Smart Hearing Mechanism for Physically Challenged Individuals

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Abstract—**The growing techniques in the field of Artificial Intelligence (AI) and Machine Learning (ML) are providing the best solutions to the demands and challenges of smart devices. In this paper, the emphasis is on the methods and application in the field of AI & ML with respect to the solutions for a physically challenged person. The main objective of the smart hearing machine is to help the people of the community who are facing the problem of deafness or hearing loss or blindness. This device is a smart assistant which can assist people as well as can play a song, give news updates, information, radio, and facility of controlling the smart home appliances. It also consists of detecting the obstacles.**

Keywords- AI; ML; embedded technology; deafness;

I. INTRODUCTION

The upcoming demand for automation and smart devices is revolutionizing the needs of intelligent devices. Artificial Intelligence (AI) and Machine Learning (ML) techniques provide the techniques and solutions to fulfill solutions. Embedded system is also one of the growing fields to provide cost-effective solutions. In such scenarios, human skills are getting replaced with intelligent sensors. Intelligent agents and devices are widely used in the field of healthcare. (Abhishek D. Pathaka, *, Jitendra V. Tembhurne, 2018)

The person with disabilities like deafness, blindness, or other physical disabilities should also take the benefits of advanced and revolutionary technologies. Deafness refers to the most severe level of hearing loss, profound hearing loss. If someone experiences profound hearing loss, their hearing loss is so severe that it limits their ability to hear most or all sounds, even loud noises close to their ears. As a Human, everyone has some responsibilities towards such a community. Everyone should contribute to today's technology to make contributions to providing better solutions.

The idea of a smart hearing machine is based on embedded technology and voice recognition technology. Hearing machines work by increasing the volume of sounds. Many people who are considered deaf still have some degree of hearing. If this is the case, the specially-designed hearing machine may be able to improve your hearing.

The proposed device is a smart assistant and helper for the group of communities that are unable to hear or which are unable to see. For making a smart hearing machine requires various embedded sensors and various network devices. The future of IoT is virtually unlimited due to advances in technology and consumers' desire to integrate devices such as smartphones with household machines. Wi-Fi has made it possible to connect people and machines. The smart hearing machine also provides the facility of sensing obstacles using computer vision by the small camera provided with it as well as it gives the facility of playing songs, connecting to radio, time, location with a smart assistant. In this proposed system hearing machine is associated with smart assistance and smart speaker so that it is beneficial for deaf and blind people.

II. MOTIVATION

In this era, everything going to be smart, on a daily basis we see a smart home, smart TV, smart speaker, smartwatch, etc. but the people who are suffering from deafness or blindness or deafblindness also need to work smart. As aware of people of this society, everyone should have some responsibility towards them. Through this project of the smart hearing machine, the machine will try to fill the gap between normal people and physically disabled people. In the era of smart machines, deaf people will also become smart, they can play music, get locations, they will be able to know weather reports, can connect to the radio, blind will be able to detect obstacles.

This is our social responsibility. To think about these people, they should not think of themselves as hapless.

III. RELATED WORK

There is already one proposed project that is a smart assistant for the deaf which is basically for the people who having difficulty while making the conversation with the sign languages which are basically made for the people who are suffering from deafness. The proposed project consists of smart gloves and flex sensors which is used for detection of the sign languages it can also help people who have speech loss problem. It is also used for detecting hand gestures. It majorly helps the people who are deaf as well as having speech loss or partial paralysis. (Md. Wahidur Rahman, Saima Siddique

Tashfia, Rahabul Islam, Md. Mahmodul Hasan, Sadee Ibn Sultan, Shisir Mia, Mohammad Motiur Rahman, 2021)

In addition to that one more interesting proposed project is present that is intelligent gloves for deaf and dumb people this project consists of gloves with various types of sensors which can help the people to communicate with others. (R. Ganguly, R. Das, R. Bose, S. Sindal and T. K. Rana, 2021).

IV. APPROACH

The smart hearing machine mainly consists of the following

- Voice Recognition System
- Wireless System
- Hearing Machine
- Microcontroller
- Power Bank module
- Computer Vision-based obstacle detection

A. Voice Recognition

Voice recognition is the process in which certain words of a particular speaker will automatically recognize that are based on the information included in an individual speech wave. The voice-controlled wireless smart home is very useful for elderly and disabled people. It is basically used for turning on or off lights, fans used it for smart speakers and anyone can also access the internet via a voice recognition system.

Types of voice recognition systems:

- Speaker dependent

In this, the machine is trained to recognize a particular voice, like a voice recognition system. The speaker must talk to the program and give it the ability to analyze the voice

- Speaker Independent

In this type, the machine does not require any training to examine the voice. Its main focus is on the speaker's word recognition.

B. Wireless System

This proposed system also utilizes Wi-Fi, Bluetooth, and other protocol standards to extend usages beyond audio playbacks, such as to control home automation devices, accessing current location, and current weather.

C. Hearing Machine

A hearing machine consists of three main parts i.e. A microphone, Amplifier, and Speaker. The hearing aid receives sound through a microphone, which converts sound waves to electrical signals and sends them to the amplifier. The amplifier increases the power of the signals received from the microphone and then sends them to the ear through a speaker.

D. Microcontroller

A Microcontroller is a small device on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. Use of Arduino Uno or raspberry pi can also be possible.

E. Power Bank module

The power bank module is a mobile power module accessory. The power bank circuit uses two integrated modules and a lithium-ion battery.

F. Computer Vision-based obstacle detection

To detect the obstacles in route for blinds we can take the benefit of computer vision. Computer vision is an interdisciplinary scientific field that deals with how computers can gain high-level understanding from digital images or videos. From the perspective of engineering, it seeks to understand and automate tasks that the human visual system can do.
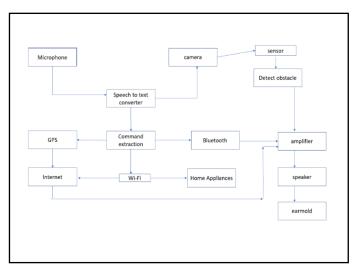

Figure 1. Basic Functioning of the smart hearing mechanism.

V. COMPARATIVE ANALYSIS

Smart hearing is a smart device that is used for the community of people who are facing the problem of hearing loss. The basic aim of this system is to provide deaf people with a good assistant which has features like playing songs, radio, news, connection to Wi-Fi as well as an obstacle detection system for blind people. It does not help to recognize sign language detection on the other hand both the proposed system which is mentioned earlier is the smart assistant for the deaf project which basically detects the sign language which consisting of smart gloves and flex sensors. it detects the sign language by the moments of fingers. And the second is intelligent gloves for deaf and dumb people which is consist of smart gloves and it is basically used to solve the communication problems for deaf and dumb people.

VI. CONCLUSION

In this proposed project the smart hearing machine, the machine solved a problem that is faced by a particular community. This device can resolve several problems which are faced by the deaf or people with hearing loss as well as blind people and help them in day-to-day life. They can use the smart home appliances easily and take the facility of a smart assistant. they get the facility of hearing songs, radio, news, and connection to the internet world.

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