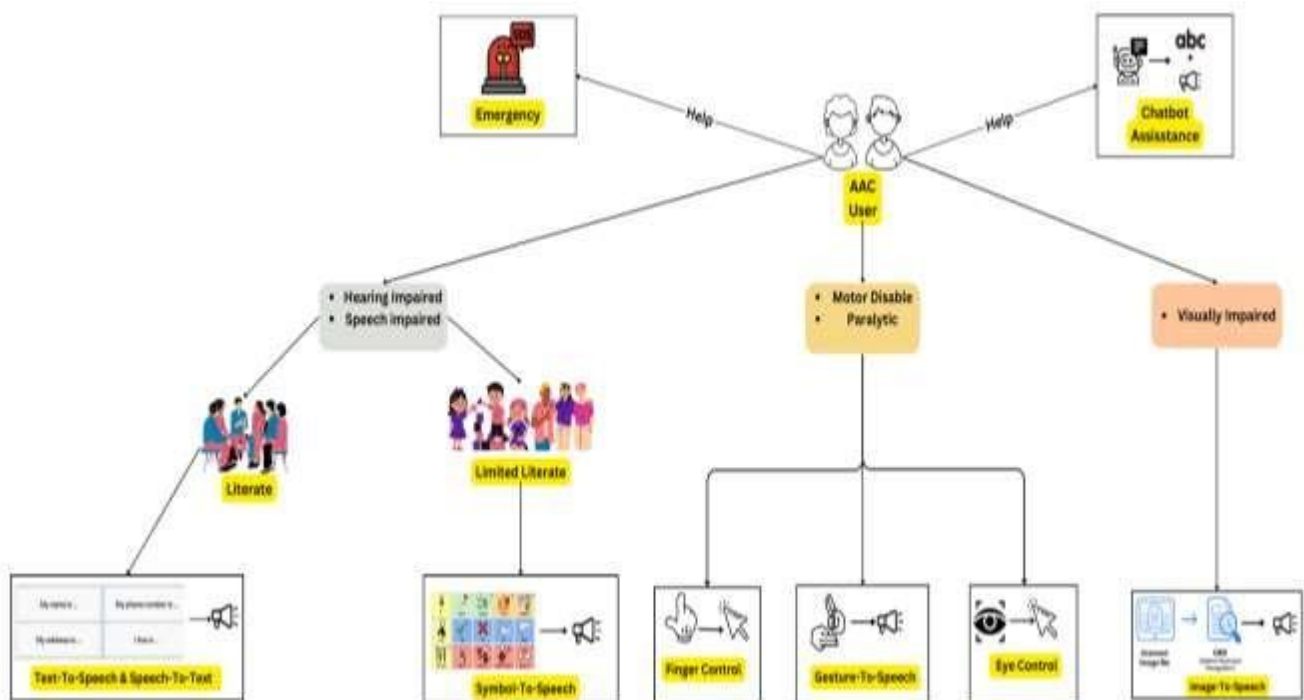
These technical specifications are geared toward enhancing accessibility and usability, making it easier for people with disabilities to engage with technology in their daily lives.

	Feature/Characteristic	Product Requirements	Technical/Engineering Specifications
1	Color, Material, Finish	Shall be made of scratch-resistant Acrylic with at least 40% transparency	Smooth finishing and decent color
2	Dimensions	Shall be 6in x 6in	
3	Visual Interface	Shall have an LCD display	Wave share Capacitive Raspberry Pi for B/B+ LCD Display
4	Touch Interface	Display shall allow for touch interactions	Capacitive Touchscreen Raspberry

