Cyberon DSpotterSDK MakerHL Programming Guide

(for Arduino Platform)

Version: 1.2.0
Date: 30 Jan, 2023

Leading Speech Solution Provider
http://www.cyberon.com.tw

Contents

1 About DSpotterSDK MakerHL

Cyberon DSpotterSDK MakerHL is a high-level wrapper of the Cyberon DSpotterSDK Maker. It encapsulates all the details about audio recording and speech recognition, simplifying the implementation of user applications. Cyberon DSpotterSDK Maker is a C++ implementation of Cyberon DSpotter SDK, Cyberon's flagship high-performance embedded speech recognition solution specially optimized for mobile phones, automotives, smart home devices, consumer products, and interactive toys. With phoneme-based acoustic models, it enables developers to create applications of speaker-independent (SI) voice recognition capability without a costly data collection process for specific commands. With the keyword customization web tool, developers can easily and quickly create their own voice command models with text input. Other important features include always-on keyword-spotting capability, high noise immunity, adjustable sensitivity, voice quality assessment, and supporting more than 30 commonly used languages.

2 Related Files

Library

- **libDSpotterSDK_Maker.a**: the pre-built SDK library of DSpotterSDK Maker for Arduino platform.
- **DSpotterSDK_Maker.h**: the API header of the pre-built DSpotterSDK Maker library for Arduino platform.
- **DSpotterSDK_MakerHL.cpp**: a high-level wrapper implementation of the DSpotterSDK Maker library. It encapsulates all the details about audio recording and speech recognition, simplifying the implementation of user applications.
- **DSpotterSDK_MakerHL.h**: a high-level API header for DSpotterSDK_MakerHL.cpp.

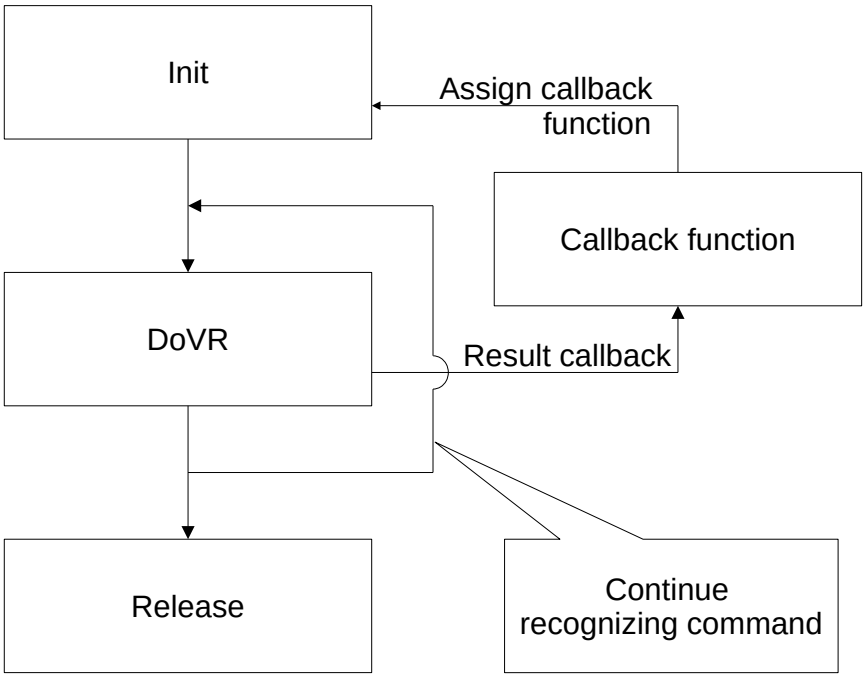
Data

- **CybLicense.h**: The license file.
- **Model_L0.h**: the header file that contains a level 0 model array which packs both trigger group and command group models together. To use the model array, developers only need to assign it to Init function. Note that this header file is in UTF8 format. The type of the model array is uint32_t and in little-endian manner.
- **Model_L1.h**: the header file that contains a level 1 model array which packs both trigger group and command group models together. In comparison with the level 0 model under the same parameter settings, the level 1 model provides better recognition stability but also requires more computing and storage requirements.

CYBERON CORPORATION
TEL: +886-2-2910-9088
FAX: +886-2-2910-7986
Web site: http://www.cyberon.com.tw
Email: info@cyberon.com.tw

3 DSpotterSDK MakerHL API

3.1 *Flow Chart of Calling API*



3.2 *Callback Function*

3.2.1 *EventCallback*

Description

The callback function that listens for the occurrence of events and executes the corresponding routines.

