elechouse / **VoiceRecognitionV3**

Arduino library for elechouse Voice Recognition V3 module

42 commits **1** branch **0** releases **3** contributors

wilson-elechouse update send_pkt ··· Latest commit `fc492cb` on 1 May

examples	Expand VR module records. Change name from V2 to V3.	3 years ago
image	Update readme.	3 years ago
README.md	Add a Bitdeli badge to README	3 years ago
VoiceRecognitionV3.cpp	update send_pkt	2 months ago
VoiceRecognitionV3.h	Expand VR module records. Change name from V2 to V3.	3 years ago
keywords.txt	Update keywords.txt	3 years ago
libref.pdf	Add library reference.	3 years ago

README.md

Voice Recognition V3 (WIP)

Feature

- Recognize maximum 7 voice commands at same time
- Store maximum 255 records of voice
- Group control and external group select pin
- Auto load records when power on
- Signature function, help to make out voice record
- LED indicate

Introduce

Terminology

- **recognizer** -- core part of voice recognition module
- **recognizer index** -- Each VoiceRecognitionModule support 7 voice command, recognizer has 7 region for each voice command, one index corresponds to one region
- **train** -- let VoiceRecognitionModule record your voice command
- **load** -- copy trained voice to recognizer of VoiceRecognitionModule
- **record** -- the trained voice command store in flash, number from 0 to 79
- **signature** -- alias for **record**
- **group** -- help to manage records, each group 7 **records**. System group and user group are supported.

Quick Start

Prepare

- Voice Recognition V3 module
- Arduino board (UNO recommended)
- Arduino Sensor Shield V07
- Arduino IDE
- Voice Recognition V3 library(Download zip file)
- Access Port

Train

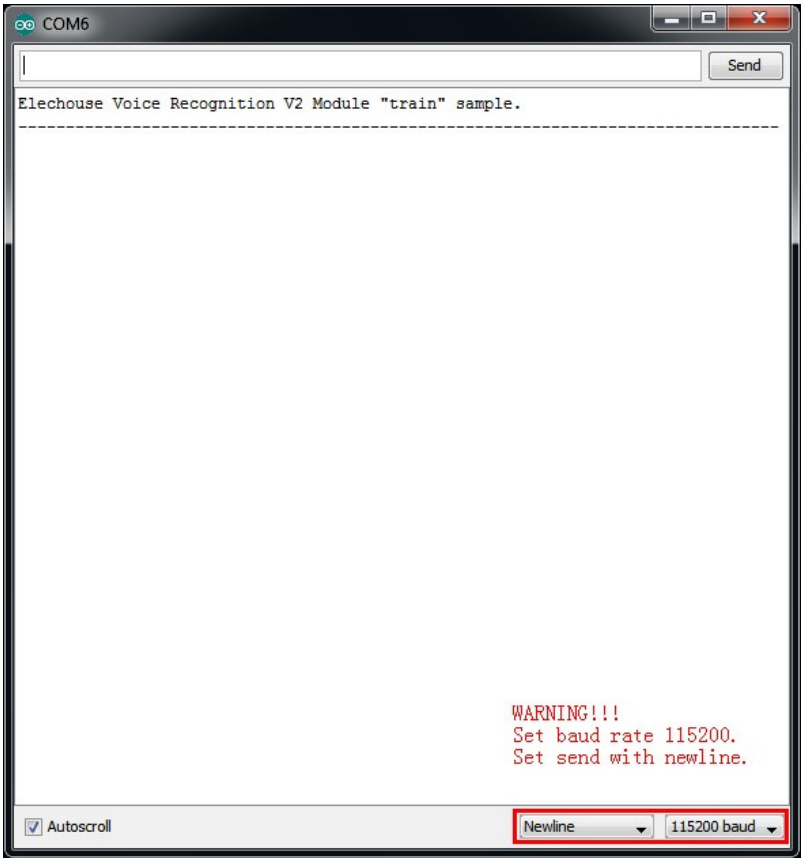
1. Connect your Voice Recognition V3 Module with Arduino, By Default:

```
Arduino                  VR Module
  5V          ---->          5V
   2          ---->          TX
   3          ---->          RX
 GND          ---->          GND
```

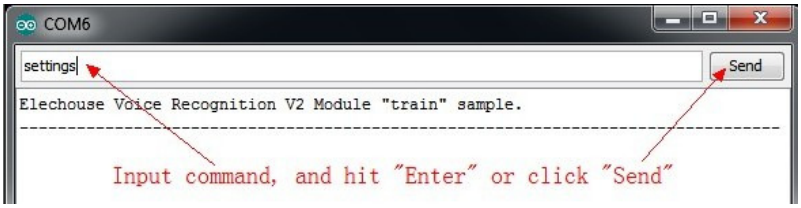
2. Download VoiceRecognitionV3 library.(download zip file or use `git clone https://github.com/elechouse/VoiceRecognitionV3.git` command)

