iSense Development Environment Setup User Guide

coalesenses
research to innovate

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Document history

Version	*Date*	*Changes*
1.0	07.11.2006	SVN instructions
1.1		Cygwin and Jennic development environment installation
1.2		Update document to adept to new Jennic software
1.3	11.01.2008	Adapted to the new ba-elf compiler
1.4	04.02.2008	Instructions for web download of compiler added. New SVN Link added. Mailing list chapter added. Removed CGAL etc. usage for internal shawn. Programming failures added to “Troubleshooting”
1.5	02.07.2008	Instructions for web compile added, updated sections on Eclipse and iShell
1.6	16.07.2008	Corrected URL in section 4.1
1.7	29.09.2008	Introduced dedicated Webcompile version
1.8	10.11.2008	Updated mailing list section.
1.9	29.04.2009	Updated compiler and firmware section.
2.0	29.06.2009	New Layout, adaptations to the new Web compile interface, detailed section on doxygen
2.1	04.04.2010	Added instructions for installing the Compiler for iSense devices with the JN5148 wireless controller (CM20X)
2.2	13.06.2010	Updated instructions for building iSense open source files, as well as for joining the mailing list.
2.3	19.12.2011	Added figures for installation of Cygwin, added the creation of the opt dir in Section 3

Contents

1. About this User Guide

In this user guide,

- files and folders are represented in the Arial typeface,
- code fragments, function names etc. are represented in the `Courier New` typeface,
- GUI elements such as button descriptions etc. are represented in “quotation marks”,
- titles of other documents are presented in *Italic* type.

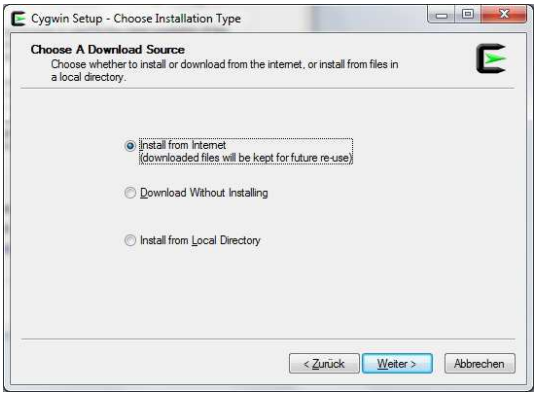
For becoming familiar with the use of iShell, consult the *iShell User Guide* [1].

For further information on iSense firmware programming concepts and on application development, it is recommended to read the *Writing iSense Applications User Guide* [2].

2. Installing Cygwin

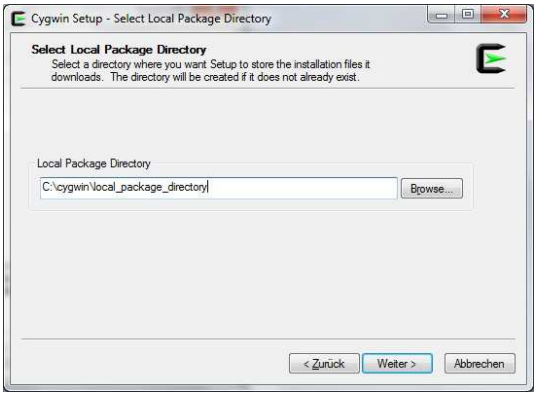
Download the installer from http://cygwin.com/setup.exe, execute setup.exe, click in “Next” (German: “Weiter”).

Choose “Install from Internet”.

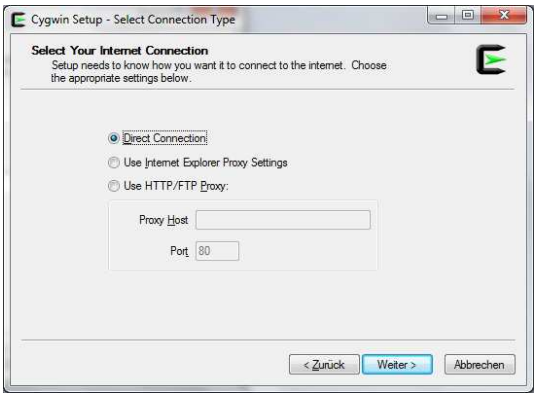


Choose your installation directory. For the remainder of the document, we assume that Cygwin is installed to c:\cygwin.

