runlinc Online Project 7:

AI Voice Recognition (runlinc Online Version)

Contents

This project uses runlinc online which can be found here:
https://www.runlinc.com/online/control.html
(Note that HTTPS is required for this project)

Make sure to right-click the link and click 'open in new tab'.

Board IP:	https://runlinc.com

**Check to ensure that the board IP text field is https://runlinc.com
as shown in the right. If it is not, try to clear your site data.**

This project does <u>not</u> require a runlinc Wi-Fi Inventors' Kit.

Please note: This project has been tested on Chrome browsers on PC and Android phones.

Introduction

Aim

This project will introduce you to implementing voice recognition on online runlinc, and the system can also give you a response depends on what you say.

Background

Speech recognition is an interdisciplinary field of computer science that develops methodologies and technologies that enable the recognition and translation of spoken language into text by computers. It is also known as automatic speech recognition (ASR), computer speech recognition, or speech to text. Some technologies may require enrollment of voice before being used, in which an individual speaker reads a text or isolated vocabulary into the system. the system then analyses the speaker's voice and uses it to fine-tune the user's voice, resulting in increased accuracy. Systems that do not use enrollment are called 'speaker independent' while those that use it are called 'speaker-dependent.

The application of Speech recognition includes a voice user interface such as voice dialing, call routing, or controlling some domestic appliances, etc. Using voice commands can be useful to interact with your smart device and activate home appliances when the switch is too far to be reached.

In this project you will make a voice recognition control web page. A "Start Listening" button will activate the voice to text conversion and print the words you say. After pressing another "Stop Listening" button, the code will check the text and respond to the user with AI voice. The code checks for words such as "hello" and when detected, it then responds with "hello to you too"

Write the Code

Using the text field on the right-side section of the runlinc webpage we will start programming our circuit. We will use HTML to add content, CSS to add design to our favor, and JavaScript to program the microchip as follows.

HTML:

```
<h1>AI Voice Recognition using runlinc technology</h1>
Click button <br>
<button id="btn-start" onclick="startListening()"> Start  Listening </button><br>
<br>
Please say greetings such as 'Hello' or 'hi' or commands like 'Turn on the light' <br>

<p>Wait for the sentence you said to be printed as text on screen</p>
Click button <br>
<button id="btn-stop" > Stop Listening </button>
<br>
<p> Spoken Sentence:  </p>
<div id="result"></div>

<p> You will get a reply for what you said. Have fun !!!</p>
<p id="incompatible-msg" hidden aria-hidden="true">
Your browser doesn't support Speech Recognition. Sorry.
</p>
```

JavaScript:

```javascript
// Main Function to start listening
function startListening(){
    console.log("in start");
    let result = document.getElementById("result");
    let finalTranscript;
    // recognition = window.SpeechRecognition();
    let speechRecognition = window.SpeechRecognition || window.webkitSpeechRecognition;

    let recognition = new speechRecognition();
    recognition.continuous = true;
    recognition.interimResults = false;
    recognition.maxAlternatives = 5;
    recognition.start();
    const onResult = event => {
        result.innerHTML = "";
        finalTranscript="";
        for (const res of event.results) {
            const tempText=res[0].transcript
            console.log(tempText);
            if(res.isFinal){
            const text = document.createTextNode(tempText);
            const p = document.createElement("p");
            p.appendChild(text);
            result.appendChild(p);
            finalTranscript=tempText;
            }
        }

    };

    recognition.addEventListener("result", onResult);
    recognition.onspeechend = function() {
```

```javascript
        console.log('Speech capturing ended');
        createResponse(finalTranscript);

    }


    let stopbutton=document.getElementById("btn-stop");
    stopbutton.addEventListener("click",()=>{console.log("Listening Stopped");recognition.stop()});
}
// Function to speak the provided string
function speak( response ){


    console.log(response);
    const speech = new window.SpeechSynthesisUtterance( response );
    speechSynthesis.speak( speech );
}


// Creates response after listening
function createResponse(sentence){
var greetwords = ['hello','hi'];
var commandWords=['command','turn on','turn off'];
var greetStr='';
var responseStr= "Command Received: ";
console.log(sentence);

for(var greet of greetwords){
   if(sentence.toLowerCase().indexOf(greet)> -1){
      greetStr="Hello to you too!";
      break;
   }
}
for(var comm of commandWords){
   if(sentence.toLowerCase().indexOf(comm)> -1){
       greetStr=responseStr+sentence;
      break;
   }
}
speak(greetStr);
```
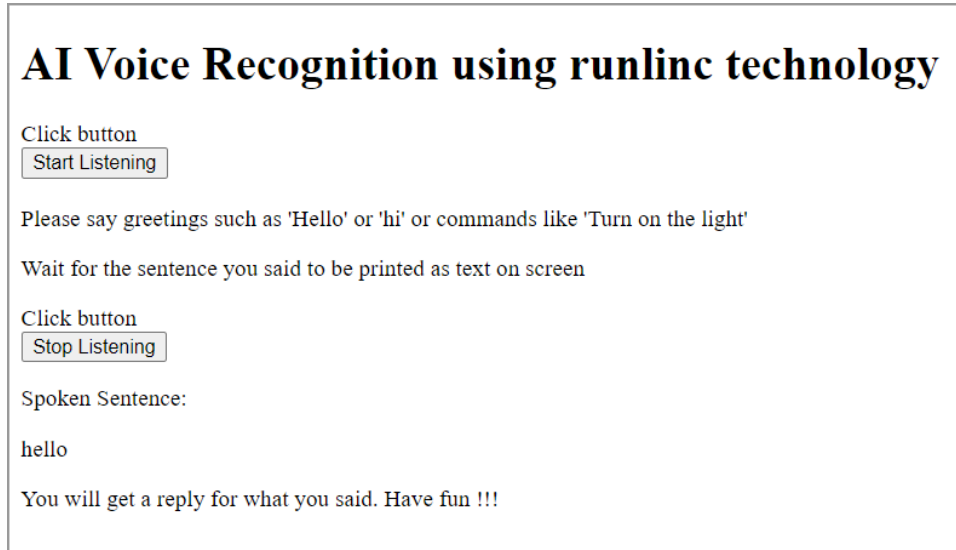
```
}
```

Figure 1: Expected runlinc online control page

Run the Application

Once you have written the code you can click 'Run Code' to start the program. You should see a page like the one shown in *Figure 2*.

Figure 2

Sometimes due to the network conditions, the speech recognition may take longer or fail to be loaded. If you do not see any response after clicking 'Start Listening', please press f12 to open the console of the browser. If the speech recognition is successfully loaded, you will see "in start" being displayed in the console. If you don't see it in 30 seconds, please press 'Stop Code' and run it again.

Firstly, click the 'Start listening' button, you can say a short sentence that should include the words which you set in the response section of the code. In this demo words are classified into two categories, greeting: ('hello', 'hi') → ("Hello to you too!") and command: ('command', 'turn on', 'turn off') → ("'Command Received:"). Make sure that before you press the Stop listening button, you should have seen the sentence you said printed on the screen (otherwise give it a few more seconds). For example, in *figure 2* above, you should see the sentence "turn on the light" under the "Spoken Sentence:" before you click the 'Stop Listening' button.

Extension

At this moment, the AI voice Recognition code will show the recognition result of your sentence and give you a response when you greet it or give a command. You can add personalized response by adding the following code under the section //Creates response after listening. (Put the new for() loop under other for() loops).

```
var otherWords=['weather'];
for(var comm of otherWords){
    if(sentence.toLowerCase().indexOf(comm)> -1){
        greetStr="open the window then you will know";
        break;
    }
}
```

Another challenge is to draw shapes according to your command. This can be done by using the same method before, and adding the following code which includes the shape that you want to draw.

```
var drawWords = ['square'];
for(var shape of drawWords){
    if(sentence.toLowerCase().indexOf(shape)> -1){
        greetStr="here is a square.";
        var canvas = document.getElementById('canvas');
        var ctx = canvas.getContext('2d');
        ctx.strokeStyle = 'black'
        ctx.beginPath();
        ctx.strokeRect(520,0,100,100);
        ctx.stroke();
        break;
    }
}
```

Note: You also need to indicate the position of the shape being drawn, this line code should be put at the end of the HTML block:

```
<canvas id="canvas" height=1000 width=1000></canvas>
```

Following the step, you will see the result in *figure 3*, the square will be displayed under the voice recognition result.

AI Voice Recognition using runlinc technology

Click button
[Start Listening]

Please say greetings such as 'Hello' or 'hi' or commands like 'Turn on the light'

Wait for the sentence you said to be printed as text on screen

Click button
[Stop Listening]

Spoken Sentence:

Square

You will get a reply for what you said. Have fun !!!

Figure 3 Expected result.

If doesn't work as expected, please check the following points:

- As only CHROME has the voice to text function in build, this program will only work on CHROME browser.
- Ensure that the board IP text field is https://runlinc.com
- Once you click on start button, speak something like "HELLO", "HI", and wait for about 30-40 seconds for it to process before pressing stop button. If the text appears then click stop button and wait until you hear the voice back.