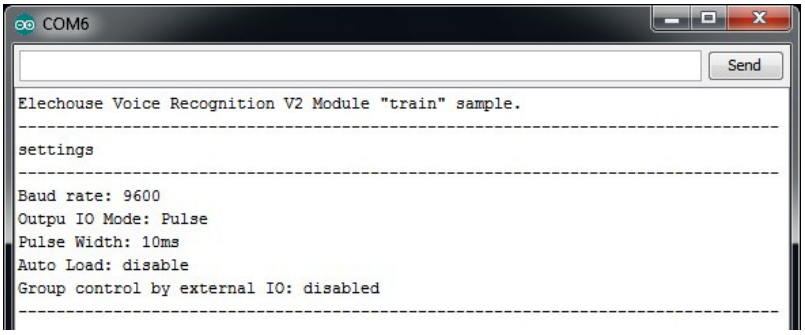
3. When use zip format file, extract **VoiceRecognitionV3.zip** to `Arduino Sketch\libraries` folder, or if you use `git clone` command copy **VoiceRecognitionV3** to `Arduino Sketch\libraries .`
4. Open **vr_sample_train**(File -> Examples -> VoiceRecognitionV3 -> vr_sample_train)
5. Choose right Arduino board(Tool -> Board, UNO recommended), Choose right serial port.
6. Click **Upload** button, wait until Arduino is uploaded.

7. Open **Serial Monitor**. Set baud rate 115200, set send with **Newline** or **Both NL & CR**.

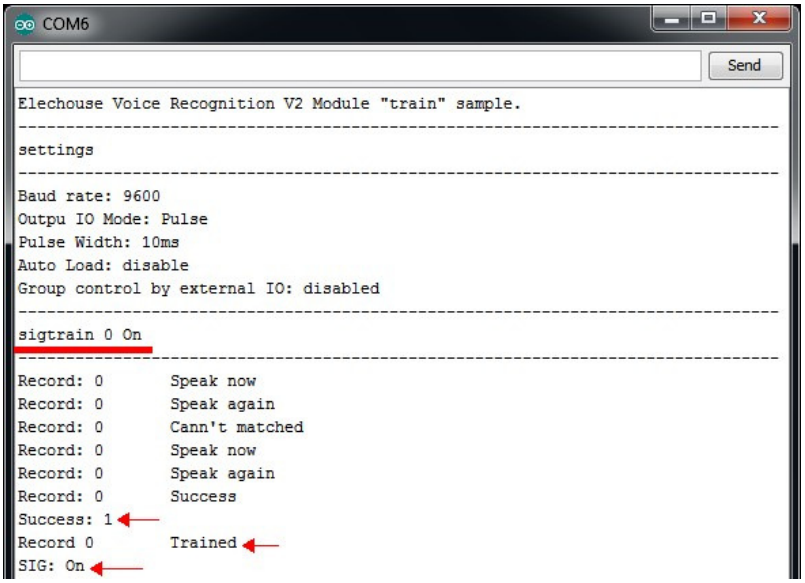


8. Send command `settings` (case insensitive) to check Voice Recognition Module settings. Input `settings` , and hit `Enter` to send.

