Robotics Engineering course

University of Genoa

Installing and starting using SOFA Framework

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Contents

1 Installation procedure on Windows

Info from [2]. However there are some things I found unclear, so I have rewritten them.
Note: this is for a Windows architecture x64, using Visual studio 2019.

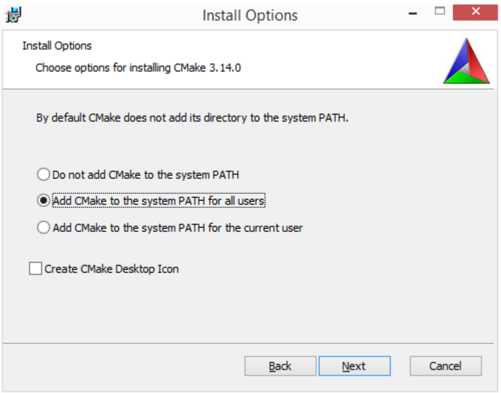
1.0.1 Dependencies

- Install **Microsoft Visual Studio**. Download from https://visualstudio.microsoft.com/fr/thank-you-downloading-visual-studio/?sku=Community&rel=16.
  In the installer, you must enable:

  In the main panel: the C++ development toolkit, called C++ Build Tools or Desktop C++.

  In the side panel: the C++ ATL and C++ MFC components.

- Install **CMake**. Download from https://cmake.org/download/: Windows x64 ZIP. If you can make the installation easy peasy and see the window in Fig 1 amazing, good for you: choose the option in the figure. If you don't: .



Install Options

Choose options for installing CMake 3.14.0

By default CMake does not add its directory to the system PATH.

○ Do not add CMake to the system PATH
● Add CMake to the system PATH for all users
○ Add CMake to the system PATH for the current user

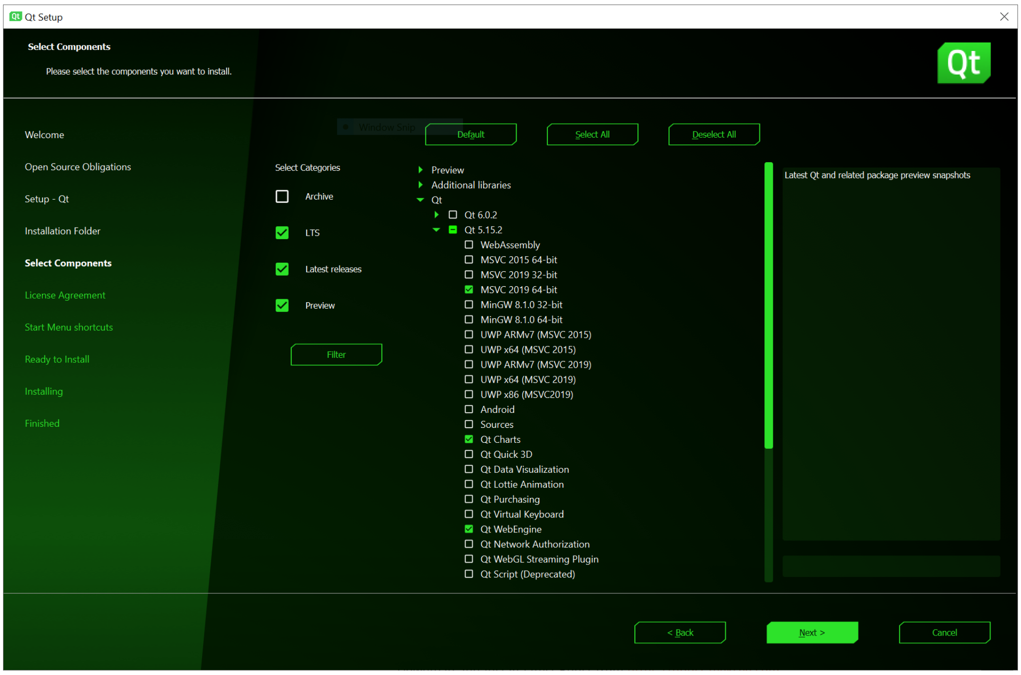
□ Create CMake Desktop Icon

Figure 1: cmake installation

  Move the zip file to a desired position. Unzip it. Enter folder/bin. Copy path. Then go to your computer's Control Panel: Advanced system settings: Ambient variables: System variables. Click on path and then on Modify. Add as last path line the path to the bin folder you previously copied. Click ok. Check if it worked by opening a terminal and typing cmake. No errors: amazing, it worked

  (Info from https://www.youtube.com/watch?v=8_X5Iq9niDE to understand how to install cmake)

- Install **Qt**: https://www.qt.io/download-qt-installer?hsCtaTracking=99d9\dd4f-5681-48d2-b096-470725510d34%7C074ddad0-fdef-4e53-8aa8-5e8a876\d6ab4. Choose Custom installation and then tick the elements specified in Fig. 2



Select Components

Please select the components you want to install.

