Cypress Text to Speech Application with the RutAdaptBoard-TextToSpeech

Marvin Schiffel,
Microcontroller, RUTRONIK Electronics Worldwide, Ispringen, Germany

***Abstract* – Many automation products must have a voice messaging capability. Recording the phrases with a human speaker for a particular product could be a very expensive and time-consuming process. A more elegant approach is to use Epson's Text-To-Speech software for phrase generation and Epson's S1V3G340 ASIC chip. This chip is integrated on the RutAdaptBoard-TextToSpeech and is now able to communicate with Cypress PSoC controllers via an SPI interface.**

Index Terms* — *Microcontroller (MCU), Application-Specific Integrated Circuit (ASIC), Programmable System on Chip (PSoC), integrated development environment (IDE), Easy Speech Phrase Editor Release 2 (ESPER2)

I. Introduction

This demonstration will show you how easy it is to get started with RutAdaptBoard-TextToSpeech, which is ideal for human machine interface (HMI) applications requiring voice guidance and audio playback in electronic products. Such products include home automation equipment, security and alarm panels, household appliances, consumer medical devices, fitness equipment, industrial safety and educational gadgets. With the Epson ASIC S1V3G340 on board, twelve languages American English, Chinese, Japanese, Korean, American Spanish, British English, Canadian French, French, German, Italian, Russian and Spanish are supported with the ESPER2 Voice Data Creation PC Tool. Epson also offers the easy-to-use Epson speech synthesis IDE tool free of charge, which allows you to create your own voice guidance audio without any studio records.

Fig. 1 RutAdaptBoard-TextToSpeech

II. Software Tools and Handling

For programming and loading the RutAdaptBoard-TextToSpeech you need two software packages provided by Epson.
For one, Epson offers the "Easy Speech Phrase Editor Release 2 (ESPER2)" in combination with evaluation boards free of charge. With this tool you can easily create speech and audio files without the need of a studio recording (currently 12 languages are supported). All generated voice and audio data are assigned a number by the ESPER2 tool, which is written into a register of the hardware processor, which then plays back the voice and audio data stored in the number. It is therefore not necessary to write separate software to link the voice and audio data.
In addition, the "Rutronik Epson Tool" is required. This tool is an in house Software development by Rutronik. With this tool, you can easily play the ROMSound files created in ESPER2 on the ASCI.
At first open the **ESPER2 software** and create a project with the IC/MCU you are using.

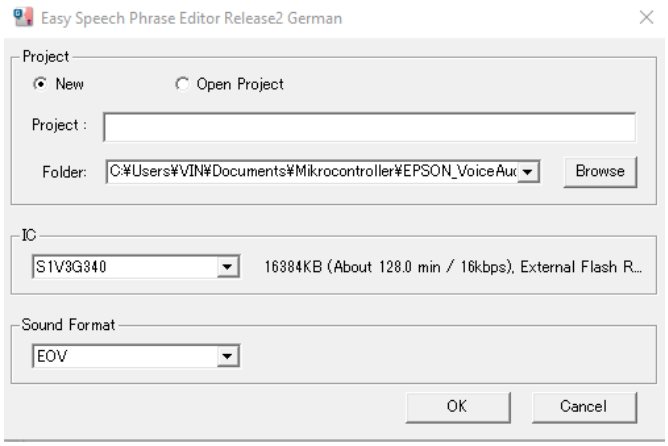


Fig. 2 Project creation window

After creation, you must enter the verification code sent by EPSON via the "Tool" function and the "KEYCODE registration" function to unlock the project