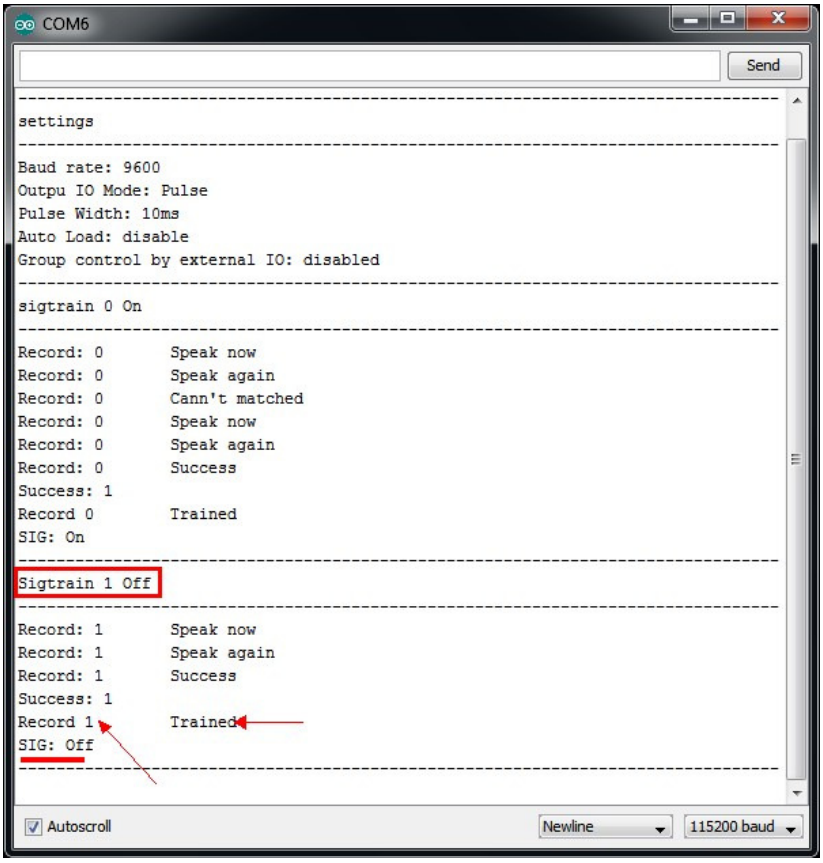




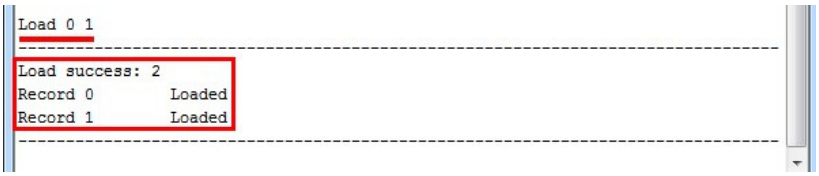
9. Train Voice Recognition Module. Send `sigtrain 0 On` command to train record 0 with signature "On". When Serial Monitor prints "Speak now", you need speak your voice(can be any word, meaningful word recommended, may be 'On' here), and when Serial Monitor prints "Speak again", you need repeat your voice again. If these two voice are matched, Serial Monitor prints "Success", and "record 0" is trained, or if are not matched, repeat speaking until success.
When training, the two led on the Voice Recognition Module can benefit your training process. After send `train` command, the SYS_LED is blinking which remind you to be ready, then speak your voice as soon as the STATUS_LED lights on, the record finishes once when the STATUS_LED lights off. Then the SYS_LED is blinking again, these status repeated, when the training is successful, SYS_LED and STATUS_LED blink together, if training is failed SYS_LED and STATUS_LED blink together quickly.



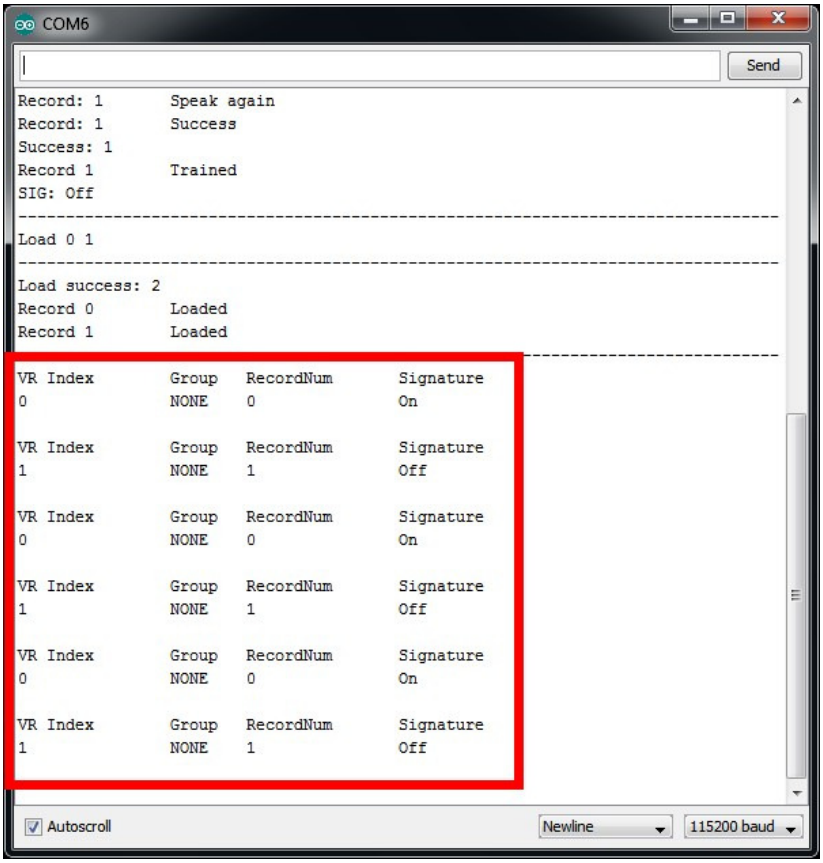
10. Train another record. Send `sigtrain 1 Off` command to train record 1 with signature "Off". Choose your favorite words to train (it can be any word, meaningful word recommended, may be 'Off' here).



