NAO Robot Google Assistant Integration: Progress So Far

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Abstract

The purpose of this project is to integrate Google Assistant with the Naoqi OS, thus enabling the NAO Robot to use Google Assistant to better interpret voice commands. This has been done using a virtual machine in order to speed up iterations of the project. Currently Google Assistant has been installed to the VM, and we are now ready to begin the testing and debug phase of the project.

1. Procedure

1.1 Setting Up OpenNAO VM

The following procedure was used to prepare the OpenNAO environment for integrating with Google Assistant.

1. Install VirtualBox.

2. Download opennao-vm-2.1.2.17.ova

3. Deploy the ova as an appliance.

4. Enable the audio controller in the VM settings, choose the Intel HD option.

5. Enable the USB controller in the VM settings, choose your USB speakers / mic in the device settings.

    5a. Edit the device settings and set Remote to yes to enable sound in VM.

6. Start the VM (I recommend headless mode).

7. Open a terminal and ssh to the VM. OpenNAO runs on the local host at port 2222. The default password is nao.

    ssh nao@localhost -p 2222

1.2 Configuring Gentoo

The next step is to configure Gentoo for audio, so that it will be ready for Google Assistant.

1. Install the portaudio package.

    sudo emerge portaudio

2. Download the latest versions of alsa-lib and alsa-utils:

    https://alsa-project.org/wiki/Main_Page

3. Install alsa-lib

    tar --extract --file alsa-lib-1.2.3.2.tar.bz2
    cd alsa-lib-1.2.3.2

```
./configure
make
sudo make install
```

4. Install alsa-util

```
tar --extract --file alsa-utils-1.2.3.tar.bz2
cd alsa-utils-1.2.3
./configure
make
sudo make install
```

1.3 Install Google Assistant Dependencies

The next step is to install the dependencies for Google Assistant. All dependencies are installed in the same manner:

```
tar --extract --gz --file <dependency.tar.gz>
cd <depedency>
sudo python setup.py install
```

The dependencies that need to be installed are, in this order:

a. Pycparser-2.20 (1)

b. cffi-1.14.0 (2)

c. sounddevice-0.4.0 (3)

d. oauthlib-3.1.0 (4)

e. request-oauthlib-1.3.0 (5)

f. google-auth-1.19.2 (6)

Note: setup.py needs to be edited. Comment out the install_requires variable.

g. google-auth-oauthlib-0.4.1 (7)

h. click-7.1.2 (8)

1.4 Install Google Assistant

The last step in the initial setup is to install Google Assistant. The current version of assistant uses Python 3, but the NAO robot requires Python 2.7, so this is only for proof of concept at the moment as a deprecated version of Google Assistant is required.

1. Download google-assistant-sdk-0.6.0 (9)

2. After extracting the archive, requirements.txt must be created prior to installation

    touch googlesamples/assistant/grpc/requirements.txt

1.5 Audio Tests

Now that the installation is complete, it is time to test the audio configuration.

1. Test the mic using the arecord function from the ALSA library and save the results.

    arecord -d 10 -r 48000 -c 2 -f S16_LE audio.wav

2. Test the speakers by playing back the file.

    aplay audio.wav

3. Test Google Assistant Audio

    googlesamples-assistant-audiotest

    This will perform a 10 second audio test, recording with the microphone and immediately playing back.

Next Steps

In the Fall 2020 semester, I plan to implement automated testing of the Google Assistant libraries, and write test scripts that allow the NAO robot to utilize the new functions available with the addition of the assistant. There are several issues that need to be addressed before this work can move forward:

1. Properly configuring OpenSSL to communicate with the python interpreter
2. Adjust audio playback volume to be audible over speakers from Google Assistant.

The current version of the project will be included in the repository, labeled NAOGAssistantSummer2020.ova.

Works Cited

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