

Document: Summary STM32F4 DSP	Date:	24/09/22
	Revision	1
	Prepared by:	Flávio Cavaliere

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Summary

Document History.....	3
Trainer	3
Training hours.....	3
Goals.....	3
Index	4
Methodology	5
Necessary resources.....	5

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Document History

Rev.	Date	Comments	Rev. by
1	20.09.22	Initial document	FGC

Trainer

Name	Company	Email
Flávio Cavalieri	Eletrocurso	flavio.cavalieri@eletrocurso.net

Training hours

Video Lessons
7 h

Goals

1. Implementing IIR and FIR filters using CMSIS DSP library on STM32F4 microcontrollers;
2. Develop programs using Octave in order to generate input signals, calculate filter coefficients, plot signals in time and frequency domain, etc;
3. Develop a STM32CubeMonitor application to connect application variables to spreadsheets, supporting in several proof of concept tasks;
4. Implement a realtime filter application using microcontroller ADC, DAC and DMA peripherals;

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Index

Video lesson 1	INITIAL CONSIDERATIONS
	<p>Introduction – Goals – Hardware and Software resources</p> <div style="border: 1px solid black; padding: 5px;"> <p>Complementary material / software:</p> <ul style="list-style-type: none"> • STM32CubeIDE • STM32CubeMonitor • GNU Octave <ul style="list-style-type: none"> • Excel • DevBoard • ST-Link Programmer • Signal generator • Oscilloscope • Dupont Jumpers </div>
Video lesson 2	BASE PROJECT
	<p>Develop a Base Project to support the development of course lectures. This Project will basically connect application variables to spreadsheets, supporting in several proof of concept tasks;</p> <div style="border: 1px solid black; padding: 5px;"> <p>Complementary material: (st.com)</p> <ul style="list-style-type: none"> • STM32 Wiki </div>
Video lesson 3	FIR FILTER – FLOATING
	<p>Explore tools, documents and libraries in order to implement and test FIR Filters using floating point format.</p> <div style="border: 1px solid black; padding: 5px;"> <p>Complementary material: (st.com)</p> <ul style="list-style-type: none"> • AN4841 Digital signal processing for STM32 microcontrollers using CMSIS <ul style="list-style-type: none"> • Cube DspDemo • CMSIS DSP Library Documentation <ul style="list-style-type: none"> • CMSIS DSP Library Files • Matlab FIR Filter Documentation • Octave FIR Filter Documentation </div>
Video lesson 4	FIR FILTER – FIXED
	<p>Implement and test FIR Filters using fixed point format.</p> <div style="border: 1px solid black; padding: 5px;"> <p>Complementary material: (st.com)</p> <ul style="list-style-type: none"> • AN4841 Digital signal processing for STM32 microcontrollers using CMSIS <ul style="list-style-type: none"> • Cube DspDemo • CMSIS DSP Library Documentation <ul style="list-style-type: none"> • CMSIS DSP Library Files • Matlab FIR Filter Documentation • Octave FIR Filter Documentation </div>

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Video lesson 5	IIR FILTER – FLOATING
	Explore tools, documents and libraries in order to implement and test IIR Filters using floating point format..
	<p style="text-align: center;">Complementary material: (st.com)</p> <ul style="list-style-type: none"> • AN4841 Digital signal processing for STM32 microcontrollers using CMSIS <ul style="list-style-type: none"> • Cube DspDemo • CMSIS DSP Library Documentation • CMSIS DSP Library Files • Octave IIR Filter Documentation • Matlab IIR Filter Documentation
Video lesson 6	IIR FILTER – FIXED
	Implement and test IIR Filters using fixed point format.
	<p style="text-align: center;">Complementary material: (st.com)</p> <ul style="list-style-type: none"> • AN4841 Digital signal processing for STM32 microcontrollers using CMSIS <ul style="list-style-type: none"> • Cube DspDemo • CMSIS DSP Library Documentation • CMSIS DSP Library Files • Octave IIR Filter Documentation • Matlab IIR Filter Documentation
Video lesson 7	IIR FILTER – REAL TIME ADC APPLICATION
	Implement a realtime filter application using microcontroller ADC, DAC and DMA peripherals.
	<p style="text-align: center;">Complementary material: (st.com)</p> <ul style="list-style-type: none"> • AN3126 Audio and waveform generation using the DAC in STM32 products • AN4841 Digital signal processing for STM32 microcontrollers using CMSIS <ul style="list-style-type: none"> • Cube DspDemo • CMSIS DSP Library Documentation • CMSIS DSP Library Files • Octave IIR Filter Documentation • Matlab IIR Filter Documentation

Methodology

- STM32F407 Development board + ST-Link Programmer
- Video lessons, handouts, softwares and manuals;

Necessary resources

- Microcomputer with at least two free USB ports, software and drivers installed: