HAL Rotator Control Program

Purpose

The HAL Rotator Control Program is designed to allow voice control of the Hy-Gain DCU-3 rotator controller. It's written in Microsoft Visual Basic and uses the Microsoft speech generation facility to speak to the user and the speech recognition facility to accept voice commands from the user. The program functions with the DCU-3 controller and should work with any controller using the EZ Rotor command set.

PC Requirements

The program was developed and tested on a Windows 10 64 bit system using a four core i7 processor running at 3.4 GHz with 16 GB of memory. The minimum PC that will run the program is unknown. A sound card with speaker output is required to hear the program's voice and a USB or soundcard connected microphone is required to receive the user's voice commands. The rotator controller must be connected to the user's PC via an RS-232 serial cable or a USB cable (the DCU-3 supports both connections and comes with a USB cable).

Installation

The program uses conventional Windows installation procedures provided by Microsoft's Visual Studio development environment. Un-zip the HAL zip file, execute the setup.exe file, and installation will complete automatically. You may need to install the Microsoft .Net package if it's not already on your Windows system.

Program setup

The program can be directed to turn the rotator by specifying a country or other geographical name or by speaking a three digit bearing. There are eight possible geographical entities and the program comes already configured with these: Australia, California, Japan, Europe, Africa, South Africa, Carribean, South America. Associated with each entity is the three digit compass bearing to that location and the default bearings are for grid square EM96. By selecting the "Settings" menu item on the program operating window, the user may change the entity names and compass bearings to anything of his choice.

When the program is initiated, it prompts you to select Settings or Run. If you select Settings, the Settings window appears. There you can select the rotator COM port and trigger word, and specify geographical entities and the compass bearings to those entities. You select the COM port from the list of all COM ports detected on your system. The default trigger word is "HAL", and you can change that to something else if the program has trouble understanding you saying "HAL".

The geographical entities can be anything you choose – country names, continents, compass directions. The defaults are: Australia, California, Japan, Europe, Africa, South Africa, Carribean, South America. The default compass bearings are for grid EM96 in northwestern North Carolina. When specifying the bearings, use a three digit number and include a leading zero for bearings less than 100 degrees.

If you position the mouse pointer over the label next to a box or above the entity and bearing boxes, you'll hear a spoken explanation of what goes in the associated box.

All changes you make on the Settings form are saved when you hit the Save Changes button on the bottom of the form.

Operation

When the program is initiated, the HAL voice gives basic instructions and the operating window appears. The window includes the current rotator bearing as well as the new bearing when entered by speaking three digits. When entering a voice command, the user must first speak the trigger word (default is "rotator"), which alerts the program that a voice command will be entered. This approach avoids the problem of the program mistakenly acting on normal conversation from the user or radio audio. The trigger word can be changed by the user by invoking Settings from the operating window tool bar.

If the program correctly hears the trigger word, it will sound a beep indicating it's ready to receive a voice command. The program will always respond to a voice command either with a beep or a spoken message. In addition to the geographical entities mentioned earlier, the program understands these commands and acts on them as described:

1. Bearing: The program queries the controller for the current bearing and speaks it as a three digit number.

2. Clear: If the user makes a mistake while speaking a three digit direction or if the program misinterprets a number, the user can say "Clear" and then begin saying the three digit bearing again.

3. Stop: If the rotator is turning as a result of saying a geographical entity name or three digit bearing, rotation can be halted immediately by saying "Stop".

4. Terminate: At any time the user can say "Terminate" and the program will end execution.

5. Help: If the user says "Help", he'll hear a voice reply about the possible commands and how a bearing can be entered.

Remember: All of these commands must be preceeded by the user saying the trigger word and hearing the beep that signifies the program recognized the trigger word. When using this program, all of the front panel controls on the DCU-3 rotator controller still work normally and you can use them in conjunction with this program. The program will sense any bearing changes initiated via the controller buttons.

Typical problems

The speech recognition engine doesn't do a perfect job of recognizing perfect speech. It may either miss a spoken word entirely, or may misinterpret the word for another. When that happens, just try again. Here are some factors that can impact the recognition engine's ability to understand spoken words:

1. Regional accents: Using the windows speech recognition training procedures may help with this as it trains the recognition engine to your voice.

2. Background noise: (loud fans, white noise from your radio speaker, voices from the radio, humans talking nearby). Getting closer to the mic will help with this.

3. Microphone quality, location, gain: Proximity to the microphone will help as well as properly setting the mic gain. An overdriven mic input will distort the user's voice and cause recognition errors. Start with the mic turned all the way down and increase the gain just to the point where the program is recognizing your speech. Some mics, such as my WalMart USB mic have a gain control on the mic base. You can use Windows Sound Settings to adjust the gain for any mic and it gives you a visual indication of the sound level reaching the program.

4. Microphone not identified to Windows as the default input device: If this isn't done, your mic input won't be routed to the program. Use Windows Sound Settings to specify the mic as the default audio input.

5. Windows 10 added privacy settings to prevent unauthorized programs from using the camera or microphone. If HAL doesn't recognize your speech, first go to Windows – Sounds, recording tab, and select your microphone. When you speak into the mic, you should see the level indicator responding to your voice.   It that's true, your microphone is working. Next go to Windows – Settings and find the Microphone Privacy settings. Make sure the switch that says "Allow apps to access your microphone" is set to ON. Under "Choose which apps can access your microphone", set all the switches to ON. Then test to see if HAL can now recognize your speech.

6. Make sure your PC speaker volume is turned up so you can hear HAL's voice and the beeps that the program generates.

73, Floyd – K8AC

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