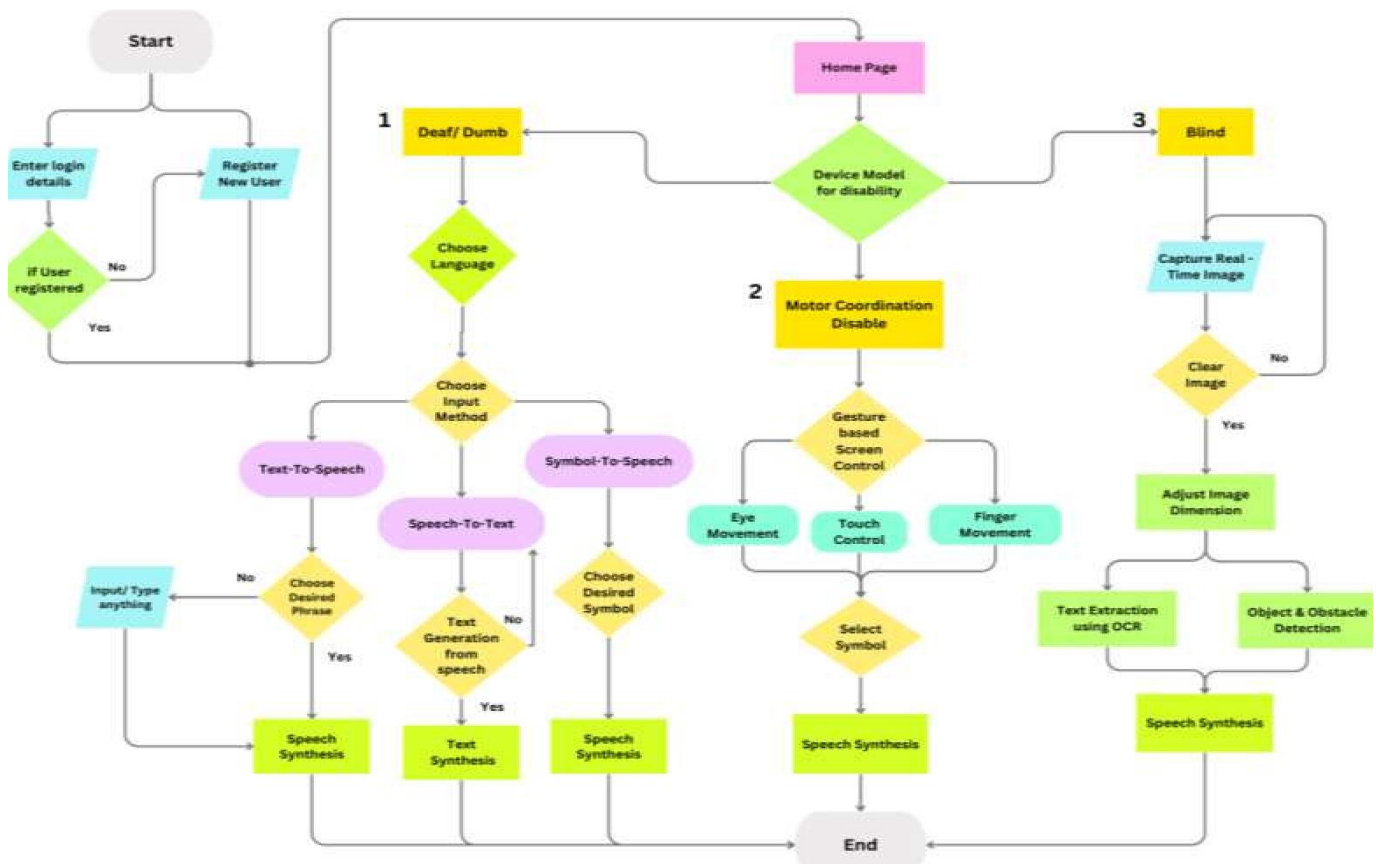
5	Connectors	Shall have a USB-C port and micro HDMI	Micro HDMI to HDMI connector
6	Placement	i. SUNOH (Hearing impaired/ Speech Disorders / Motor Disabilities)-Shall be able to be placed on hand	Handheld

