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SMART ASSISTIVE DEVICE FOR DEAF AND DUMB PEOPLE

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Abstract: In today's world, there is a high need for automatic appliances with an increase in standard of living; there is a sense of urgency for developing circuits that would make our life go on easier. This project is designed and developed to help deaf and dumb people in their needs. Speaking microcontroller makes awareness about the needs of disabled. The person should know how to operate control buttons. When control buttons are pressed, voice IC will give out a sound signal corresponding to the control buttons. Speaking micro controller helps to indicate what the patient needs.

Index Terms **– CC3200, Energia software.**

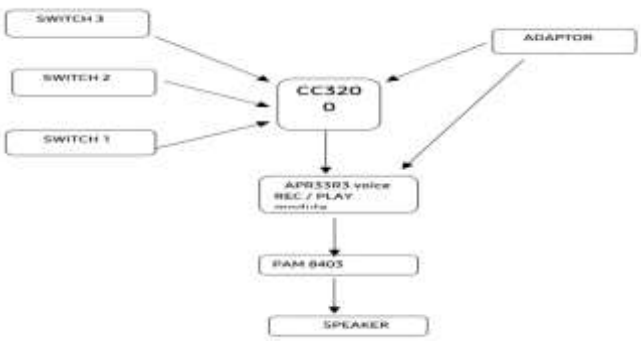
I. INTRODUCTION

A smart assistive device for dumb and deaf people is designed to give the signs or by using switches, which are already loaded in the device. It is a microcontroller based device, which gives the warn sounds just by using hand gesture sensor, which are given some redefined messages like asking for water, washroom etc.., here the person can just give the already defined gesture which indicates the sign of Water then the device sounds the same with some output volume.

Microcontroller is the heart of the device. It stores the data of needs of a person. So that it can make use of data stored whenever the person uses the device. This device helps deaf and dumb people to notify their requirements. By this the person who is near can be able understand their need and help them. This saves the time to understand each other and makes communication easier. This device is developed and made to provide with a higher advantage producing voice based announcement for the users i.e., the user gets the voice which he is need as and when it is required.

"Speech" and "gestures" are the expressions, which are mainly used in communication between humans. Learning of their use begins with the first years of life. In our communication, the use of speech and gestures are completely coordinated. Machine gesture and sign language recognition is about recognition of gestures and sign language using gloves or some other devices. A number of hardware techniques are mainly used for gathering information about body positioning; typically either image-based (using cameras) or device-based (using instrumented gloves, position trackers etc.). However, getting the data is only the first step. The second step, that of Recognizing the sign or gesture once it has been captured is highly challenging, especially in a Continuous stream. In fact currently, this is the focus of the research going on about these signs.

1 Block Diagram:



2. Hardware Components:

2.1 CC3200 Board

CC3200 is a microcontroller unit (MCU) with built-in Wi-Fi connectivity. Created for the Internet of Things (IOT), the Simple Link CC3200 device is a wireless MCU that integrates a high-performance ARM Cortex-M4 MCU, allowing customers to develop an entire application with a single IC. With on-chip Wi-Fi, Internet, and robust security protocols, no prior WiFi experience is required for faster development. The CC3200 device is a complete platform solution including software, sample applications, tools, user and programming guides, reference designs, and the TI E2E™ support community. The device is available in a QFN package that is easy to layout. The applications MCU subsystem contains an industry-standard ARM Cortex-M4 core running at 80MHz. The device includes a wide variety of peripherals, including a fast parallel camera interface, I2S, SD/MMC, UART, SPI, I 2C, and four-channel ADC. The CC3200 family includes flexible embedded RAM for code and data and ROM with external serial flash boot loader and peripheral drivers. The Wi-Fi network processor subsystem features a Wi-Fi Internet-on-a-Chip and contains an additional dedicated ARM MCU that completely offloads the applications MCU. This subsystem includes an 802.11 b/g/n radio, baseband, and MAC with a powerful crypto engine for fast, secure Internet connections with 256-bit encryption. The CC3200 device supports Station, Access Point, and Wi-Fi Direct modes. The device also supports WPA2 personal and enterprise security and WPS 2.0. The Wi-Fi Internet-on-a-chip includes embedded TCP/IP and TLS/SSL stacks, HTTP server, and multiple Internet protocols. The power-management subsystem includes integrated DC-DC converters supporting a wide range of supply voltages. This subsystem enables low-power consumption modes, such as the hibernate with RTC mode requiring less than 4 μA of current.

