

Low Cost Home Automation Using Offline Speech Recognition

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Abstract

This project is initiated by the inception of an idea which not only aims at using the product but also study in depth about existing and proposed systems in the same category. A proposal is taken , which is far better from the existing system.

Device required

GSM modem ; Raspberry pi 3 ; Relay modules ; Connecting wires ; LED display ; Microphone ; Normal sim card 4G .

Existing system

Home automation already in practice is controlling home appliances via wired network. The existing product are expensive and also speech recognition is available with usage of internet means online. This existing system deals with the **voice activity detector (VAD)**. It tries to separate speech signal from background noises.

Disadvantages of existing system

The exiting products are expensive .In exiting system , controlling method is through wired network , which makes physically challenged and elderly people access or controlling difficult .In exiting system , the speech recognition is possible only through online (internet).

Proposed system

With advancement of technology , the concept of speech recognition is done without internet (offline).The proposed system , As a board perspective of the system Raspberry pi operates and controls motion detectors. It helps to perform routine task in a much simplified manner. The sound recognition is done in the concept of hidden Markov recognition tool kit (HTK) in offline manner. Human voice is converted to text using (HTK) and it is wirelessly trans received using GSM modem . the first step of speech recognition is done through USB microphone. Raspberry pi board and GPIO pins . The voice is recognized and converted to text and displayed in terminal window using GSM modem . The other GSM modem receiver at the end of the system , receives the word and according to it automation is done.

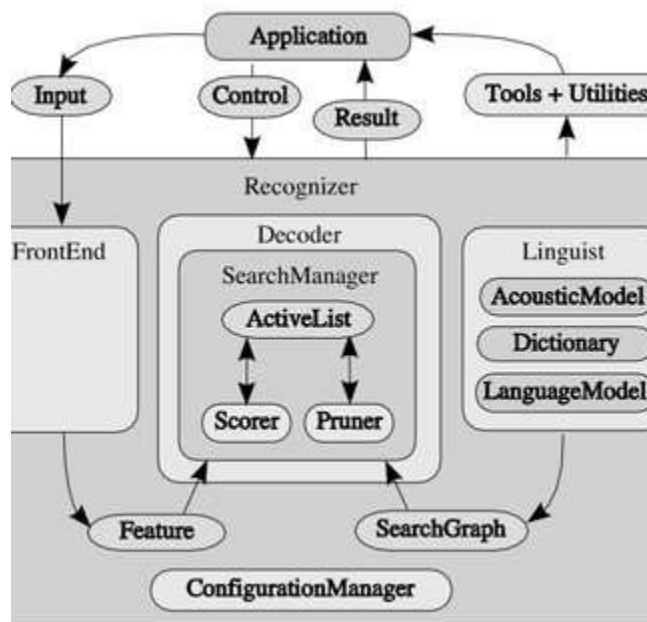
Advantages of proposed system

This project deals with the design and implementation sound intelligence is added to a home automation based on acoustics for sophistication of physically challenged people.The voice based control system makes routine task simplified .It is low cost system . proposed system makes system respond back to the user using offline text application (i.e, internet is not required).

Modules

- Collection and recognition of voice signal.
- Transmitter.
- Receiver.
- Controlling home appliances.

Schematic Diagram



Module 1

Collection and recognition of voice signal

The human voice signal is detected by USB microphones. Human voice is converted to text using HTK (Hidden Markov Model tool kit). Sphinx-4 is also used for speech recognition. Sphinx-4 is a framework modularity.

Module 2

Transmitter

The human voice signal converted to text is transmitted using GSM modem. Which makes wireless transmission possible.

Source code

Module 3

Receiver

The signal which is wirelessly transmitted is received in other GSM modem(receiver). which is at the end of the system.