Flow Charts and Diagram

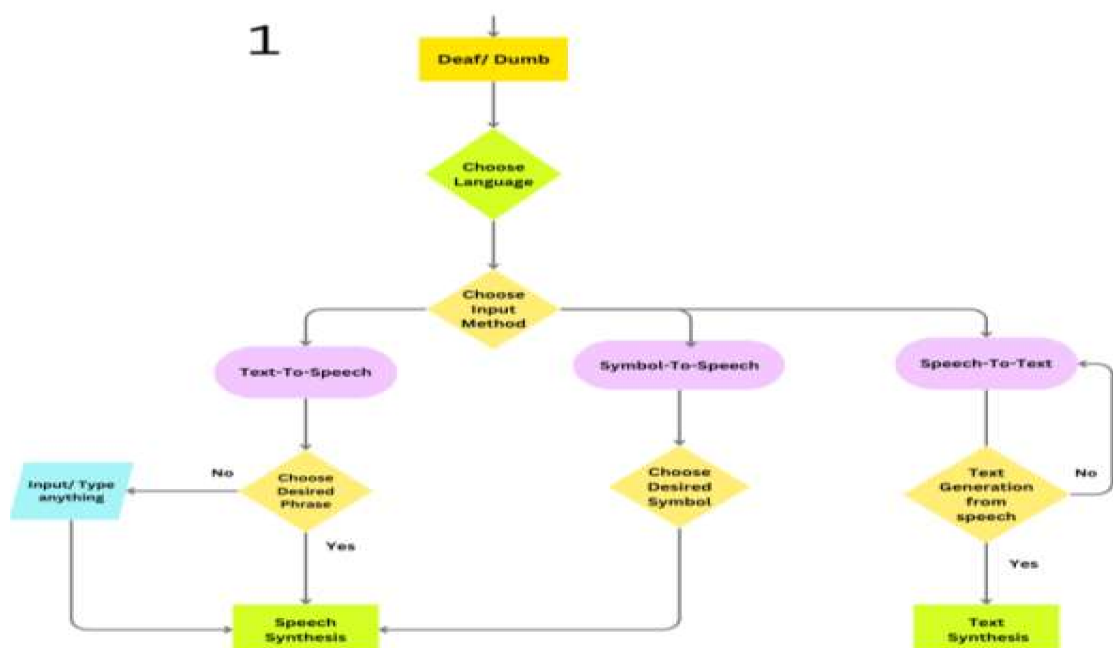
The diagram attached below represents our working model representation



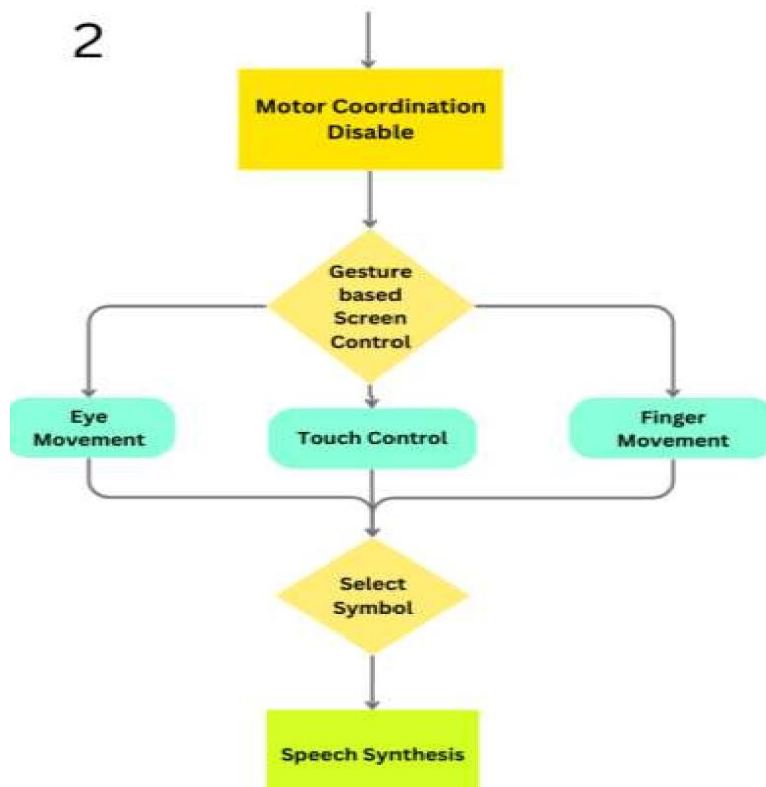
Complete flowchart for the working of SAHYOG



