Getting started with STM32CubeIDE

Exercise 1: GPIO as output

Aims:

The aim of this project is to Learn how to setup GPIO as an output and create a lighthouse flashing pattern on STM32L476VG-DISCO using STM32CubeIDE. The project demonstrates the steps to create and build a program and upload the code to the DISCO development board.

Objectives:

- Configure GPIO as output
- Generate and compile the code
 - Function used: HAL_Delay() & HAL_GPIO_Toggle()
- Run and debug the functionality

Block Diagram and Schematics:



Info: Use Control plus Space bar to see auto complete proposal in STM32CubeIDE.

Logbook Hint: Add block diagram, circuit diagram, flow chart and structure English/Pseudo algorithm code description for each activity to score good marks.

Additional resource (Optional)

https://www.youtube.com/watch?v=kbwWuRMMJ40&list=PLnMKNibPkDnEEvQWrDqVuu1w_iQ214 GXi&index=16

<u>Caution</u>: YouTube instruction is based on older version of software so please use them only for your reference.

Step 1:



Double click the 'STM32CubeIDE' icon on the desktop to start the program.

<u>Step 2:</u>

Select the workspace location, Default location is preferred your PCs.

* In university PCs please create a folder 'STM32' in your **H-drive** and use it.

IDE STM32CubeIDE Launcher	\times
Select a directory as workspace	
STM32CubeIDE uses the workspace directory to store its preferences and development artifacts.	
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Use this as the default and do not ask again	
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Click the Launch button to accept it and proceed further.

Step 3:

Open new project: Click in a sequence, File-> New-> STM32 Project.

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<u>Step 4:</u>

Target selection will popup, type in 'STM32L476VGT6' in **part number** in textbox.

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<u>Step 5:</u>

Select the MCU and Press 'Next'

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eries	>	ACTIVE Active	Unit Price for 10kU (U	S\$): 4.636		
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<u>Step 6:</u>

Assign a Name to your project 'LED_Blink'. Click Finish to proceed further, observe the default section.

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<u>Step 7:</u>

Click Yes to accept the STM32CubeMX perspective. You will now be presented with the STM32 chip layout where we must select and configure the pins that will be used in the project. Left click on 'PE8' and select '**GPIO_Output**'. The pin colour should turn to green.



Note: The PIN PE8 is connected to Green LED on the discovery Kit, see the schematic in DISCO data brief (uploaded on Campusmoodle).



Step 8:

For GPIO configuration go to 'System Core' and click drop down menu and select 'GPIO'

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In GPIO menu select 'PE8' then it will the configuration observe and make sure 'GPIO output level' is 'low', 'GPIO mode' is 'Output push pull', 'GPIO Pull-Up/Pull-Down' is 'No pullup and pulldown' and 'maximum output speed' is 'Low'.

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<u>Step 9:</u>

Click File and then Save and then Yes to generate code. Click on 'Project' menu and select 'Generate Code' or use the shortcut thought icon as shown here:



Step 10:

At the top left-hand side click to expand **Core**, then click to expand **Src**. Double-click to open **main**.c which is the main program template. Move down to find int **main(void)** which is the entry point of our program. Add the following code in while(1) loop:

```
HAL_GPI0_TogglePin(GPI0E, GPI0_PIN_8);
```

HAL_Delay(500);

Function HAL_GPIO_TogglePin(GPIOE, GPIO_PIN_8) toggle the GPIO pin 8 in port E. The function HAL_Delay(n) creates the delay in 'n' milliseconds.



Step 11:

First, let us set the compiler to generate **Release** code instead of Debug code. This is done by clicking **Project**, followed by **Build Configurations**, and then **Set Active**, and set to **Release.** As below.



Click Project followed by Build project to compile the program. See the console screen for 0 errors.



Now, make sure the DISCO board is plugged into the USB port of your PC. Press the Run icon



Click 'OK' in appearing menu to proceed further.

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You should see the blinking LED.