The high-performance ARM Cortex-M4 processor provides a low-cost platform that meets the needs of minimal memory implementation, reduced pin count, and low power consumption, while delivering outstanding computational performance and exceptional system response to interrupts.

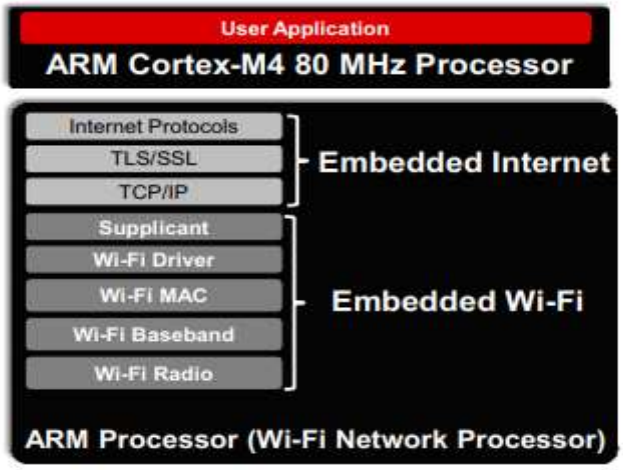
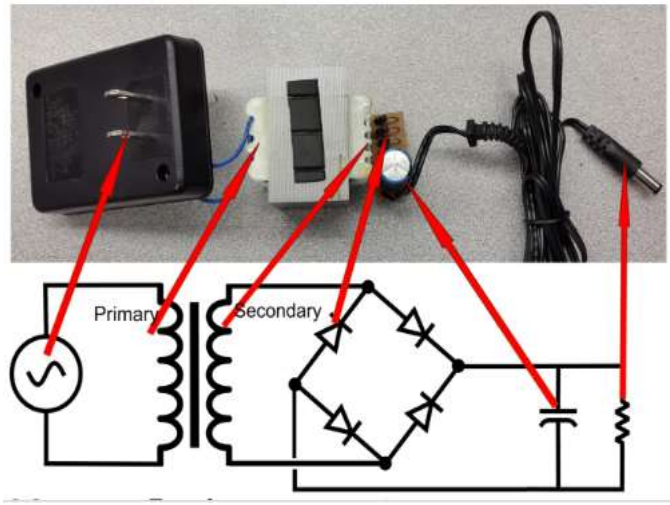


Figure 1-2. CC3200 Embedded Software Overview

2.2 POWER ADAPTOR

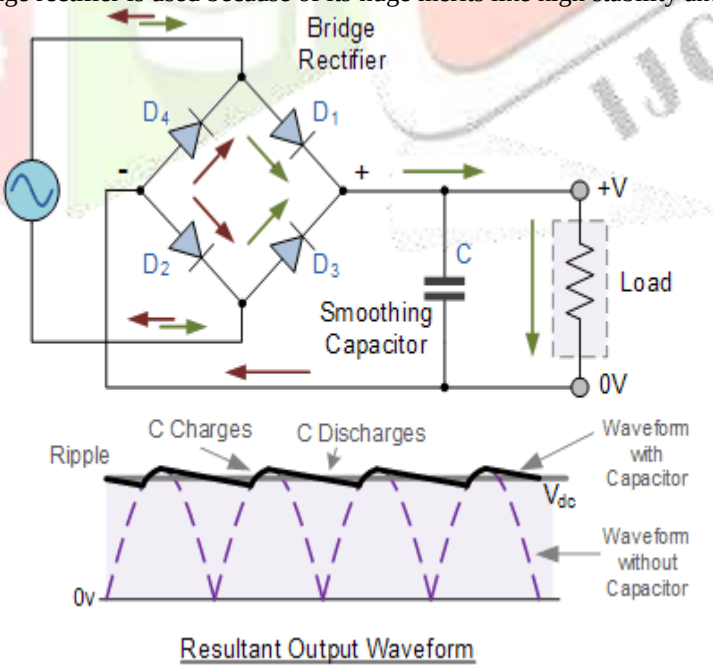
The input to the circuit is applied from a regulated power supply. The ac input i.e., 230V from the mains supply is step down by the transformer to 12V and is feeded to rectifier to convert the AC to DC with help of diodes and capacitor.