Syntax

```
void (*EventCallback)(int nFlag, int nID, int nScore, int nSG, int nEnergy);
```

Parameters

- **nFlag(OUT)**: The flag of the callback's event. There are 5 events:
  - DSpotterSDKHL::InitSuccess: Initializing successful.
  - DSpotterSDKHL::GetResult: While get a recognition result, nID will be given with the result keyword ID. nScore, nSG and nEnergy will be given with the result information.
  - DSpotterSDKHL::ChangeStage: While recognition stage changed, nID will be given with the new recognition stage.
  - DSpotterSDKHL::GetError: An error occurred.
  - DSpotterSDKHL::LostRecordFrame: Frame lost of recording detected.
- **nID(OUT)**: The return value of the callback's event.
- **nScore(OUT)**: While get a recognition result, nScore will be given with the result confidence score. The larger the nScore value, the more similar the recognized voice is to the command.
- **nSG(OUT)**: While get a recognition result, nSG will be given with the result silence and garbage score. The larger the nSG value, the less similar the recognized voice is to the non-command voice.
- **nEnergy(OUT)**: While get a recognition result, nEnergy will be given with the result voice energy. The larger the Energy value, the louder the recognized voice.

Returns

None.

Example

```
// Callback function for VR engine
void VRCallback(int nFlag, int nID, int nScore, int nSG, int nEnergy)
{
  if (nFlag==DSpotterSDKHL::InitSuccess)
  {
    //ToDo
  }
  else if (nFlag==DSpotterSDKHL::GetResult)
  {
```

```
    /*
    When getting an recognition result,
    the following index and scores are also return to the
    VRCallback function:

        * nID is The result command id
        * nScore is used to evaluate how good or bad
        the result is. The higher the score, the more
        similar the voice and the result command are.
        * nSG is the gap between the voice and non-command
        (Silence/Garbage) models. The higher the score,
        the less similar the voice and non-command
        (Silence/Garbage) models are.
        * nEnergy is the voice energy level.
        The higher the score, the louder the voice.
    */
    //ToDo
}
else if (nFlag==DSpotterSDKHL::ChangeStage)
{
    switch(nID)
    {
        case DSpotterSDKHL::TriggerStage:
            LED_RGB_Off();
            LED_BUILTIN_Off();
            break;
        case DSpotterSDKHL::CommandStage:
            LED_BUILTIN_On();
            break;
        default:
```

```
            break;
        }
    }
    else if (nFlag==DSpotterSDKHL::GetError)
    {
        if (nID == DSpotterSDKHL::LicenseFailed)
        {
            Serial.println(DSpotterSDKHL::GetSerialNumber());
        }
        g_oDSpotterSDKHL.Release();
        while(1);//hang loop
    }
    else if (nFlag == DSpotterSDKHL::LostRecordFrame)
    {
      //ToDo
    }
}
```

CYBERON CORPORATION
TEL: +886-2-2910-9088
FAX: +886-2-2910-7986
Web site: http://www.cyberon.com.tw
Email: info@cyberon.com.tw

3.3 *API*

3.3.1 *DSpotterSDKHL::GetSerialNumber*

Description
Get the seurail number of Arduino device.
Syntax

```
static const char* GetSerialNumber();
```

Parameters
None.
Returns
Return the serial number string.
Example

```
void setup()
{
  Serial.begin(9600);
  Serial.print("The serial number of your device is ");
  Serial.println(DSpotterSDKHL::GetSerialNumber());
  return;
}
```

3.3.2 *DSpotterSDKHL::ShowDebugInfo*

Description
Show debug info, should be called after Serial.begin.

```
static void ShowDebugInfo(bool bShowDebugInfo = false);
```

Parameters
None.
Returns
None.
Example

```
  // Init Serial output for show debug info
  Serial.begin(9600);
  DSpotterSDKHL::ShowDebugInfo(true);
```

CYBERON CORPORATION
TEL: +886-2-2910-9088
FAX: +886-2-2910-7986
Web site: http://www.cyberon.com.tw
Email: info@cyberon.com.tw

3.3.3 *DSpotterSDKHL::Init*

Description

Initialize DSpotter engine and assign the event callback function.

Syntax

```
int Init(const uint32_t *lpdwLicense, int nLicenseSize,
         const uint32_t *lpdwModel, EventCallback VRCallback);
```

Parameters

- **lpdwLicense(IN)**: The license data.
- **nLicenseSize(IN)**: The size of the license data.
- **lpdwModel(IN)**: The voice model.
- **VRCallback(IN)**: The callback function to receive results from the voice recognition engine.

Returns

Success, or negative value for error.

