

# Rapport Realtime Oscilloscope

Martin Meyer

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## 1 Introduction

Dans ce laboratoire, nous avons créé un système temps réel réalisant un fonction d'oscilloscope. Une partie des tâches, comme l'échantillonnage, fonctionne en temps réel. D'autre tâches, comme l'affichage, n'en ont pas besoin.

Pour ce faire, nous avons travaillé avec les cartes microcontrôleur STM32f7-discovery, System Workbench for STM32 et STM32CubeMX.

Ce rapport décrit quelques parties intéressantes du programme, notamment grâce à des diagrammes UML.

## 2 Tests

### 2.1 A

<b>A1</b>	<b>Title :</b>	<b>Check if ADC Signal acquisition is working</b>
Group :	Signal Acquisition	
Description :	Is buffer continuously feed with new ADC measures ?	
Initial Conditions :	Running program	
Test Results :	The buffer is continuously feed with new ADC measures.	
Final Conditions :	Running program	
Comments :		
Test Passed :	Yes	

<b>A2</b>	<b>Title :</b>	<b>Check TIM1 continously trigger the ADC</b>
Group :	Signal Acquisition	
Description :	Not software trigger, nor ADC continous conversion mode	
Initial Conditions :	Running program	
Test Results :	Yes, the ADC conversion is started directly from the TIM1 timeout signal.	
Final Conditions :	Running program	
Comments :		
Test Passed :	Yes	

<b>A3</b>	<b>Title :</b>	<b>Check TIM1 trigger frequency</b>
Group :	Signal Acquisition	
Description :	Is TIM1 trigger frequency as expected ?	
Initial Conditions :	-	
Test Results :	Test can't be done. No oscilloscope available	
Final Conditions :	-	
Comments :		
Test Passed :	-	

## 2.2 B

<b>B1</b>	<b>Title :</b>	<b>Check Sinus wave can be correctly measured</b>
Group :	Signal Frequencies	
Description :	50 Hz	
Initial Conditions :	Sampling rate : 100kSample/s, Input freq : 50Hz	
Test Results :	Test can't be done. No Sinus generator for 50Hz	
Final Conditions :	-	
Comments :		
Test Passed :	-	

<b>B2</b>	<b>Title :</b>	<b>Check Sinus wave can be correctly measured</b>
Group :	Signal Frequencies	
Description :	370 Hz	
Initial Conditions :	Sampling rate : 100kSample/s, Input freq : 370Hz	
Test Results :	The sinus is correctly displayed. The input period matches with de divisions	
Final Conditions :	-	
Comments :		
Test Passed :	Yes	

<b>B3</b>	<b>Title :</b>	<b>Check Sinus wave can be correctly measured</b>
Group :	Signal Frequencies	
Description :	500 Hz	
Initial Conditions :	Sampling rate : 100kSample/s, Input freq : 500Hz	
Test Results :	The sinus is correctly displayed. The input period matches with de divisions	
Final Conditions :		
Comments :		
Test Passed :	Yes	

<b>B4</b>	<b>Title :</b>	<b>Check Sinus wave can be correctly measured</b>
Group :	Signal Frequencies	
Description :	700 Hz	
Initial Conditions :	Sampling rate : 100kSample/s, Input freq : 700Hz	
Test Results :	The sinus is correctly displayed. The input period matches with de divisions	
Final Conditions :		
Comments :		
Test Passed :	Yes	