Choose your Local Package directory:

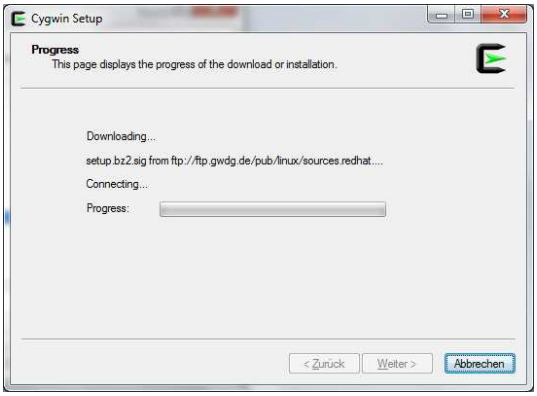


Select your connection settings:



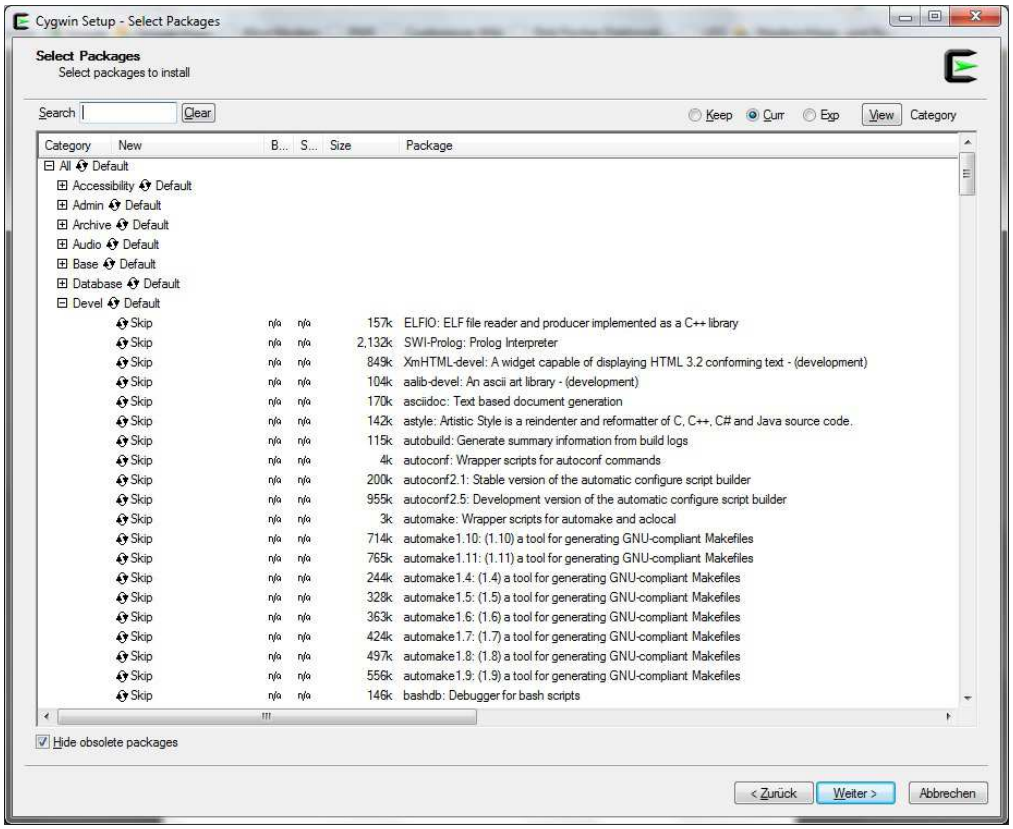
Choose a mirror server (close to your location):

The Cygwin setup will then download the setup data.

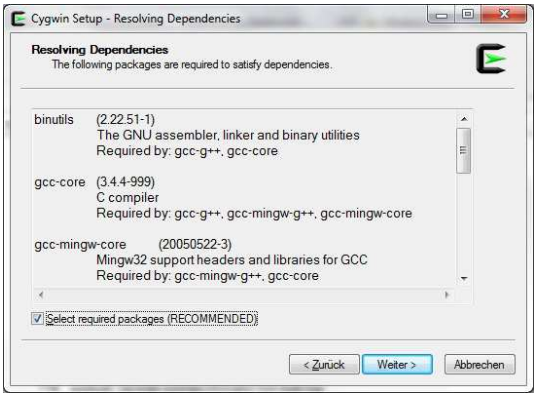


Next, choose the packages to install. Select at least the following packages for installation:

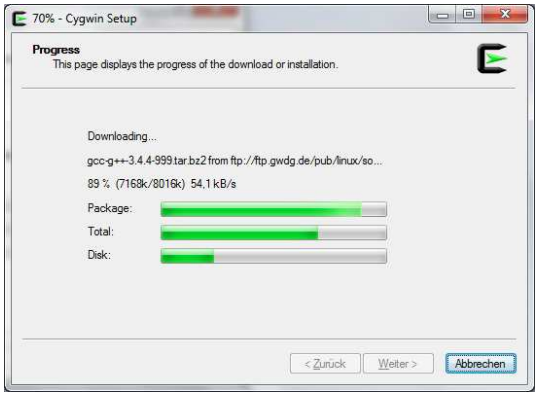
- Devel/make
- Devel/cmake
- Devel/gcc-g++

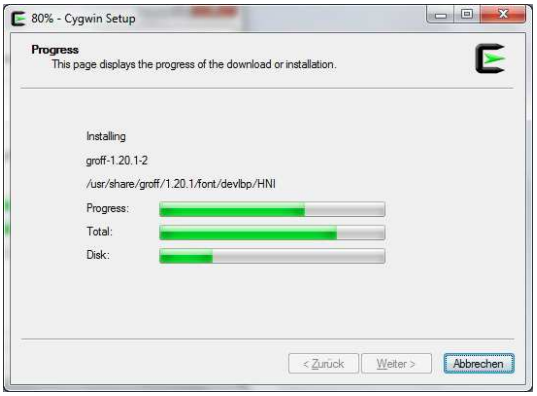


The Cygwin setup will then resolve the packages that your selection depends on. Be sure to activate “Select required packages (RECOMMENDED)”.

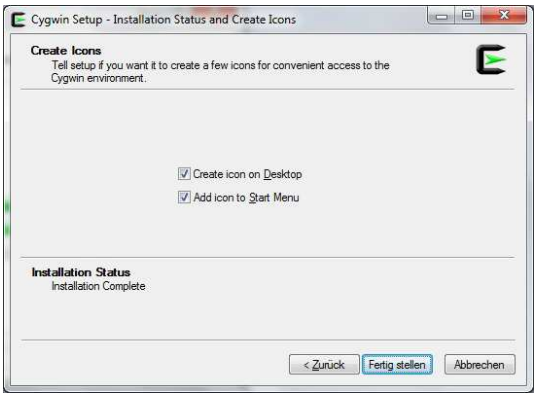


The Cygwin setup will then download and install the selected packages:





After that, the Cygwin installation is complete.



If not already included, add C:\ cygwin\bin to the PATH environment variable of your system.

3. Install the ba-elf-compiler

- Go to the "Development Environment" section on the coalesenses homepage: visit http://www.coalesenses.com, click on "Downloads" and then on "iSense Development Environment".
- If you want to develop for CM10X based iSense devices,
  - from below the "BA1 Compiler" heading, download the "Windows Compiler (for use with CygWin) for the iSense devices with JN5139/JN5139R1 controller (CM10X)" and save it to your cygwin directory.
  - extract the archive to the cygwin directory by typing „*tar xzf ba-elf-r11976.i686-cygwin.tar.gz*" in the cygwin directory. You can delete the local .gz file after extraction
  - add C:\Programme\cygwin\opt\ba-elf\bin (or the corresponding path on your system) to the PATH environment variable
- If you want to develop for CM20X/CM30X based iSense devices,
  - from below the "BA2 Compiler" heading, download the "Windows Compiler (for use with CygWin) for the iSense devices with JN5148 controller (CM20X/CM30X)" and save it to your cygwin directory.
  - If you did not install the BA1 compiler for the CM10X devices, create a directory called /opt in your Cygwin directory
  - extract the contents of the ZIP file to the /opt directory in you Cygwin directory

4. Obtain the iSense Firmware

4.1. Obtain the iSense directory structure

Obtain the isense_sdk.zip file from

www.coalesenses.com/download/isense_sdk.zip

or by going to the “iSense Firmware” page in the download section on the coalesenses homepage: visit http://www.coalesenses.com, click on “Downloads” and then on “iSense Firmware”. Download the “iSense development directory structure and simple demo application” by clicking on “Zip file” on the right.