11. Send `load 0 1` command to load voice. And say your word to see if the Voice Recognition Module can recognize your words.



If the voice is recognized, you can see.



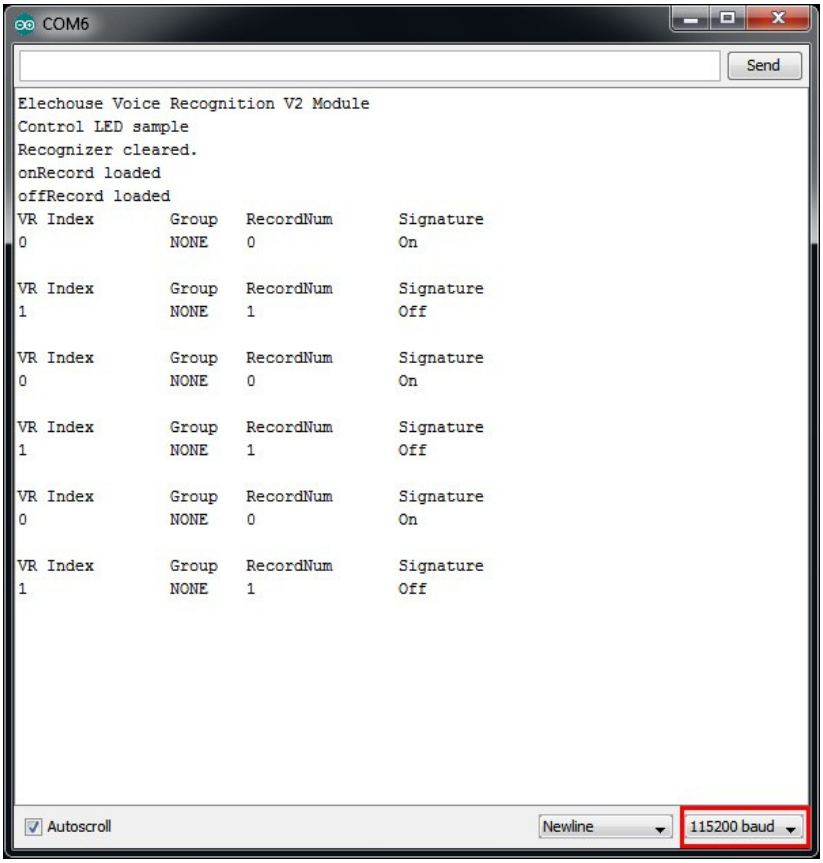
12. Train finish. Train sample also support several other commands.

COMMAND	FORMAT	EXAMPLE	Comment
train	train (r0) (r1)...	train 0 2 45	Train records
load	load (r0) (r1) ...	load 0 51 2 3	Load records
clear	clear	clear	remove all records in Recognizer
record	record / record (r0) (r1)...	record / record 0 79	Check record train status
vr	vr	vr	Check recognizer status
getsig	getsig (r)	getsig 0	Get signature of record (r)
sigtrain	sigtrain (r) (sig)	sigtrain 0 ZERO	Train one record(r) with signature(sig)
settings	settings	settings	Check current system settings

Application

Control LED Sample

1. Open **vr_sample_control_led**(File -> Examples -> VoiceRecognitionV3 -> vr_sample_control_led)
2. Choose right Arduino board(Tool -> Board, UNO recommended), Choose right serial port.
3. Click **Upload** button, wait until Arduino is uploaded.
4. Open **Serial Monitor**. Set baud rate 115200.
5. Say your trained voice to control the LED on Arduino UNO board. When record 0 is recognized, the led turns on. When record 1 is recognized, the led turns off.



6. Control led finish.

Examples

vr_sample_train

See Train for more information.