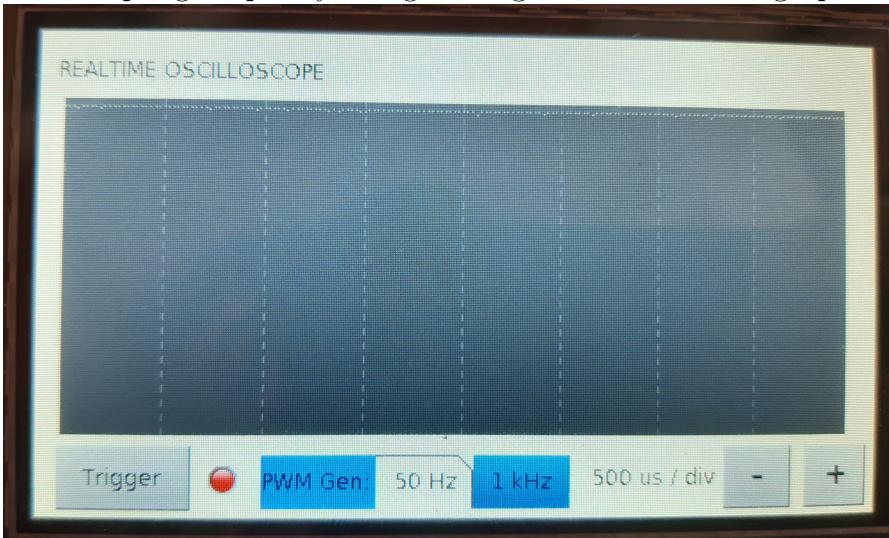
## 2.3 C

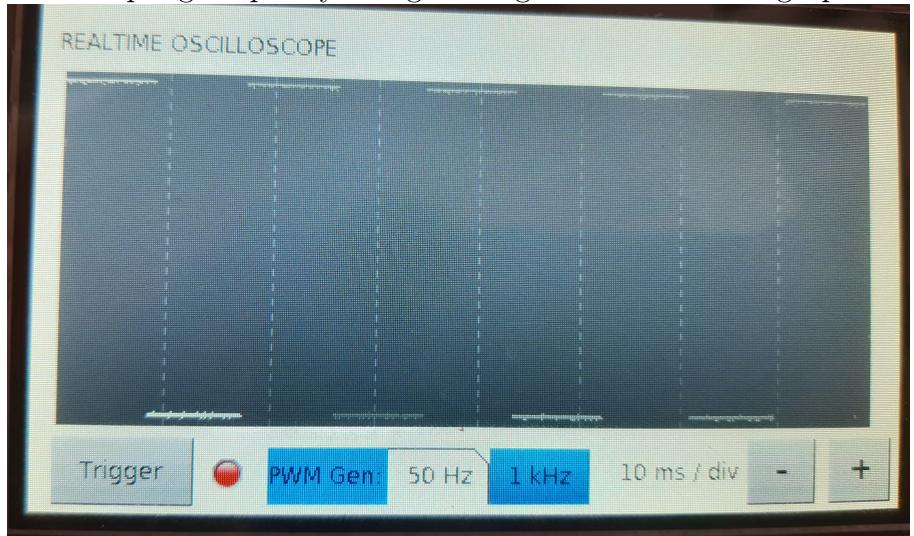
<b>C1</b>	<b>Title :</b>	<b>Check maximum sampling rate</b>
Group :	Maximum Sampling Rate	
Description :	Sample singnal with 10 k samples/s	
Initial Conditions :	No DMA, Sampling rate : 10kSamples/s	
Test Results :	The sampling works	
Final Conditions :		
Comments :		
Test Passed :	Yes	

<b>C2</b>	<b>Title :</b>	<b>Check maximum sampling rate</b>
Group :	Maximum Sampling Rate	
Description :	Sample singnal with 100 k samples/s	
Initial Conditions :	No DMA, Sampling rate : 100kSamples/s	
Test Results :	The sampling works	
Final Conditions :		
Comments :		
Test Passed :	Yes	

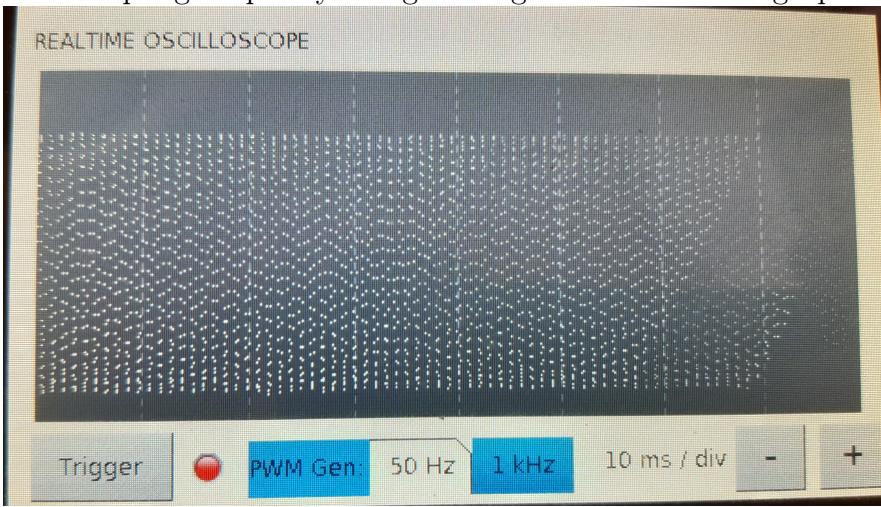
<b>C3</b>	<b>Title :</b>	<b>Check maximum sampling rate</b>
Group :	Maximum Sampling Rate	
Description :	Sample singnal with 1 M samples/s	
Initial Conditions :	No DMA, Sampling rate : 1MSamples/s	
Test Results :	The sampling doesn't work. The uC is fully used for the ADC conversion.	
Final Conditions :		
Comments :		
Test Passed :	No	

## 2.4 D

D1	Title :	Check if Sinus wave can be correctly visualised
	Group :	Signal Display
	Description :	50 Hz Signal with 500 us/div time base
	Initial Conditions :	Sampling rate : 100kSamples/s
	The sampling frequency is high enough. There are enough points.	
		