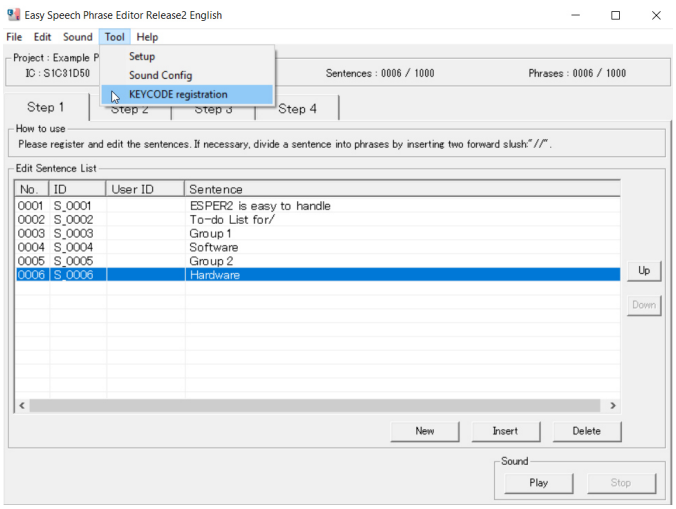


Fig. 3 Keycode registration

Step 1:

Create a new sentence with the "New" or "Insert" function. With the functions "Up" and "Down" you can change the order. With the function "Play" and "Stop" the sentence is played/paused by your PC.

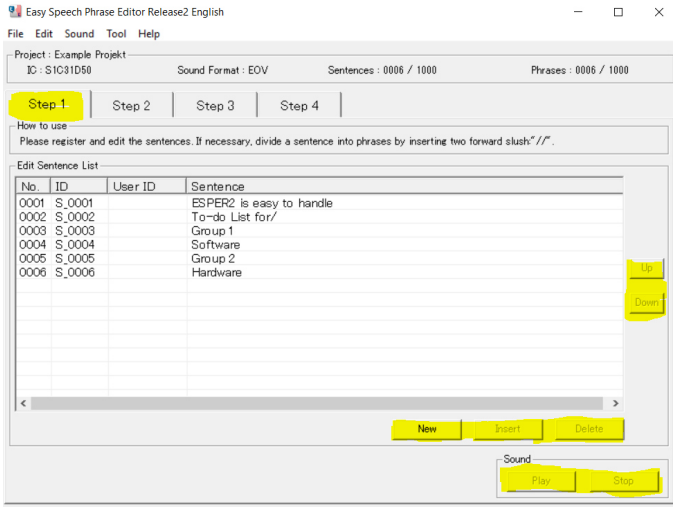


Fig. 4 Window for Step 1

Step 2:

In Step 2 you can edit the pronunciation of individual sentences and words by selecting a sentence and using the "Edit" function to open the editing window. You can also insert sound files in wav or EOV format by selecting the "Import" function.

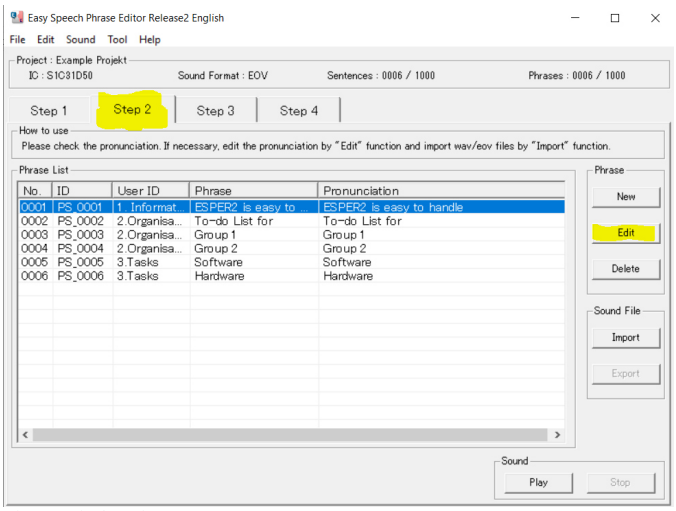


Fig. 5 Window for Step 2

You can make various changes in the editing window. For one, you can use the "User ID" to divide records into categories. Otherwise, they can use the individual functions to optimize things like playback speed, pitch, pauses, volume and more. About the function "Play" they can simply listen to the result and if dissatisfied further optimize or press the "Reset" function to undo the changes again. With "OK" you confirm the changes.