2.3 Transformer :

Usually, DC voltages are required to operate in various electronic equipment and these voltages are 5V, 9V or 12V. But these voltages cannot be obtained directly. Thus the ac input available at the mains supply i.e., 230V is to be brought down into a required voltage level. This is mainly done by a transformer. Thus, a step down transformer is specifically employed to decrease the voltage to a required level.

The output from the transformer is given to the rectifier. It converts A.C. into pulsating D.C. The rectifier may be a full wave or a half wave rectifier. In this project, a bridge rectifier is used because of its huge merits like high stability and full wave rectification.



The Bridge rectifier is a circuit, which is able to convert an ac voltage to dc voltage using both half cycles of the input ac voltage. The Bridge rectifier circuit is as shown in the figure. The circuit has four diodes which are connected to form a bridge. The ac input voltage is applied to the diagonally opposite ends of the bridge. The load resistance is connected between the other two ends of the bridge.

The conducting diodes will be in series with the load resistance RL and hence the load current flows through RL For the positive half cycle of the input ac voltage, diodes D1 and D3 conduct, whereas diodes D2 and D4 remain in the OFF state.. For the negative half

cycle of the input ac voltage, diodes D2 and D4 conduct whereas, D1 and D3 remain OFF. The conducting diodes D2 and D4 will be in series with the load resistance RL and hence the current flows through RL in the same direction as in the previous half cycle. Thus a bi-directional wave is converted into a unidirectional wave.

2.4 APR33R3 Voice REC/ Play module

APR9600 is a low-cost and high performance sound record/replay IC incorporating flash analogue storage technique. Recorded sound will be retained even after power supply is removed from the module. The replayed sound exhibits a high quality with a low noise level. Sampling rate for a 60 second recording period is 4.3 kHz that provides a sound record/replay bandwidth of 20Hz to 2kHz. However, by changing an oscillation resistor, a sampling rate can be achieved higher.

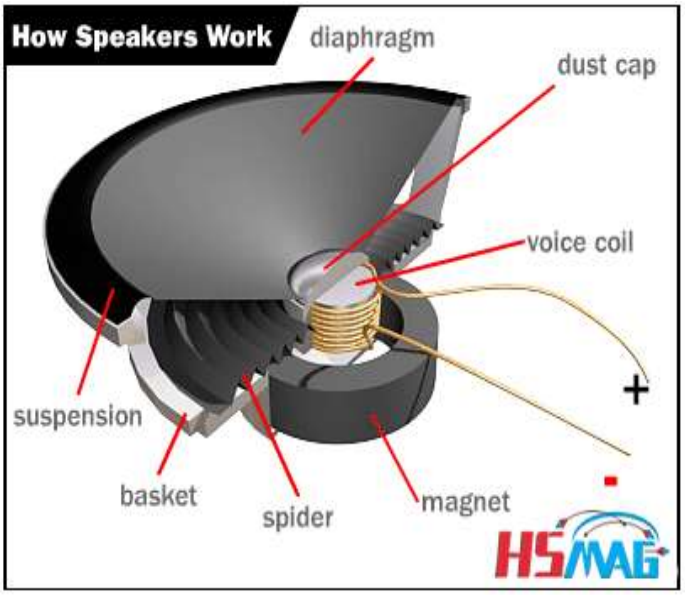
This may shorten the total length of sound recording to 32 seconds. Total sound recording time can be varied from 32 seconds to 60 seconds by converting the value of a single resistor. The IC can be operatable in one of two modes: serial mode as well as parallel mode. In serial access mode, sound can be registered in 256 sections. In parallel access mode, sound can be registered in 2, 4 or 8 sections. The IC can be controlled using push button keys. It is also possible to control the IC using external digital circuitry such as micro-controllers and computers. The APR9600 has a 28 pin DIP package. Supply voltage is between 4.5V to 6.5V. During recording and replaying, current consumption is 25 mA. In constant mode, the current drops to 1 mA. The APR9600 experimental board is an assembled PCB board consisting of an APR9600 IC, an microphone, support components and necessary switches allows users to explore all functions of the APR9600 chip. The oscillation resistor is chosen so that the total recording period is 60 seconds with a sampling rate of 4.2 kHz. The board measures about 80mm by 55mm.

2.5 Speaker :

Speakers are one of the most usual output devices used with computer systems. Some speakers are made to work specifically with computers, while others can be dependent to any type of sound system. Despite of their design, the use of speakers is to produce audio output that can be heard by the listener.