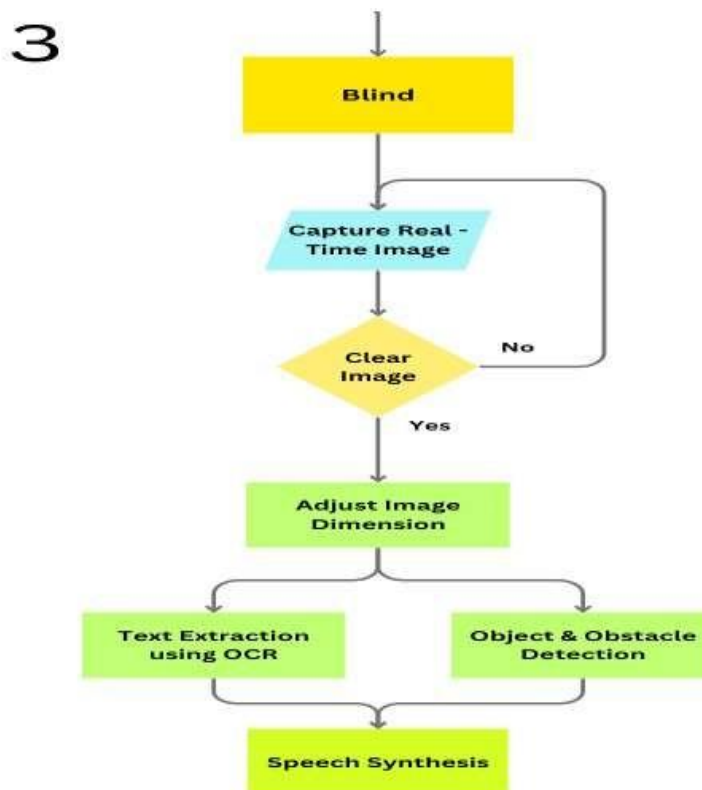
Flowchart for Deaf/Dumb Module



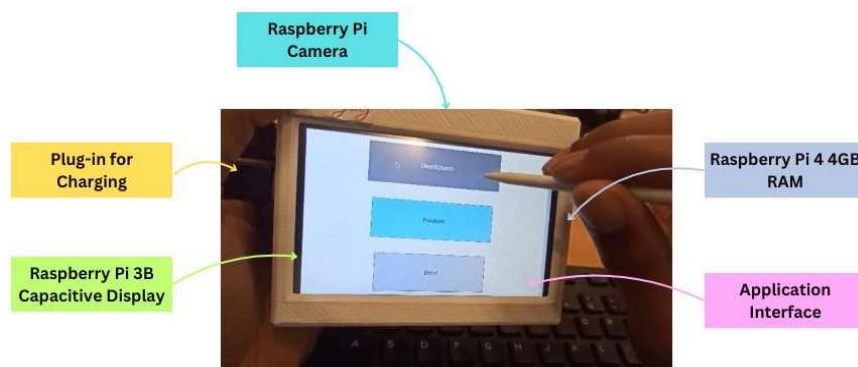
Flowchart for Motor Disability Module



Flowchart for Blind Module



Picture of the Setup for the device



CLAIMS

1. *Method for Multimodal Communication:*

- Our patent claims the method for facilitating multimodal communication through a single device, encompassing text-to-speech, symbol-to-speech, and speech-to-text interfaces tailored to diverse user categories.

2. *Adaptive Input Control System for Motor Coordination Disabilities:*

- Our patent encompasses an adaptive input control system designed to accommodate users with motor coordination disabilities, offering touch, eye movement, and one-finger movement control options for seamless interaction.

3. *Wearable Device for Visual Impairment:*

- Our patent claims the design and functionality of a wearable device enabling individuals with visual impairments to perceive and navigate their surroundings through virtual eyes, including object detection, obstacle avoidance, and text-to-speech conversion capabilities.

4. *Interface of AAC device*

- Our patent covers the customizable user interface of the AAC device, offering features such as font size and type adjustments, brightness control, voice selection, and support for multiple languages to enhance accessibility and user experience.

5. *Intelligent Object Recognition and Speech Synthesis:*

- Our patent encompasses the intelligent object recognition and speech synthesis technology integrated into the AAC device, enabling real-time conversion of detected objects and text into speech for enhanced communication and independence among users with communication and visual impairments.