Todo: Create light house blinking sequence, using code below.

```
HAL_GPIO_WritePin(GPIOE, GPIO_PIN_8, GPIO_PIN_SET);
HAL_Delay(200);
HAL_GPIO_WritePin(GPIOE, GPIO_PIN_8, GPIO_PIN_RESET);
HAL_Delay(100);
HAL_GPIO_WritePin(GPIOE, GPIO_PIN_8, GPIO_PIN_SET);
HAL_Delay(200);
HAL_GPIO_WritePin(GPIOE, GPIO_PIN_8, GPIO_PIN_RESET);
HAL_Delay(100);
HAL_Delay(400);
```

Step 12:

For debug session click on debug Icon



Click 'Switch' on appearing menu.



<u>Step 13:</u>

Click on 'Resume' icon to run/stop the execution.

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Add 'break point' to stop the code and use 'resume' button the execute the code.

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Exercise 2: GPIO as Input

<u>Aims:</u>

The aim of this project is to Learn how to setup GPIO as an input and use a push button on STM32L476VG-DISCO using STM32CubeIDE. Please follow the steps from previous experiment to create and build a program and upload the code to the DISCO development board.

Objectives:

- Configure GPIO as input
- Generate Code
- Function used: HAL_Delay() & HAL_GPIO_ReadPin() & HAL_GPIO_WritePin()
- Run and verify the functionality

<u>Step 1-6</u>: Follow steps shown in previous experiment.

Info: PA0 is attached to centre button of Joystick and have an external pull-down circuit attached. See the product brief for further information.

<u>Step 7:</u> Left click on 'PAO' and select 'GPIO_Input' to configure GPIO as input. This PIN is attached to center button of joystick. Refer to Data brief for further information.



<u>Step 8-10</u>: Follow as shown in previous project and add the code as below:

```
/* USER CODE BEGIN 1 */
int state_PE8;
/* USER CODE END 1 */
while (1)... Area code
    state_PE8 = HAL_GPI0_ReadPin(GPI0A, GPI0_PIN_0);
    if (state_PE8 == 1)
        HAL_GPI0_WritePin(GPI0E, GPI0_PIN_8, GPI0_PIN_SET);
    else
        HAL_GPI0_WritePin(GPI0E, GPI0_PIN_8, GPI0_PIN_RESET);
```

Step 11: Follow the steps as shown in previous project. You should see the glowing LED once you press and hold the middle button of joystick.

Appendix A

Logic Analyzer Installation:

Step 1: USB driver installation

Plugin the logic analyzer into USB port and go to 'Device Manager' to view the 'unknow device'. It may change the name base on you PC so unplug and plugin the USB connector.



Step 2:

Download the Zadig driver installation file and Double click the Icon:

https://zadig.akeo.ie/



Click on 'Install anyway' - it may not appear on your PC.

	×
The app you're trying to install isn't a	
Microsoft-verified app	
Installing apps from the Store helps to protect your PC and keep it running smoothly.	
Get apps from Store Install anyway	
Change my app recommendation settings >	

The main menu is as shown below:

Zadig	- 🗆 X
Device Options Help	
	← Edit
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Click on 'Options' and select 'List All the Device'.

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Select the device 'Unknown Device 1' and click on 'Install Driver' or 'Reinstall Driver'

🗾 Zadig	- 🗆 X
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Driver Installation: SUCCESS	Zadig 2.5.730
Installing Driver	
Installing Driver	

Click 'Close' to finish the installation.

Driver Installation	
The driver was installed successfully.	
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Step 3: Sigrok -cli installtion

Download the Sigrok-cli software and double click the icon.

https://sigrok.org/wiki/Downloads



Click 'Next'

省 sigrok-cli Setup	- 🗆 X
	Welcome to sigrok-cli Setup
	Setup will guide you through the installation of sigrok-di.
	It is recommended that you close all other applications before starting Setup. This will make it possible to update relevant system files without having to reboot your computer.
	Click Next to continue.
R	
	Next > Cancel

Select 'Next' to accept the agreement.