vr_sample_control_led

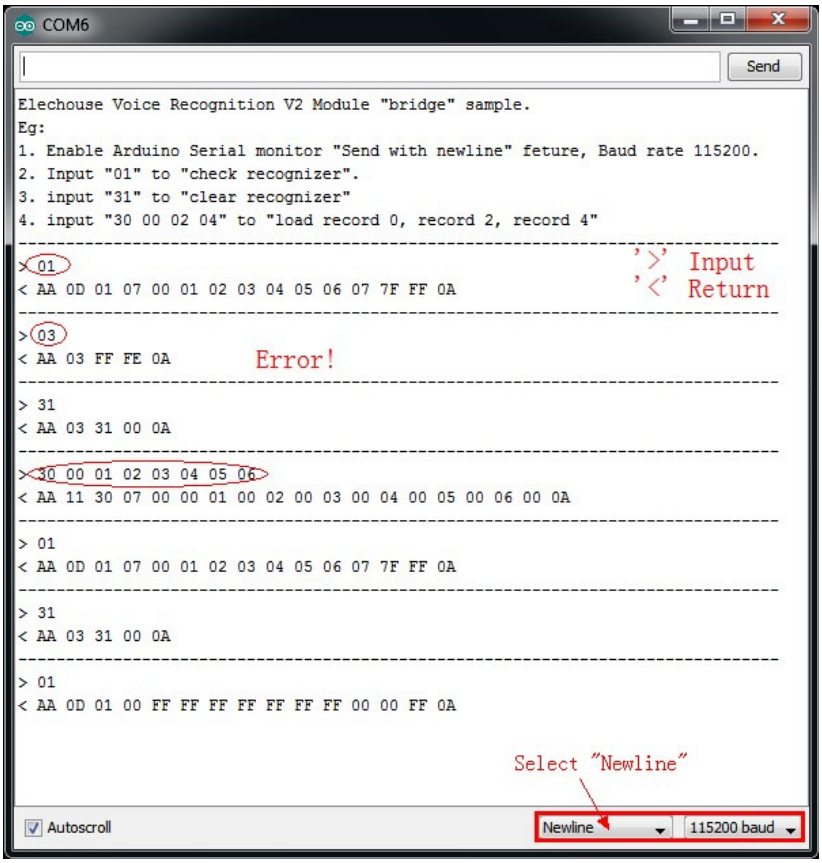
See Control LED for more information.

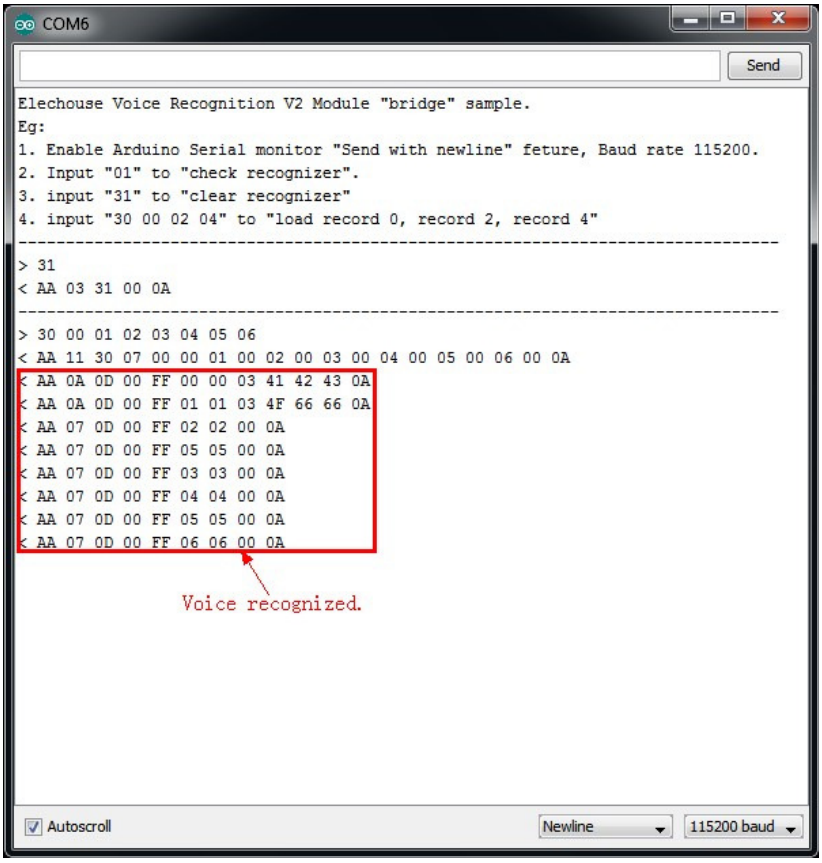
vr_sample_bridge

Use this sample to know the command of VoiceRecognition Module. Details about command, see Protocol . You must do not input **Frame Head**, **Frame Length**, **Frame End**, only need input **Frame Command** and **Frame Data**. For example, Check Recognizer Command is "AA 02 01 0A" for all, here you only need input 01.