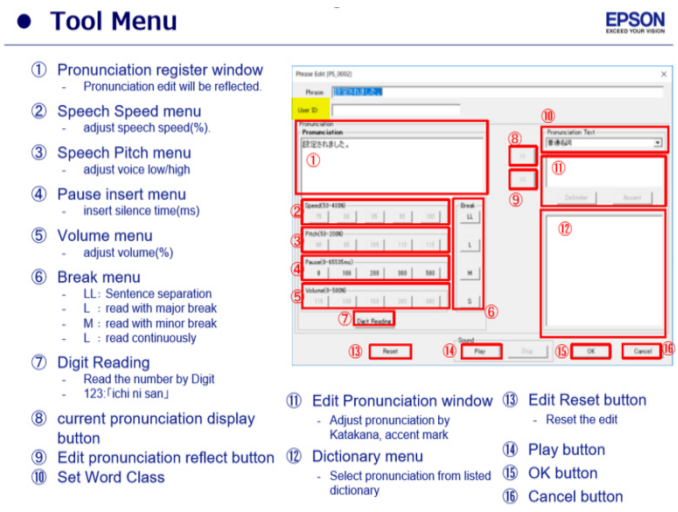


Fig. 6 Window for pronunciation optimization

Step 3:

In the third step, pairs of sentences can be formed using the "drag & drop" function. Simply select the sentence to be edit from the "Sentence List" (left) and add the desired phrases from the "Phrase List" (right) using the "drag & drop" method. In addition, audio files such as wait music can be added to sentences here. With the "Play" function, you can listen to the result. By selecting a phrase and using the "Edit" function, you can access the pronunciation menu again. With the "Delay" function, you can insert pauses between sentences.

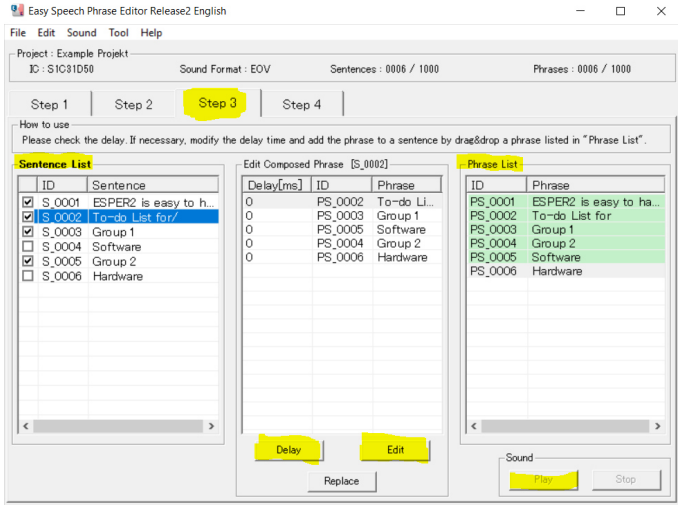


Fig. 7 Window for Step 3

Step 4:

This step is used to check that the sentences are complete. Use the functions "No."; "ID"; "User ID"; "Phrase" to sort them as desired. This also can be done with the "Edit" function in the submenu "ID renumbering". After checking, you should now check the size of the file to be converted with the function "Size Check". Next, you create your sound file with the "ROM" function.

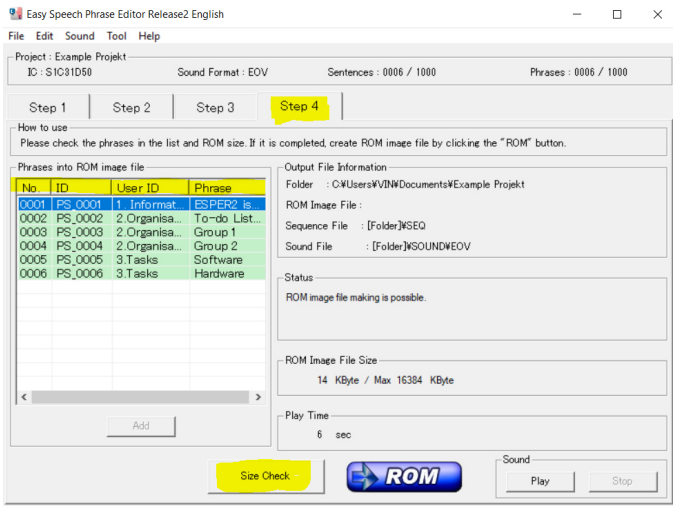


Fig. 8 Window for Step 4

Now you have done all necessary steps in the "ESPER2" software and be ready to open the "**Rutronik Epson Tool**" software to load the created sound file to the RutAdaptBoard. At first, you have to connect your Board via USB cable with your PC and via Aux cable to your speakers. Take care that the switch positions have to be in the "ON-USB" position.

