AUSTRIAN INSTITUTE OF TECHNOLOGY

AIT Rapid Control Prototyping Instructions

Prerequisites

- Typhoon HIL Control Center V2021.1 SP2 or later
- TI Code Composer Studio 9.3.0.00012 or later
- TI C2000 compiler v20.12.0.STS or later
- 7z utility
- aBootFlasher v3.1.5 or later

Required files

- *ASGC Rapid Control Prototyping example*
- *ASGC pv example*

Notes

The required TI C2000 compiler should be included in the TI Code Composer Studio installation. If the compiler is missing, user gets notified that the import to the Code Composer Studio failed for project "vindobona_demo" because its compiler definition is not available. In that case, compiler needs to be downloaded separately from here. Compiler version should be selected based on the Code Composed Studio version installed on the user PC.

When the project is built in Code Composed Studio, PowerShell scripts are executed in the background. For this reason, PowerShell execution policies on the user PC should be set to enable execution of the scripts. More information can be found here. In case this is disabled, build process will fail with the message pointing out to PowerShell execution policies.

When copying files to a location on the user PC, make sure none of the folders have spaces in their name because this will also result with an error in CCS.

When importing the project into CCS, it might happen that the project cannot be selected. This is likely because the project has already been imported. This step can thus be skipped the next time code is exported. CCS files are automatically updated with the newly exported code and available in CCS.

Code generation

Control code is generated from the model in the Typhoon HIL schematic editor. Code is than imported into the Code Composer Studio which generates an *aboot* file compatible with the control board.

To generate the *aboot* file follow the steps below.

- In the Package Manager, open AIT HIL Controller package.
- Select *Open in file explorer* → *Open additional files*.
- From *additional_files* folder, copy *ccs* folder to a desired directory on the PC.
- Open example *ASGC Rapid Control Prototyping* in the schematic editor.
- Open *Model* → *Model settings* → *C Code Export*.
- Select platform *AIT Vindobona*.
- Set export directory to *%YOUR-EXTRACT-DIR%\ccs\vindobona_demo*.
- Close setup dialog with *OK*.
- In the schematic, right click on the *VindobonaDemo* component and select *C code export* → *Export*. This will generate the C code from the model. Export message output is shown in Figure 1.
- Open Code Composer Studio.
- Browse and select *%YOUR-EXTRACT-DIR%\ccs* as workspace.
- *Launch*.
- Select *Project* → *Import CCS Projects…*
- *Browse* and *Select folder*. This will search for the project in the selected folder.
- After the project is discovered select it if not already selected and press *Finish.* Project *vindobona_demo* should appear in the Project Explorer.
- Select *Project* → *Build Project* or click on the hammer symbol in the Toolbar. Make sure there are no spaces in the directory path, otherwise building process might fail.
- The output *aboot* file is generated in *%YOUR-EXTRACT-DIR%\ccs\vindobona_demo\Debug*.

```
Your schematic model is being prepared for the compilation...
This may take some time depending on the size of the schematic, please wait...
Checking component connections...
Resolving the schematic model...
Evaluating the properties of the components...
Checking component types...
Warning occurred in context of 'VindobonaDemoModel'
  → General warning
  → OutputNotConnected: Component's out output "out" is not connected.

Warning occurred in context of 'VindobonaDemoModel'
  → General warning
  → OutputNotConnected: Component's y output "y" is not connected.

Warning occurred in context of 'VindobonaDemoModel'
  → General warning
  → OutputNotConnected: Component's y output "y" is not connected.

Validation passed!

C code export started...
Creating files:
    * [SUCCESS] vindobonademo.hpp file created.
    * [SUCCESS] vindobonademo.cpp file created.
    * [SUCCESS] types.hpp file created.
    * [SKIPPED] custom_types.hpp file already exist. This file will not be generated in order to preserve your manual changes!
    * [SUCCESS] vindobonademo-meta.json file created.
C code exported successfully!
Output directory of exported C code: C:/Users/sgcdemo/Documents/rcp/AIT_Vindobona_RCP_Demo_2024-2-19_V0.1.13/demo/ccs/vindobona_demo
```

Figure 1 VindobonaDemoModel C export message output

Running the demo

Finally, the generated firmware can be flashed onto the control board. This will require aBootFlasher v3.1.5 or later since the option *Disable image verification* is not available in the older versions.