Extract the contents of the isense_sdk.zip to a location of your choice. It contains the iSense directory structure (especially an empy directory iSense, to where you should extract the iSense firmware), and a directory iApps where iSense applications reside.

4.2. Obtain the standard iSense firmware

The easiest way to obtain the iSense firmware is to download the standard iSense firmware from the web. It provides a standardized configuration of the firmware, where the most features of the firmware are enabled, that should suit the demands of most users.

Download the standard firmware from

http://www.coalesenses.com/download/isense_firmware.zip

or by going to the “iSense Firmware” page in the “Download” section on the coalesenses homepage: visit http://www.coalesenses.com, click on “Downloads” and then on “iSense Firmware”. Download the “Standard iSense firmware” by clicking on “Zip file” on the right.

Extract the contents of isense_firmware.zip to the “iSense” directory extracted in the step above.

4.3. Customize our iSense firmware using the web configuration interface

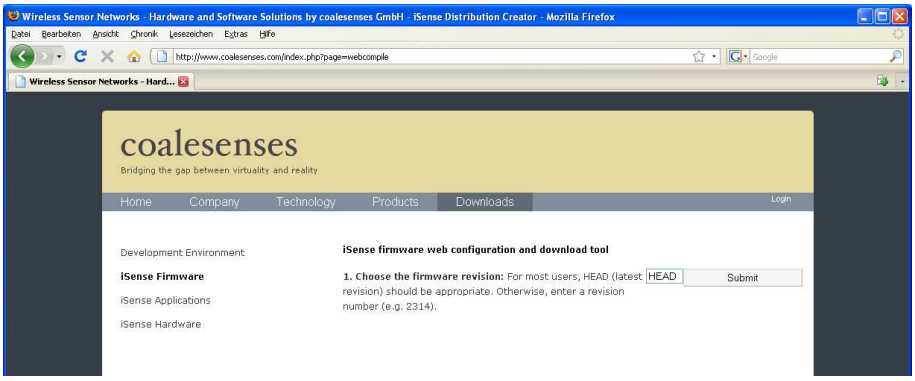
In the rare case that the standard iSense firmware does not meet your requirements, you can download a customized version of the iSense firmware. It supports the additional compilation targets “pacemate” and “JN5121”, and allows to set different constants (such as the memory size or queue lengths), and to enable or disable all the different features of the firmware separately for compiling especially lean firmware instances.

Go to

http://www.coalesenses.com/index.php?page=webcompile

or go to the “iSense Firmware” page in the “Download” section on the coalesenses homepage: visit http://www.coalesenses.com, click on “Downloads”, on “iSense Firmware”, and then on “Go to” right of “iSense firmware web configuration interface”.

You will find the iSense configuration interface there. Choose the desired software revision, and click on submit.

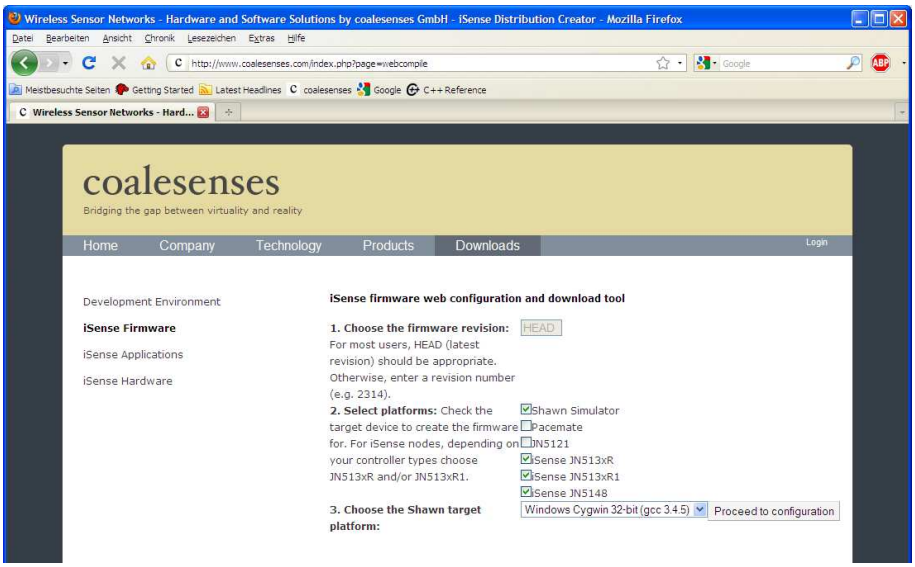


Now, choose the platform(s) you would like to build the firmware for. A selection appropriate for most users was already made, so most users don't have to change anything.