Example

```
static DSpotterSDKHL g_oDSpotterSDKHL;

void setup()

{

  // Init Serial output

  Serial.begin(9600);

  while(!Serial);

  // Init VR engine & Audio

  if (g_oDSpotterSDKHL.Init(DSPOTTER_LICENSE, sizeof(DSPOTTER_LICENSE),
                DSPOTTER_MODEL, VRCallback) != DSpotterSDKHL::Success)

     return;

}
```

CYBERON CORPORATION
TEL: +886-2-2910-9088
FAX: +886-2-2910-7986
Web site: http://www.cyberon.com.tw
Email: info@cyberon.com.tw

3.3.4 *DSpotterSDKHL::DoVR*

Description
Do the voice recognition.
Syntax

```
void DoVR();
```

Parameters
None.
Returns
Callback function is called when an event of the callback occurred.
Example

```
static DSpotterSDKHL g_oDSpotterSDKHL;

...

void loop()

{

  // Do VR

  g_oDSpotterSDKHL.DoVR();

}
```

CYBERON CORPORATION
TEL: +886-2-2910-9088
FAX: +886-2-2910-7986
Web site: http://www.cyberon.com.tw
Email: info@cyberon.com.tw

3.3.5 *DSpotterSDKHL::Release*

Description
Release DSpotter engine.
Syntax

```
void Release();
```

Parameters
None.
Returns
None.
Example

```
static DSpotterSDKHL g_oDSpotterSDKHL;

// Callback function for VR engine

void VRCallback(int nFlag, int nID)

{

  if (nFlag==DSpotterSDKHL::InitSuccess)

  {

      //ToDo

  }

  ...

  else if (nFlag==DSpotterSDKHL::GetError)

  {

      g_oDSpotterSDKHL.Release();

      while(1);//hang loop

  }

  ...

}
```

CYBERON CORPORATION
TEL: +886-2-2910-9088
FAX: +886-2-2910-7986
Web site: http://www.cyberon.com.tw
Email: info@cyberon.com.tw

4 Constant and Error Code

Callback Flag

Constant Flag	Value	Description
DSpotterSDKHL::InitSuccess	0	Initializing successful
DSpotterSDKHL::GetResult	1	Got a result
DSpotterSDKHL::ChangeStage	2	Stage is changed
DSpotterSDKHL::GetError	3	An error occurred
DSpotterSDKHL::LostRecordFrame	4	Frame loss of recording detected

Constant

Constant Symbol	Value	Description
DSpotterSDKHL::InitStage	-1	Init Stage
DSpotterSDKHL::TriggerStage	0	Trigger Stage
DSpotterSDKHL::CommandStage	1	Command Stage

Error Code

Error Symbol	Value	Description
DSpotterSDKHL::Success	0	Success
DSpotterSDKHL::NotInit	-2001	Not init yet
DSpotterSDKHL::IllegalParam	-2002	Wrong parameter
DSpotterSDKHL::LeaveNoMemory	-2003	Memory not enough
DSpotterSDKHL::AudioFailed	-2004	Audio device error
DSpotterSDKHL::LoadModelFailed	-2005	Failed to load model
DSpotterSDKHL::Stopped	-2030	Not start yet
DSpotterSDKHL::LicenseFailed	-2200	License failed

CYBERON CORPORATION
TEL: +886-2-2910-9088
FAX: +886-2-2910-7986
Web site: http://www.cyberon.com.tw
Email: info@cyberon.com.tw

5 Supported Languages

Arabic	English(TWN)	Polish
Bahasa(Indonesia)	English(UK)	Portuguese(BRA)
Bahasa(Melayu)	English(US)	Portuguese(EU)
Cantonese(HK)	English(Worldwide)	Russian
Chinese(CHN)	Finnish	Slovak
Chinese(CHN)/English	French	Spanish(EU)
Chinese(TWN)	German	Spanish(LA)
Czech	Greek	Swedish
Danish	Hindi	Taiwanese
Dutch	Hungarian	Thai
English(AU)	Italian	Turkish
English(IN)	Japanese	Ukrainian
English(PHI)	Japanese/English	Vietnamese
English(SEA)	Korean	
English(SG)	Norwegian	

CYBERON CORPORATION
TEL: +886-2-2910-9088
FAX: +886-2-2910-7986
Web site: http://www.cyberon.com.tw
Email: info@cyberon.com.tw

6 Release History

Release no	Date of issue	Author	Comment
1.2.0	Jan 30, 2023	Tom	Rename document.
1.1.0	Jan 13, 2023	Tom	Add new API, change SDK name.
1.0.0	Aug 12, 2022	Tom	First release.

CYBERON CORPORATION
TEL: +886-2-2910-9088
FAX: +886-2-2910-7986
Web site: http://www.cyberon.com.tw
Email: info@cyberon.com.tw