Since the user generated firmware is generated using a different key from the one used internally at AIT, image verification needs to be disabled or flashing process will fail informing the user that the *aboot* file is not valid. Except for this one additional step, firmware upgrade process is otherwise the same as with any other firmware provided in the package.

To upload the firmware and run the application follow the steps below.

- Upload the generated *vindobona_demo.aboot* firmware using the aBootFlasher v3.1.5 or later. Refer to the firmware upgrade tutorial.
- Select *Disable image verification* as shown in Figure 2.
- Open ASGC PV example and compile and load it into HIL SCADA and run the simulation.
- Connect to the controller in Standalone HIL SCADA and run the simulation.

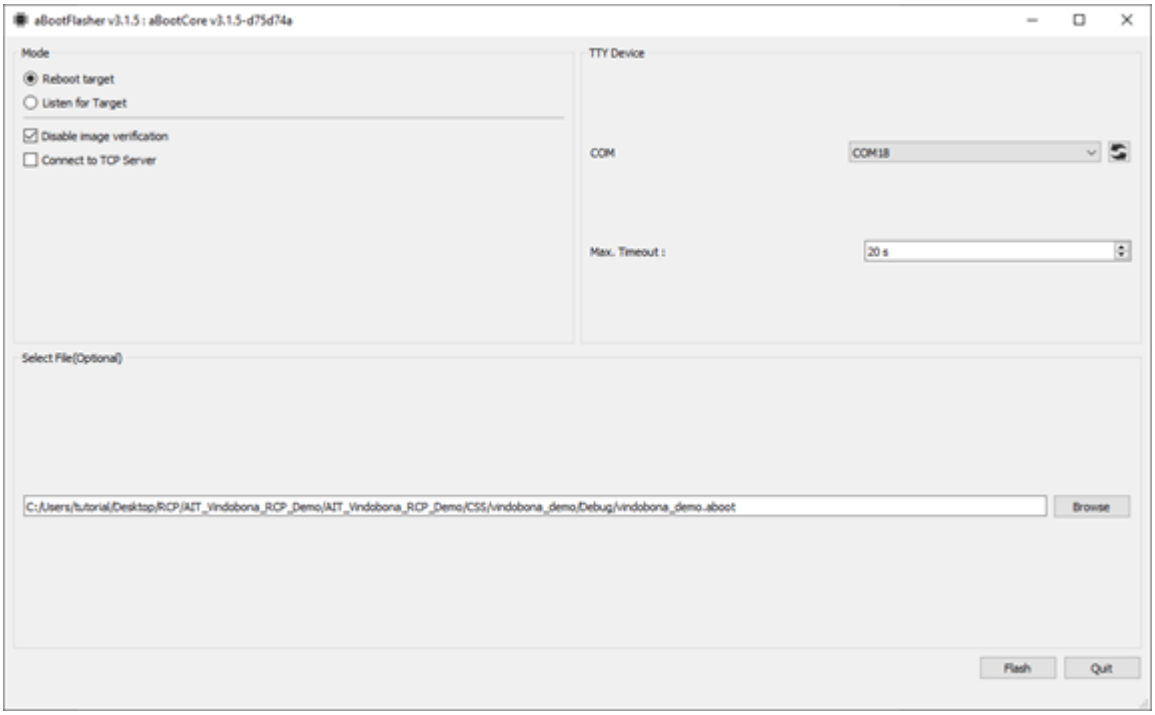


Figure 2 Disable image verification