Example:

1. Enable Arduino Serial monitor "Send with newline" feture, Baud rate 115200.
2. Input "01" to "check recognizer".
3. input "31" to "clear recognizer"
4. input "30 00 02 04" to "load record 0, record 2, record 4"





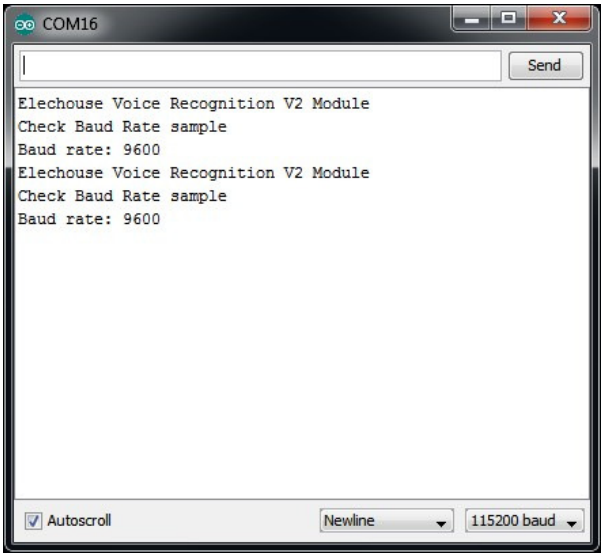
vr_sample_multi_cmd

This sample shows how to use multi commands(Break 7 voice command limits),this sample use **RECORD 0** to switch between the 2 command 'groups'(not Voice Recognition Group Function), first group is made up of *record 0, 1, 2, 3, 4, 5, 6,** and second group is made up of **record 0, 7, 8, 9, 10, 11, 12** .

Note: Before start this sample, you need train your Voice Recognition module first, and make sure that all records from 0 to 12 should be trained.

vr_sample_check_baud_rate

This sample is used to check the baud rate, when you forgot your custom settings.



Protocol

The simplest way to play the Voice Recognition V3 module is to use this VoiceRecognition Arduino library. But for many

hackers, this is far from enough, so we supply this protocol by which user can communicate with the Voice Recognition V3 module.

Base Format

Control

| **Head (0AAH)** | **Length**| **Command** | **Data** | **End (0AH)** |
Length = L(Length + Command + Data)

Return

| **Head (0AAH)** | **Length**| **Command** | **Data** | **End (0AH)** |
Length = L(Length + Command + Data)

NOTE: Data area is different with different with commands.

Code

ALL CODE ARE IN HEXADECIMAL FORMAT

FRAME CODE
AA --> Frame Head
0A --> Frame End

CHECK
00 --> Check System Settings
01 --> Check Recognizer
02 --> Check Record Train Status
03 --> Check Signature of One Record

SYSTEM SETTINGS
10 --> Restore System Settings
11 --> Set Baud Rate
12 --> Set Output IO Mode
13 --> Set Output IO Pulse Width
14 --> Reset Output IO
15 --> Set Power On Auto Load

RECORD OPERATION
20 --> Train One Record or Records
21 --> Train One Record and Set Signature
22 --> Set Signature for Record

RECOGNIZER CONTROL
30 --> Load a Record or Records to Recognizer
31 --> Clear Recognizer
32 --> Group Control

THESE 3 COMMANDS ARE ONLY USED FOR RETURN MESSAGE
0A --> Prompt
0D --> Voice Recognized
FF --> Error

Details

Check System Settings (00)

Use "Check System Settings" command to check current settings of Voice Recognition Module, include serial baud rate, output IO mode, output IO pulse width, auto load and group function.

Format:

| AA | 02 | 00 | 0A |

Return:

| AA | 08 | 00 | STA | BR | IOM | IOPW | AL | GRP | 0A |

STA : Trained status (0-untrained 1-trained FF-record value out of range)

BR: Baud rate (0,3-9600 1-2400 2-4800 4-19200 5-38400)

IOM: Outpu IO Mode (0-Pulse 1-Toggle 2-Clear 3-Set)

IOPW: Outpu IO Pulse Width(Pulse Mode) (1~15)

AL: Power on auto load (0-disable 1-enable)

GRP: Group control by external IO (0-disable 1-system group 2-user group)

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Check Recognizer (01)

Use "Check Recognizer" command to check **recognizer** of Voice Recognition Module.

Format:

| AA | 02 | 01 | 0A |

Return:

| AA | 0D | 01 | RVN | VRI0 | VRI1 | VRI2 | VRI3 | VRI4 | VRI5 | VRI6 | RTN | VRMAP | GRPM | 0A |

RVN: number of valid records in recognizer. (MAX 7)

VRIn(n=0~6): Record which is in recognizer, n is recognizer index value

RTN: number of total records in recognizer.

VRMAP: valid record bit map for VRI0~VRI6.

GRPM: group mode indicate. (FF-not in group mode 00~0A-system group 80~87-user group mode)

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Check Record Train Status (02)

Use "Check Record Train Status" command to check if the record is trained.