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(and a	License Agreement		
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Step 4: PulseView Installation

Download the 'PulseView' software and double click the icon.

https://sigrok.org/wiki/Downloads



Select 'Next' ...

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	Welcome to PulseView Setup
	Setup will guide you through the installation of PulseView.
	It is recommended that you close all other applications before starting Setup. This will make it possible to update relevant system files without having to reboot your computer.
	Click Next to continue.
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GNU GENE	RAL PUBLIC LICENSE		
Version	5, 25 June 2007		
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Go ahead with default location and select 'Next'....

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Appendix B

Getting Started with Logic Analyzer

Step 1:

Double click the installed application and before that make sure you have already plugged in the logic Analyzer USB.

Step 2:

Now Connect 'Channel 1' pin and 'GND' pin of logic analyzer to STM32L476VG-DISCO pin 'PE8' and pin 'GND', respectively.

Step 3:

Click on 'Configure Channel' icon and select 'D0'.



Once you STM32L476VG-DISCO is powered, click on 'Run' icon to view the waveform.



You can measure the timing using 'Show cursor' icon and by adjusting widow boarder to required logic transition places.





Possible Error: if Logic Analyzer USB is not connected you will get an error shown below:

Caution: Avoid connecting the logic analyzer pins to any other higher voltage pins except the GPIOs of MCU.

Appendix C

Installation process for STM32Cube IDE

Download load the 'STM32CubeIDE' file which appropriate for your operating system and unzip the file.

https://www.st.com/en/development-tools/stm32cubeide.html

Double click the .exe file and give permission to install. Later following screen will appear press 'Next'..... until last screen appears with 'Finish' tab.



<u>Step 1:</u>

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<u>Step 2:</u>

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License Agreement	
Please review the license terms before installing STMicroelectronics STM32CubeIDE.	
Press Page Down to see the rest of the agreement.	
aTMicroelectronics Software License Agreement	^
SLA0048 Rev4/March 2018	
BY INSTALLING COPYING, DOWNLOADING, ACCESSING OR OTHERWISE USING THIS SOFTWARE PACKAGE OR ANY PART THEREOF (AND THE RELATED DOCUMENTATION) FROM STMICROELECTRONICS INTERNATIONAL N.V, SWISS BRANCH AND/OR ITS AFFILIATED COMPANIES (STMICROELECTRONICS), THE RECIPIENT, ON BEHALF OF HIMSELF OR HERSELF, OR ON BEHALF OF ANY ENTITY BY WHICH SUCH RECIPIENT IS EMPLOYED AND/OR ENGAGED AGREES TO BE BOUND BY THIS SOFTWARE PACKAGE LICENSE AGREEMENT.	~
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<u>Step 3:</u>

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<u>Step 4:</u>

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Select components to install:	SEGGER J-Link drivers	Description Position your mouse over a component to see its description,		
Space required: 2.2 GB				
	< <u>B</u> ack	Install	Can	cel

<u>Step 5:</u>

STMicroelectronics STM32CubeIDE		_		\times
Installing				
Please wait while STMicroelectronics STM32CubeIDE is installed.	being			
Extract: org.edipse.cdt.core.native_5.10.100.201906	192010.ja	r		
Show <u>d</u> etails				
< 5	lack	<u>N</u> ext >	Cano	el

<u>Step 6:</u>

STMicroelectronics STM32CubeIDE -	-	\times
Installation Complete		
Setup was completed successfully.		
Completed		_
Show <u>d</u> etails		
< <u>B</u> ack <u>N</u> ext >	0	Cancel

<u>Step 7:</u>

STMicroelectronics	STM32CubeIDE	_		\times
57	Completing STMicro STM32CubeIDE Se	electron tup	ics	
meranĝmenteo	STMicroelectronics STM32CubeID your computer.)E has been in	stalled on	
	Click Finish to dose Setup.			
STM32 Cube	⊡ Create desktop shortcut			
	< <u>B</u> ack	Einish	Cano	cel