Speakers are transducers that transfer electromagnetic waves into sound waves. The speakers receive audio input from a device such as an audio receiver. This input may be present either in analog or digital form. Analog speakers amplify the analog electromagnetic waves into sound waves. Since sound waves are received in analog form, digital speakers must first convert the digital input to an analog signal, hence produce sound waves.

The sound produced by speakers is mainly determined by frequency and amplitude. The frequency determines how high or low the pitch of the sound is. For example, a soprano singer's voice gives high frequency sound waves, while a bass guitar or kick drum generates sounds in the low frequency range. A speaker system's ability to exactly reproduce sound frequencies is a good indicator of how clear the audio will be. Many speakers include multiple speaker cones for different frequency ranges, which helps produce more accurate sounds for each range. Two-way speakers typically have a tweeter and a mid-range speaker, while three-way speakers have a tweeter, mid-range speaker, and subwoofer.



Amplitude, or loudness, is shown by the change in air pressure created by the speakers' sound waves. Therefore, when you crank up your speakers, you are highly actually increasing the air pressure of the sound waves they produce. Since the signal produced by some audio sources is not very inflated and it may need to be amplified by the speakers. Therefore, most external computer speakers are highly amplified, meaning they use electricity to amplify the signal. Speakers that can amplify the sound input are often called active speakers. You can usually tell if a speaker is active if it contains a volume control or can be plugged into an electrical outlet. Speakers that don't have any internal amplification are called passive speakers. Since these speakers don't amplify the audio signal, they require a high level of audio input, which may be produced by an audio amplifier.
Speakers typically come in pairs. It allows them to produce stereo sound. This means the left and right speakers transmit audio on two completely separate channels. By using two speakers, music sounds are much more natural since our ears are used to hear sounds from the left and right at the exact time. Surrounding systems may include two to seven speakers, which creates an even more realistic experience.

2.6 Liquid crystal display

LCD (Liquid Crystal Display) screen is an electronic display module and find a high range of applications. A 16x2 LCD display is source module and is very commonly used in many devices and circuits. These modules are mainly preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are low price; easily programmable; have no limitations of displaying special & even custom characters (unlike in seven segments), animations and so on.
A **16x2 LCD** means it can show 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD contains two registers, namely, Command and Data.
The command register keep the command instructions given to the LCD. A command is an instruction given to LCD to perform a high task like initializing it, clearing its screen, setting a cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be reveal on the LCD.

3. Parameters and Characteristics:

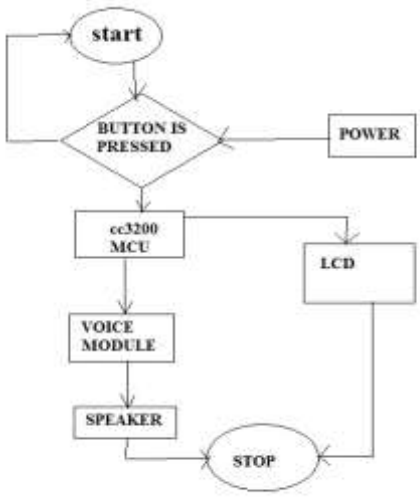
3.1.1 Applications:

- Deaf and Dumb people
- Handicapped people.
- Old age people.

3.1.2. Future Scope

This project can be further enhanced with cloud IOT technology to achieve high performance to current technology, we can also develop android application for the user to make it more easy operation side part.

4. Flow Chart:



5. Implementation:

Here in the implementation process, the inputs are given through buttons. These buttons act as input to the microcontroller(cc3200). The microcontroller is connected to a voice play module in which many number of voices can be saved. Here we are inserting about 8 voices in it. And through that voice module, the voices are sent into a speaker. Speaker acts as an output for dumb people. And similarly a LCD is connected to microprocessor through which output can be seen.
How does voices get saved into voice module(APR33R3)?
This module consists of record and save buttons through which any number of voices can be saved.
Here in this project, speaker acts an output for dumb people whereas LCD acts an output for deaf as well as dump people.

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6. Result:

The developed device will provide voice assistance and display for deaf and dumb people in their day-to-day operation of the applications present in their surroundings thus increasing the level of comfort**.**

The device forms a bridge between physically disabled people and normal people.

7. Conclusion:

This project is very useful as compared to existing system, which will help physically handicapped people, and we can further modify this project with display screen for dump people and we can also include barley keypad to this project. This project further can be modified with IOT .

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