Format:

Check all records

| AA | 03 | 02 | FF| 0A |

Check specified records

| AA | 03+n | 02 | R0 | ... | Rn | 0A |

Return:

| AA | 5+2*n* | *02* | *N* | *R0* | *STA* | *...* | *Rn* | *STA* | *0A* |

*N**: number of trained records.**

****R0** ~ **Rn**: record.**

STA : trained status (0-untrained 1-trained FF-record value out of range)

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Check Signature of One Record (03)

Use this command to check the signature of one record.

Format:

| AA | 03 | 03 | Record | 0A |

Return:

| AA | 03 | 03 | Record | SIGLEN | SIGNATURE | 0A |

SIGLEN: signature string length

SIGNATURE: signature string

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Restore System Settings (10)

Use this command to restore settings of Voice Recognition Module to default.

Format:

| AA | 02 | 10 | 0A |

Return:

| AA | 03 | 10 | 00 | 0A |

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Set Baud Rate (11)

Use this command to set baud rate of Voice Recognition Module, effect after Voice Recognition Module is restarted.

Format:

| AA | 03 | 11 | BR | 0A |

Return:

| AA | 03 | 11 | 00 | 0A |

BR: Serial baud rate.(0-9600 1-2400 2-4800 3-9600 4-19200 5-38400)

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Set Output IO Mode (12)

Use this command to set output IO mode of Voice Recognition Module, take effect immediately after the instruction execution.

Format:

| AA | 03 | 12 | MODE | 0A |

Return:

| AA | 03 | 12 | 00 | 0A |

MODE: Output IO mode.(0-pulse mode 1-Toggle 2-Set 3-Clear)

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Set Output IO Pulse Width (13)

Use this command to set output IO pulse width of Voice Recognition Module, take effect immediately after the instruction execution. Pulse width is used when output IO mode is **"Pulse"**.

Format:

| AA | 03 | 13 | LEVEL | 0A |

Return:

| AA | 03 | 13 | 00 | 0A |

LEVEL: pulse width level. Details:

- 00 10ms
- 01 15ms
- 02 20ms
- 03 25ms
- 04 30ms
- 05 35ms
- 06 40ms
- 07 45ms
- 08 50ms
- 09 75ms
- 0A 100ms
- 0B 200ms
- 0C 300ms
- 0D 400ms
- 0E 500ms
- 0F 1s

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Reset Output IO (14)

Use this command to reset output IO. This command can be used in output IO set/clear mode to generate a user-defined pulse.

Format:

| AA| 03 | 14 | FF | 0A | (reset all output io)
| AA| 03+n | 14 | IO0 | ... | IOn | 0A | (reset output ios)
Return:
| AA | 03 | 14 | 00 | 0A |
IOn: number of output io

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Set Power On Auto Load (15)

Use this command to enable or disable "Power On Auto Load" function.
Format:
| AA| 03 | 15 | 00 | 0A | (disable auto load)
| AA| 03+n | 15 | BITMAP | R0 | ... | Rn | 0A | (set auto load)
Return:
| AA| 04+n | 15 | 00 |BITMAP | R0 | ... | Rn | 0A | (set auto load)
BITMAP: Record bitmap.(**0**-zero record, disable auto load **01**-one record **03**-two records **07**-three records **0F**-four records **1F**-five records **3F**-six record **7F**-seven records)
R0~**Rn**: Record

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Train One Record or Records (20)

Train records, can train several records one time.
Format:
| AA| 03+n | 20 | R0 | ... | Rn | 0A |
Return:
| AA| LEN | 0A | RECORD | PROMPT | 0A |
| AA| 05+2*n* | *20* | *N* | *R0* | *STA0* | *...* | *Rn* | *STAn* | *SIG* | *0A* |
*SIG**: signature string**
****PROMPT**: prompt string
Rn: Record
STA: train result(0-Success 1-Timeout 2-Record value out of range)
N: number of train success

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Train One Record and Set Signature (21)

Train one record and set a signature for it, one record one time.
Format:
| AA| 03+SIGLEN | 21 | RECORD | SIG | 0A | (Set signature)
Return:
| AA| LEN | 0A | RECORD | PROMPT | 0A | (train prompt)
| AA| 05+SIGLEN | 21 | N | RECORD | STA | SIG | 0A |
SIG: signature string
PROMPT: prompt string
STA: train result(0-Success 1-Timeout 2-Record value out of range)
N: number of train success

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Set Signature for Record (22)