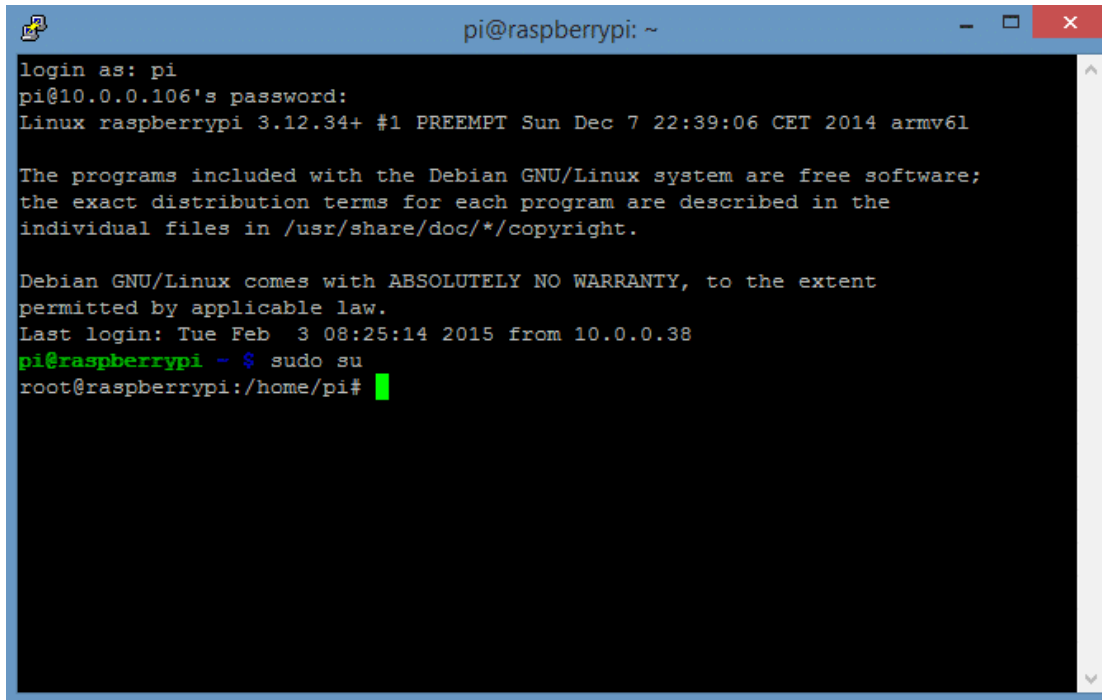
Module 4

Controlling home appliances

The signal received by GSM modem receiver is then sent to microcontroller. Then the devices / appliances is controlled through offline.

```
pi@raspberrypi: ~/python
File Edit Tabs Help
pi@raspberrypi ~ $ mkdir python
pi@raspberrypi ~ $ cd python
pi@raspberrypi ~/python $ touch blinker.py
pi@raspberrypi ~/python $ leafpad blinker.py &
[1] 3024
pi@raspberrypi ~/python $ sudo python blinker.py
Here we go! Press CTRL+C to exit
pi@raspberrypi ~/python $
```

```
test: vim - Konsole
File Edit View Bookmarks Settings Help
from my_lib import Object
print("Hey")
print("yo")
import os
from my_lib import Object3
from my_lib import Object2
import sys
from third_party import lib15, lib1, lib2, lib3, lib4, lib5, lib6, lib7, lib8, lib9, lib10, lib11, li
import sys
import os
from __future__ import absolute_import
from third_party import lib3
from third_party import lib3
~
~
~
```



```
pi@raspberrypi: ~
login as: pi
pi@10.0.0.106's password:
Linux raspberrypi 3.12.34+ #1 PREEMPT Sun Dec 7 22:39:06 CET 2014 armv61

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Tue Feb  3 08:25:14 2015 from 10.0.0.38
pi@raspberrypi ~ $ sudo su
root@raspberrypi:/home/pi#
```

Conclusion

From this project we concluded that an approach is taken to control home appliances in offline speech recognition and with the help of various devices and the user voice is transmitted as a signal through text using GSM modem receiver.