	Test Results :	
	Final Conditions :	
	Comments :	
	Test Passed :	
	Yes	

<b>D2</b>	<b>Title :</b>	Check if Sinus wave can be correctly visualised
Group :	Signal Display	
Description :	50 Hz Signal with 10 ms/div time base	
Initial Conditions :	Sampling rate : 100kSamples/s	
	The sampling frequency is high enough. There are enough points.	
Test Results :		
Final Conditions :		
Comments :		
Test Passed :	Yes	

D3	Title :	Check if Sinus wave can be correctly visualised
	Group :	Signal Display
	Description :	1 kHz Signal with 500 us/div time base
	Initial Conditions :	Sampling rate : 100kSamples/s
	The sampling frequency is high enough. There are enough points.	
	Test Results :	
	Final Conditions :	
	Comments :	
	Test Passed :	Yes

<b>D4</b>	<b>Title :</b>	Check if Sinus wave can be correctly visualised
Group :	Signal Display	
Description :	1 kHz Signal with 10 ms/div time base	
Initial Conditions :	Sampling rate : 100kSamples/s	
Test Results :	The sampling frequency is high enough. There are enough points. 	
Final Conditions :		
Comments :		
Test Passed :	Yes	

## 2.5 E

<b>E1</b>	<b>Title :</b>	Check maximum display refresh rate
Group :	Display Refresh Rate	
Description :	Display refresh rate : 50 Hz	
Initial Conditions :	Display refresh rate : 50 Hz	
Test Results :	The refresh is correctly done	
Final Conditions :		
Comments :		
Test Passed :	Yes	

<b>E2</b>	<b>Title :</b>	<b>Check maximum display refresh rate</b>
Group :	Display Refresh Rate	
Description :	Display refresh rate : 66 Hz	
Initial Conditions :	Display refresh rate : 66 Hz	
Test Results :	The refresh is correctly done	
Final Conditions :		
Comments :		
Test Passed :	Yes	

<b>E3</b>	<b>Title :</b>	<b>Check maximum display refresh rate</b>
Group :	Display Refresh Rate	
Description :	Display refresh rate : 100 Hz	
Initial Conditions :	Display refresh rate : 100 Hz	
Test Results :	The refresh is correctly done	
Final Conditions :		
Comments :	There are no difference between all these tests. The measured duration of a refresh is 22 ms. So the uC is refreshing all the time as fast as possible, even with the 50 Hz refresh rate.	
Test Passed :	Yes	

## 2.6 F

<b>F1</b>	<b>Title :</b>	<b>Check if changes of x-axis scaling take effect on signal view</b>
Group :	Time Divisions Display	
Description :	From 500 us/div to 1 ms/div	
Initial Conditions :	Input signal : square 1kHz, Div : 500 us	
Test Results :	The signal changes accordingly	
Final Conditions :	Div : 1 ms	
Comments :		
Test Passed :	Yes	

<b>F2</b>	<b>Title :</b>	<b>Check if changes of x-axis scaling take effect on signal view</b>
Group :	Time Divisions Display	
Description :	From 1 ms/div to 2 ms/div	
Initial Conditions :	Input signal : square 1kHz, Div : 1 ms	
Test Results :	The signal changes accordingly	
Final Conditions :	Div : 2 ms	
Comments :		
Test Passed :	Yes	

<b>F3</b>	<b>Title :</b>	<b>Check if changes of x-axis scaling take effect on signal view</b>
Group :	Description :	Time Divisions Display
Description :	Initial Conditions :	From 2 ms/div to 5 ms/div
Initial Conditions :	Test Results :	Input signal : square 1kHz, Div : 2 ms
Test Results :	Final Conditions :	The signal changes accordingly
Final Conditions :	Comments :	Div : 5 ms
Comments :	Test Passed :	
Test Passed :		Yes

<b>F4</b>	<b>Title :</b>	<b>Check if changes of x-axis scaling take effect on signal view</b>
Group :	Description :	Time Divisions Display
Description :	Initial Conditions :	From 5 ms/div to 10 ms/div
Initial Conditions :	Test Results :	Input signal : square 50 Hz, Div : 5 ms
Test Results :	Final Conditions :	The signal changes accordingly
Final Conditions :	Comments :	Div : 10 ms
Comments :	Test Passed :	
Test Passed :		Yes