Set a signature for a record, one record one time.
Format:
| AA | 03+SIGLEN | 22 | RECORD | SIG | 0A | (Set signature)
| AA | 03 | 22 | RECORD | 0A | (Delete signature)
Return:
| AA | 04+SIGLEN | 22 | 00 | RECORD | SIG | 0A | (Set signature return)
| AA | 04 | 22 | 00 | RECORD | 0A | (Delete signature return)

SIG: signature string
SIGLEN: signature string length

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Load a Record or Records to Recognizer (30)

Load records(1~7) to recognizer of Voice Recognition Module, after execution the Voice Recognition Module start to recognize immediately.
Format:
| AA| 2+n | 30 | R0 | ... | Rn | 0A |
Return:
| AA| 2+n | 30 | N | R0 | STA0 | ... | Rn | STAn | 0A |
N: number of loading successfully R0~Rn: Record STA0~STAn: Load result.(**0**-Success **FF**-Record value out of range **FE**-Record untrained **FD**-Recognizer full **FC**-Record already in recognizer)

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Clear Recognizer (31)

Stop recognizing, and empty recognizer of Voice Recognition Module. **Format:**
| AA | 02 | 31 | 0A |
Return:
| AA | 03 | 31 | 00 | 0A |

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Group Control (32)

Group select

Set group control mode(disable, system, user), if group control function is enabled(system or user), then voice recognition module is controlled by the external control IO.
Format:
| AA| 04 | 32 | 00 | MODE | 0A |
MODE: new group control mode. (00-disable 01-system 02-user FF-check)
Return:
| AA| 03 | 32 | 00 | 0A |
or
| AA| 05 | 32 | 00 | FF | MODE | 0A | (check command return)

Set user group

Set user group content(record).
Format:
| AA| 03 | 32 | 01 | UGRP | 0A | (Delete UGRP)
| AA| LEN | 32 | 01 | UGRP | R0 | ... | Rn | 0A | (Set UGRP)
UGRP: user group number
R0~**Rn**: record index number (n=0,1,...,6)
Return:
| AA| 03 | 32 | 00 | 0A | (Success return)

Load system group

Load system group to recognizer, this command would clear recognizer.
Format:
| AA| 04 | 32 | 02 | SGRP | 0A |
Return:
| AA| 04 | 32 | SGRP | VRI0 | VRI1 | VRI2 | VRI3 | VRI4 | VRI5 | VRI6 | RTN | VRMAP | GRPM | 0A |
SGRP: System group number.
VRIn(n=0~6): Record which is in recognizer, n is recognizer index value
RTN: number of total records in recognizer.
VRMAP: valid record bit map for VRI0~VRI6.

GRPM: group mode indicate. (00~0A-system group)

Load user group

Load user group to recognizer, this command would clear recognizer.
Format:
| AA| 04 | 32 | 03 | UGRP | 0A |
Return:
| AA| 04 | 32 | UGRP | VRI0 | VRI1 | VRI2 | VRI3 | VRI4 | VRI5 | VRI6 | RTN | VRMAP | GRPM | | 0A |
UGRP: System group number.
VRIn(n=0~6): Record which is in recognizer, n is recognizer index value
RTN: number of total records in recognizer.
VRMAP: valid record bit map for VRI0~VRI6.
GRPM: group mode indicate. (00~0A-system group)

Check user group

Check user group content.
Format:
| AA| 04 | 32 | 04 | 0A | (check all user group)
or
| AA| 04 | 32 | 04 | UGRP0| ... | UGRPn | 0A | (check user group)
Return:
| AA | 0A | 32 | UGRP | R0 | R1 | R2 | R3 | R4 | R5 | R6 | 0A |
UGRP: User group number.
R0~**R6**: Any record.

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Prompt (0A)

Prompt command is only used for Voice Recognition Module to return data when user train voice command.
Format:
NONE
Return:
| AA | 07 | 0A | RECORD | PROMPT | 0A |
RECORD: record which is in training
PROMPT: prompt string

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Voice Recognized (0D)

Voice Recognized command is only used for Voice Recognition Module to return data when voice is recognized.
Format:
NONE
Return:
| AA | 07 | 0D | 00 | GRPM | R | RI | SIGLEN | SIG | 0A |
GRPM: group mode indicate. (FF-not in group mode 00~0A-system group mode 80~87-user group mode)
R: record which is recognized.
RI: recognizer index value for recognized record.
SIGLEN: signature length of the recognized record, 0 means on signature, on SIG area
SIG: signature content

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Error (FF)

Error command is only used for Voice Recognition Module to return error status.
Format:
NONE
Return:

| AA | 03 | FF | ECODE | 0A |

ECODE: error code (FF-command undefined FE-command length error FD-data error FC-subcommand error FB-command usage error)

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Library Reference

See `VoiceRecognitionV3.cpp` or libref.pdf to get more information.

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