The "Shawn Simulator" option enables code generation for simulations with integrated simulator Shawn. The "Pacemate" option enables code generation for the pacemate devices of the University of Lübeck and the University of Applied Sciences Lübeck. The four JN51X options are to be used for the different device types that feature Jennic controllers.

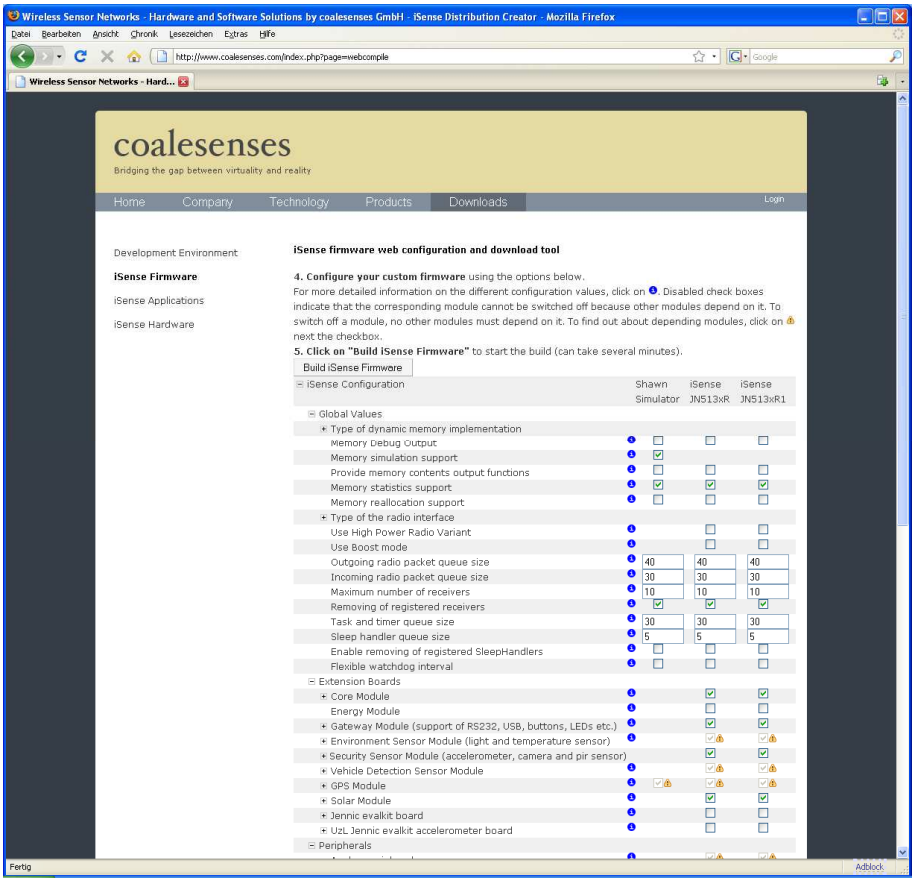
For the iSense nodes, use "iSense JN513xR", "iSense JN513xR1" and/or "iSense JN5148", depending on the controller type on your devices. Generally, "iSense JN513xR" or "iSense JN513xR1" are appropriate for the first generation Core Modules (CM10X). For details on determining the controller type of your nodes, please refer to the "iSense Core Module User Guide" [3]. For the second and third generation Core Modules (CM20X/CM30X) choose the JN5148 setting.

Then, choose the target platform for the Shawn simulator (you can ignore this option if the "Shawn Simulator" platform has not been chosen). Available options comprise 32-bit windows (via Cygwin) and 32-bit linux. Currently, 64-bit platforms are not supported.



Click on "Proceed to configuration", and after a few seconds the configuration screen appears.

By default, a configuration that should be helpful for most users is selected. If you need more information about the different modules available, click on the blue circle with the "i" right of the module name, and a popup displaying a descriptive text will appear.



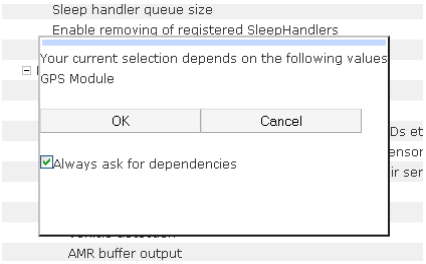
If a checkbox is checked, this indicates that the according firmware module is activated.