Select Categories

□ Archive
☑ LTS
☑ Latest releases
☑ Preview

- Preview
- Additional libraries
- Qt
  - □ Qt 6.0.2
  - ▪ Qt 5.15.2
    - □ WebAssembly
    - □ MSVC 2015 64-bit
    - □ MSVC 2019 32-bit
    - ☑ MSVC 2019 64-bit
    - □ MinGW 8.1.0 32-bit
    - □ MinGW 8.1.0 64-bit
    - □ UWP ARMv7 (MSVC 2015)
    - □ UWP x64 (MSVC 2015)
    - □ UWP ARMv7 (MSVC 2019)
    - □ UWP x64 (MSVC 2019)
    - □ UWP x86 (MSVC2019)
    - □ Android
    - □ Sources
    - ☑ Qt Charts
    - □ Qt Quick 3D
    - □ Qt Data Visualization
    - □ Qt Lottie Animation
    - □ Qt Purchasing
    - □ Qt Virtual Keyboard
    - ☑ Qt WebEngine
    - □ Qt Network Authorization
    - □ Qt WebGL Streaming Plugin
    - □ Qt Script (Deprecated)

Latest Qt and related package preview snapshots

Figure 2: Qt elements needed

- Install **Boost**. Download from https://boost.teeks99.com/: choose a version higher than 1.65. Click it. Users with Windows 64-bit and VS 2019: choose boost_X_X_X-msvc-14.2-64.exe

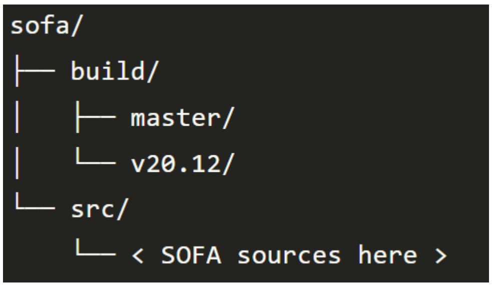
- Install **python 3.7.x**: I downloaded the exe file 3.7.9 from https://www.python.org/downloads/release/python-379/ and then followed instructions.

- Install **Eigen**. Download at https://eigen.tuxfamily.org/index.php?title=Main_Page. Unzip to desired location. Then open command window and go to the Eigen source directory. Type
  mkdir build
  cd build
  cmake ..
  make install

- Install **other libraries**. Download from: https://www.sofa-framework.org/download/WinDepPack/VS-2017/latest
- Add paths to boost and Qt to the ambient variables (optional but i did it):
  C:/local/boost_1_75_0
  C:/local/boost_1_75_0 lib64-msvc-14.2
  C:/Qt/5.15.2/msvc2019_64 bin
  C:/Qt/5.15.2/msvc2019_64 lib

1.0.2 Install SOFA

- **Install SOFA**. Download zip from https://github.com/sofa-framework/sofa or, better, use git command. Unzip it to *desired_location*/sofa/src. Unzip the previously downloaded other libraries in the same folder sofa/src.
- **Build SOFA**. Inside your sofa folder create other folders so that you have the structure in Fig. 3.



```
sofa/
├── build/
|   ├── master/
|   └── v20.12/
└── src/
    └── < SOFA sources here >
```

Figure 3: SOFA folder structure

In Windows Start menu, search for Native Tools Command Prompt and run the one correponding to your Windows architecture (x64 for 64-bit, x86 for 32-bit).

In the terminal: *cmake-gui*

If you get the error *'cmake-gui' is not recognized as an internal or external command*, it means that your system PATH does not correctly include the path to cmake-gui. In this case, you need to provide the full path to your cmake-gui.

In CMake-GUI, set source folder and build folder.
Run Configure.
A popup will ask you to specify the generator for the project. If you want use Visual Studio IDE, select Visual Studio 15 2017 Win64 or Visual Studio 16 2019

Win64.

If you have an error with Eigen not found: set, from the cmake gui, the EIGEN3_INCLUDE_DIR to the folder in which you installed eigen.

If you have an error with Qt not found: click on Add Entry and add CMAKE_PREFIX_PATH with path to your Qt directory (navigate until msvcXXXX_XX directory).
Example: CMAKE_PREFIX_PATH=C:/dev/Qt/5.11.3/msvc2017_64. Then click Configure again.

When you are ready, run Generate. In the build directory, this will create a Visual Studio project (Sofa.sln) or a Makefile depending on the generator you chose before.

- **Compile SOFA**.To build SOFA in Visual Studio, simply open the generated Sofa.sln. Finally, build the solution using the Visual Studio interface. Select release (see Fig 4). click Build then Build solution. Takes a long time to build, in the end there's a bin file in Release folder.

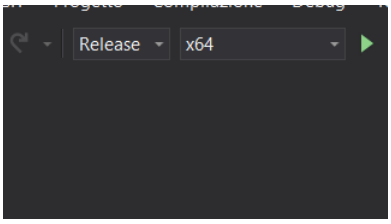


Figure 4: Visual studio parameter

- To run sofa: either enter sofa/build/bin/Release from terminal:
  runSofa
  or enter the same folder from file explorer and double click runSofa.exe. It is better to run it from terminal but mine does not work.

2 Using sofa

Here are my **personal suggestions** on how to start working with SOFA since I got a bit lost at the beginning.

- Start with watching Hugo's video at [1] until the end of section 'Examples of applications'.
- Then follow SOFA's theory at [3]. (Note: skip tutorial application: it's deprecated.)
- Then go back to Hugo's video and continue it (from User Tutorial part 1). I was not able to find the files that he uses, but I followed it step by step by re-writing and the full code is on my github page: First_trial.scn.
  Note: check errors both on visual studio (click Visualize then Errors) and on SOFA click Graph.
- Now that you know something look at the actual SOFA tutorials: go to folder sofasrc examplesTutorials.

References

[1] *Conference on SOFA Framework*. 2020. URL: https://www.youtube.com/watch?v=KHTAgD1oG8Y&t=4307.

[2] *Installation procedure for Windows*. URL: https://www.sofa-framework.org/community/doc/getting-started/build/windows/.

[3] *SOFA Tutorials*. URL: https://www.sofa-framework.org/community/doc/using-sofa/runsofa/.