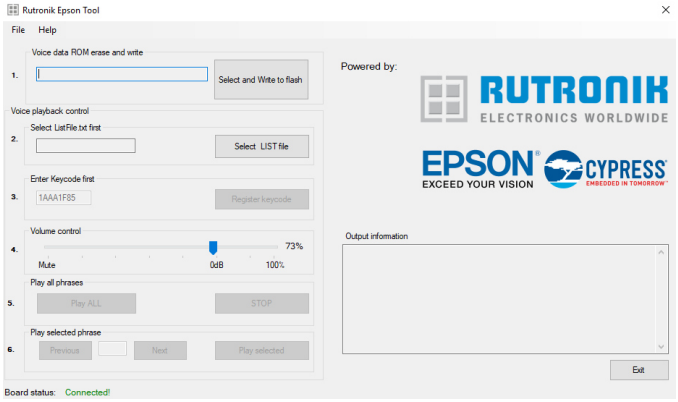


Fig. 9 Rutronik Tool

Here you can insert the created sound files and load them into the RutAdaptBoard-TextToSpeech.
At first use the "Select and Write to Flash" button to open your previously created project in via the tabs "SOUND" and "EOV" you can navigate to your sound file, before you load new data into the Board you have to erase the Flash.

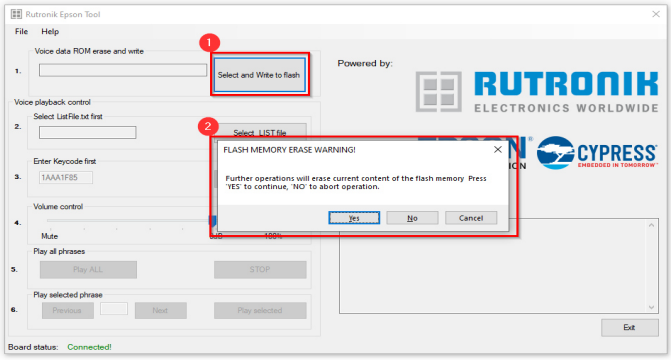


Fig. 10 Rutronik Tool step 1

As next step, you have select the "Select LIST file" button to select the List file, which the Software needs to indicate and navigate through the sentences.

Fig. 11 Rutronik Tool step 2

The last Step is to register your Keycode to verify your changes. This code is provided by Epson and the same code that you used to unlock your ESPER2 Tool.

After Registration, you can listen to your imported sound files by the use of the “Play selected”,”Next”and “Previous” button.

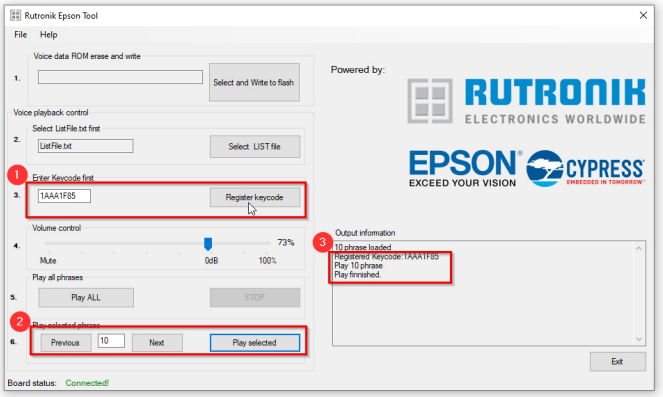


Fig. 12 Rutronik Tool Step 3

After these steps, you are done with the RutAdaptBoard for the time being and now have to deal with the Cypress PSoC controller.

At first, you have to connect you Controller via USB to your PC and then open the PSoC Creator. The first Software step will be to create your own workspace. For that, you select “File” , “New” and then “Project”.

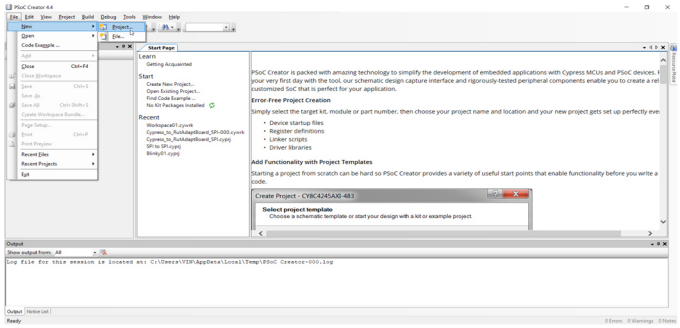


Fig. 13 PSoC Creator

Select “Target Device” and choose your target controller.

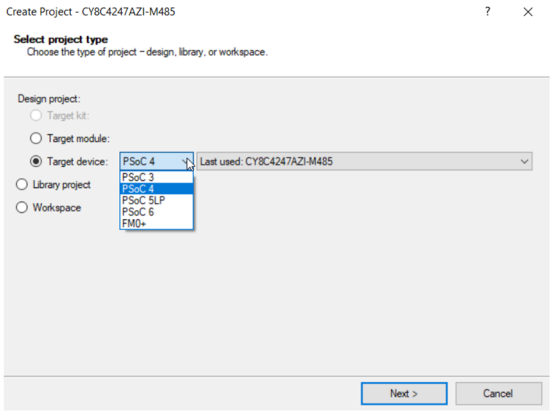


Fig. 14 PSoC Creator

In the next window, you could use Code examples by Cypress but we will go on with the “Empty schematic”.

Fig. 15 PSoC Creator

Now please name your Project and Workspace.

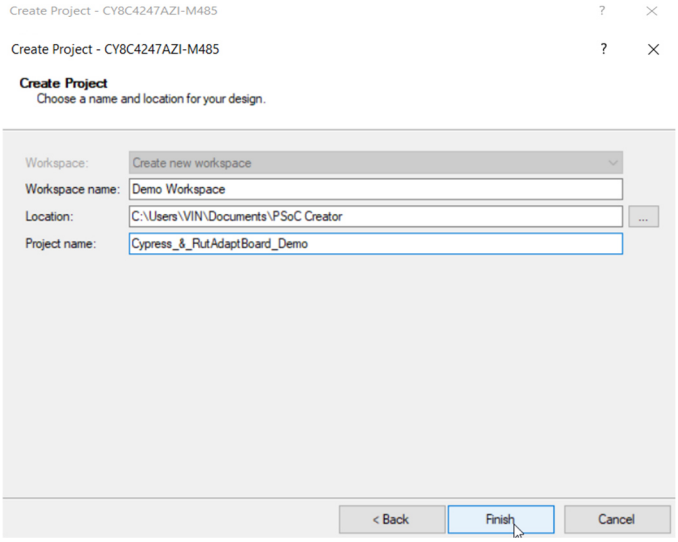
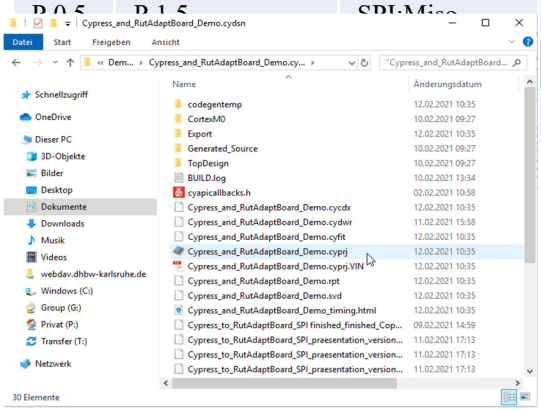


Fig. 16 Example for Button functions

After you have created you own Workspace you need the ZIP folder "Cypress_and_RutAdaptBoard_Demo", which is exclusively available at the PM Digital department from Rutronik. Please unzip this folder in you workspace folder. After unpacking the folder open the folder and start the “Cypress_and_RutAdaptBoard_Demo.cyprj” application.