<b>F5</b>	<b>Title :</b>	<b>Check if changes of x-axis scaling take effect on signal view</b>
Group :	Description :	Time Divisions Display
Description :	Initial Conditions :	From 10 ms/div back to 5 ms/div
Initial Conditions :	Test Results :	Input signal : square 50 Hz, Div : 10 ms
Test Results :	Final Conditions :	The signal changes accordingly
Final Conditions :	Comments :	Div : 5 ms
Comments :	Test Passed :	
Test Passed :		Yes

<b>F6</b>	<b>Title :</b>	<b>Check if changes of x-axis scaling take effect on signal view</b>
Group :	Description :	Time Divisions Display
Description :	Initial Conditions :	From 5 ms/div back to 2 ms/div
Initial Conditions :	Test Results :	Input signal : square 50 Hz, Div : 5 ms
Test Results :	Final Conditions :	The signal changes accordingly
Final Conditions :	Comments :	Div : 2 ms
Comments :	Test Passed :	
Test Passed :		Yes

<b>F7</b>	<b>Title :</b>	<b>Check if changes of x-axis scaling take effect on signal view</b>
Group :	Time Divisions Display	
Description :	From 2 ms/div to 1 ms/div	
Initial Conditions :	Input signal : square 1kHz, Div : 2 ms	
Test Results :	The signal changes accordingly	
Final Conditions :	Div : 1 ms	
Comments :		
Test Passed :	Yes	

<b>F8</b>	<b>Title :</b>	<b>Check if changes of x-axis scaling take effect on signal view</b>
Group :	Time Divisions Display	
Description :	From 1 ms/div to 500 us/div	
Initial Conditions :	Input signal : square 1kHz, Div : 1 ms	
Test Results :	The signal changes accordingly	
Final Conditions :	Div : 500 us	
Comments :		
Test Passed :	Yes	

## 2.7 G

<b>G1-5</b>	<b>Title :</b>	<b>Check if when enabling signal triggering, the periodic signal stays still on the display</b>
Group :	Trigger Signal Display	
Description :	Enable the triggering, and change the time base	
Initial Conditions :	Input signal : 50Hz square, Div : 500us	
Test Results :	The periodic signal stay still on the display, but sometimes it moves just for 1 frame.	
Final Conditions :	Div : 10 ms	
Comments :		
Test Passed :	Partially	

<b>G6-10</b>	<b>Title :</b>	<b>Check if when enabling signal triggering, the periodic signal stays still on the display</b>
	<b>Group :</b>	Trigger Signal Display
	<b>Description :</b>	Enable the triggering, and change the time base
	<b>Initial Conditions :</b>	Input signal : 1kHz triangle, Div : 500us
	<b>Test Results :</b>	The periodic signal stay still on the display, but sometimes it moves just for 1 frame.
	<b>Final Conditions :</b>	Div : 10 ms
	<b>Comments :</b>	
	<b>Test Passed :</b>	Partially

<b>G11-15</b>	<b>Title :</b>	<b>Check if when enabling signal triggering, the periodic signal stays still on the display</b>
	<b>Group :</b>	Trigger Signal Display
	<b>Description :</b>	Enable the triggering, and change the time base
	<b>Initial Conditions :</b>	Input signal : 1kHz sinus, Div : 500us
	<b>Test Results :</b>	The periodic signal stay still on the display, but sometimes it moves just for 1 frame.
	<b>Final Conditions :</b>	Div : 10 ms
	<b>Comments :</b>	
	<b>Test Passed :</b>	Partially

## 2.8 L

<b>L1</b>	<b>Title :</b>	<b>Does the software hang after a while ?</b>
	<b>Group :</b>	Long-Term Test
	<b>Description :</b>	Check if the system is running without user interaction for about 5 minutes
	<b>Initial Conditions :</b>	With RTOS
	<b>Test Results :</b>	The system still run correctly
	<b>Final Conditions :</b>	
	<b>Comments :</b>	
	<b>Test Passed :</b>	Yes

<b>L2</b>	<b>Title :</b>	<b>Does the software hang after a while ?</b>
Group :	Long-Term Test	
Description :	Check if system is running with continuous user interaction for about 5 minutes	
Initial Conditions :	With RTOS	
Test Results :	The system still run correctly	
Final Conditions :		
Comments :		
Test Passed :	Yes	

<b>L3</b>	<b>Title :</b>	<b>Does the software hang after a while ?</b>
Group :	Long-Term Test	
Description :	Check if system is running for more than 6 hours	
Initial Conditions :	With RTOS	
Test Results :	The system still run correctly	
Final Conditions :		
Comments :		
Test Passed :	Yes	

## 2.9 Summary

<b>Total Tests :</b>	<b>31</b>
Tests passed :	27
Tests partially passed :	3
Tests not passed :	1

## 3 Conclusion