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Assistant talking bot: For people with physical disabilities

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Abstract--Virtual assistants are increasingly finding ways to enter our homes and everyday lives, where they serve as powerful human-machine interfaces to control devices through natural language. A low cost and user-friendly Assistant Talking Bot (ATB) has been designed and developed that is employed by voice and after receiving a command, the robot will act according to the instruction and will be able to speak different sentences using a Bluetooth module and an APR33A3 recorder/playback module. Arduino IDE is the software interface for the modules connected to the arduino board and the commands thus acquired are interpreted and produced as output. The system, realized successfully, is a solution for people with physical disabilities as it facilitates easy access to help from people whenever required.

Keywords--arduino IDE, assistant talking bot, recorder, playback.

Introduction

The raise in utilization of robots and automation offers various advantages as well as it has drawn the attention of both academic investigation and commercial programs. The observations on numerous techniques of controlling robot has accomplished quite a few success by introducing a number of innovative & unique methods of robot movement control [1]. Verbal interaction intended for robot controlling and monitoring is actually sort of an innovative process among many methods which are introduced regarding robotics control. Previous works on voice controlled robots shows that the design of those robot were complicated and none of them were able to interact with users. Robots are anticipated to socialize along with its user however it has not yet arrived at this kind of level. [7]

There are numbers of techniques to control robot using voice identification yet it is reasonably limited. The development of a voice controlled robot is demonstrated in this paper which has the ability to follow voice command from user and does communicate with user by using pre-recorded human voice sound. Another Voice Controlled Robotic Vehicle utilized computer with a sound card and a microphone which was not user friendly. [8] A technique to give voice command using android based smart phone using Bluetooth is presented to construct the robot based on Arduino UNO microcontroller. The robot can accept instructions from users verbally and interact with user by speaking various sentences which will make it user friendly. [2]

Overview of the proposed system

The bot will be based on Arduino Uno microcontroller because of its numerous advantages of Atmega328P and will have an open source platform with the benefit of physical computing. [6] The system will utilize Bluetooth. Bluetooth uses radio waves with safe, less power consuming device to connect and exchange data between devices without using of any kind of physical contact like wires and cable. The main application that the robot will be able to perform is discussed below: To communicate with the user: After power up the robot, it will introduce itself to the user when asked “who are you?”. When user gives a command for any specific requirement, the robot will be saying by generating voice record that has been stored in the recorder/playback module. Each command robot will receive, it will generate sound of every sentences defined for its each command. The sound will be pre-recorded human voices and stored in a voice recorder/playback module, connected to the microcontroller unit using a bluetooth [10]

Hardware platform

The bot is developed using ATMEGA328P arduino, to acquire data from Bluetooth module via smartphone and a voice recorder/playback module. The block diagram consists of the components as shown in Figure 1.

Block Diagram

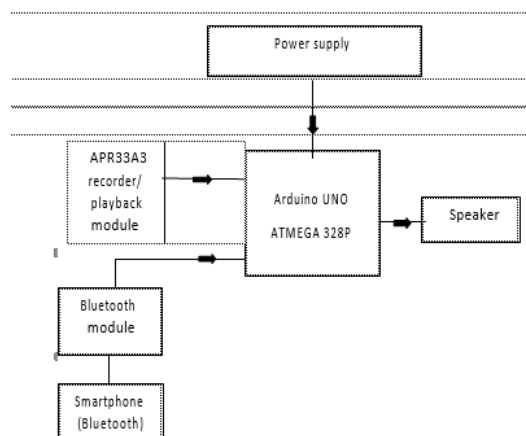


Figure 1. Block Diagram of ATB

Bluetooth module

HC-05 is a Bluetooth module, designed for wireless communications. This module acquires input commands from Arduino Automation application via smartphone.

- APR33A3 voice recorder/playback module
- APR33A3 recorder/playback module uses a powerful 16-bit digital audio processor with minimal external components. It has 8 channels to record and store voice, each of length 1.3 minutes. On whole we can record up to 11 minute audio at 8 KHz sampling rate with 16 bit resolution. It has a non-volatile flash memory technology so there is no need of battery back-up. [9]

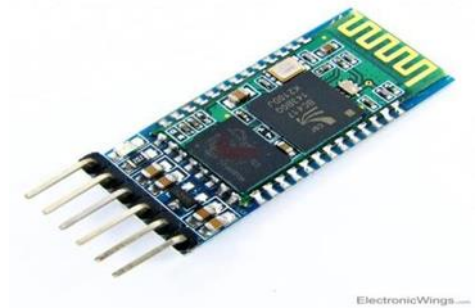


Figure 2. HC-05 Bluetooth module. [3][4]



Figure 3. APR33A3 recorder/playback module

The series of steps involved in the Assistant Talking Bot is represented in the form of below system flow chart in Figure 4

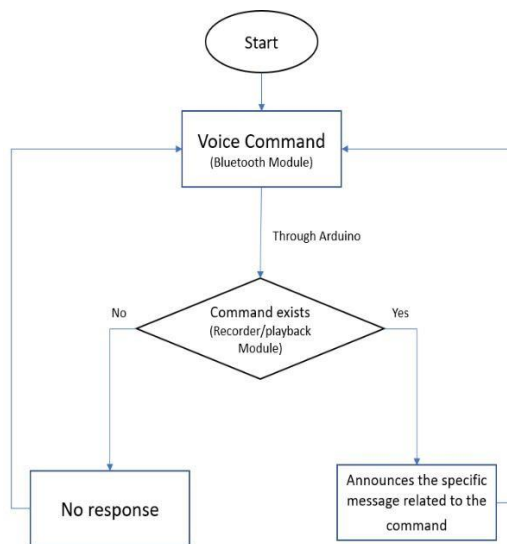


Figure 4. Flow Chart of ATB

When a voice command is given using the Arduino Automation application, via Bluetooth module to the bot, the Arduino Converts the voice data into texts and checks with the data stored in recorder/playback module. If a relevant command exists, the bot replies accordingly. If else, the bot randomly triggers the message (as example), “Aliceis calling you”. [5]

Results and Discussions

The Arduino Uno was programmed to respond to the various commands given by the subject through an 8 ohms speaker.

Table I

Below shows the different recorded sounds of voice recording of the robot for different voice commands

Voice Command	Bot Response
Who are you?	Hi, I'm Assistant Talking Bot. I'm here to helpAlice.
Water	Alice needswater.
Washroom	Alice wants to go to the washroom.
Hungry	Alice is hungry.
Medicines	Alice needsmedicines.
Change	Alice needsyour help
Company	Alice needs your company

When the input command is unclear or is out of the box requirement, the bot still tries to trigger saying, "Alice is calling you".



Conclusions

The Arduino based Assistant Talking Bot serves people by acquiring voice commands that are analysed using Arduino based working algorithm. The Arduino Talking Bot thus developed, efficiently receives commands and successfully provides reliable service to help people with physical disabilities.

Future Scope

The Arduino Talking Bot can be made more versatile by using two recorder/playback modules and expanding the storage capacity to 16 channels. It can be further connected to the internet, using artificial intelligence in order to make the functionality unlimited. With these modifications done, ATB finds its applications in the field of emerging technologies.

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