Fig. 17 Demo Project

PSoC Port	RutAdaptBoard	Function	PSoC Port	Plug-in board
P 0.0	P 6.4	MessageReady	P 1.0	LED1
P 0.1	P 6.5	StandByExit	P 1.1	LED2
P 0.2	P 6.7	DeviceReset	P 1.2	LED3
P 0.3	P 1.2	Mute	P 1.3	LED4
P 0.4	P 1.4	SPI:Mosi	P 1.4	Button
P 0.5	P 1.5	SPI:Miso		



This application contains all important driver files that are important for communication. Please do not do any changes in this application. For Debugging and Flashing, you can use the button in the upper left corner.

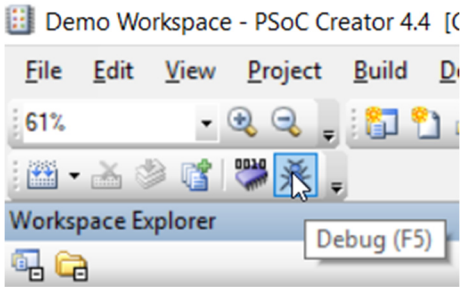


Fig. 18 Demo Project

III. Hardware Configuration and Handling

For this step, you will need your RutAdaptBoard-TextToSpeech, Cypress Controller, a speaker cable, speakers, a USB Micro-B cable with data transfer function and a power source such as your laptop.
In our Demo, we used the PSoC4 Prototyping Kit with four extern LED´s as Status Register and an extern Button as Input Signal.

At first, you have to connect both boards together and with the extern, peripherals like shown in “Fig. 19” and “Fig. 20”

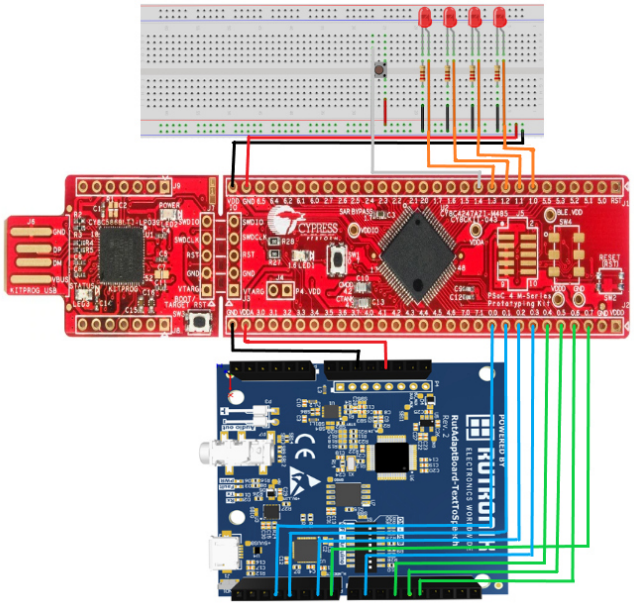


Fig. 19 Demo Project

Fig. 20 Demo Project

After you did all the Hardware connections please connect the Cypress Controller via USB with a power source like your PC.

After this, you can start the Audio Playback by using the extern Button. This Demo was created with four Phrases so every LED gives Signal about one Phrase.

IV. Summary

This manual shows you how easy it is to start working with the RutAdaptBoard-TextToSpeech and a Cypress PSoC Controller and create your own Text to Speech files. With the 12 supported languages, there are almost no limits and infinite possibilities to use this technology.

References

[1] “RutAdaptBoard–TextToSpeech User’s Manual” user manual, by Rutronik. (September 2020).
[2] [3] “Rutronik Epson Tool getting started” Guideline, by Rutronik. (September 2020).
[3] RutAdaptBoard-TextToSpeech_Cypress_Guide”, by Rutronik

Contact:
Marvin Schiffel
Dual student of electrical engineering
RUTRONIK Elektronische Bauelemente GmbH
Industriestr. 9
75228 ISPRINGEN
Germany
www.rutronik.com