Note that some checkboxes will be disabled (indicated by grey checkbox), and a little warning sign appears right next to it. This is due to the modular structure of iSense firmware. For consistent functionality, some features require that one or more other features are activated (this is called: module A depends on module B, or module B has depending modules). The default configuration is inherently consistent, i.e. all modules that other modules depend on are activated. To preserve consistency during configuration, modules that have depending modules cannot be disabled unless the depenters are disabled.

To find out which modules depend on a certain module you want to deactivate, click on the little yellow warning sign right next to the disabled checkbox. A popup indicating the depending modules will be displayed.

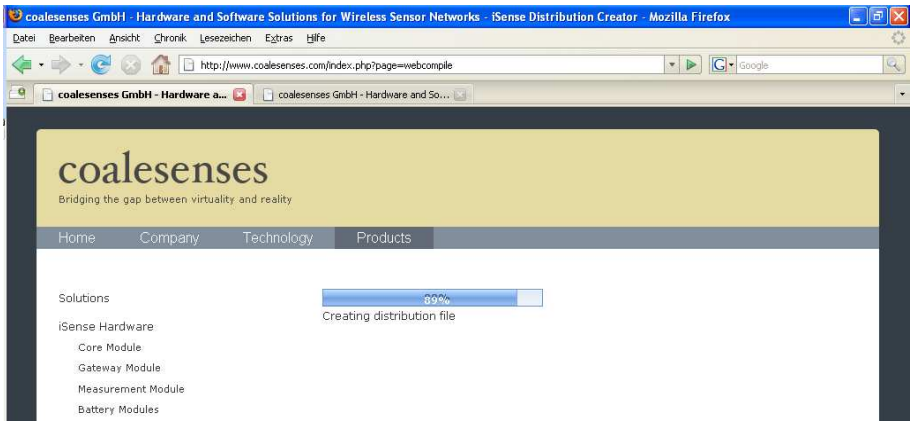
Once you have disabled all modules that depend on a certain module, you can uncheck this module as well.

If you try to activate a module that depends on other modules, and those other modules are not activated yet, a dialog pops up and asks whether the according modules should be activated automatically.

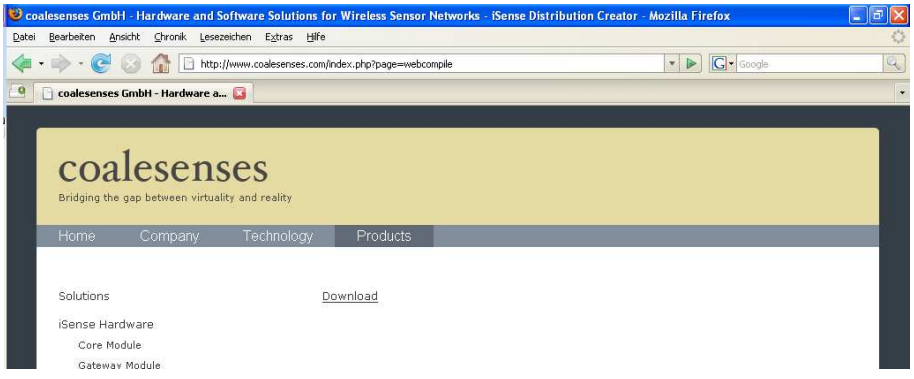


Choose “Ok” to enable the module and all modules it depends on, or “Cancel” if you want to refrain from activation. In the later case, you latest (manual) activation will not be done either, as the configuration would become inconsistent otherwise. If you uncheck “Always ask for dependencies”, you will not be asked again, and the dependencies will be automatically activated during further configuration.

After making all your choices, click on “Build iSense Firmware” and wait for the compilation process to complete. Note that the compilation can take several minutes.



After the compilation completes, click on “Download” to access the compiled firmware zip file.



Extract the contents of isense.zip to the iSense directory extracted in the steps described in Section 4.1. Be sure that the directory is empty before you extract the ZIP file.

4.4.Building the open source files of iSense for the SHAWN simulator

This step is only required if you also want to build iSense applications for the SHAWN simulator.

Go to the iSense directory created in the steps described in Section 4.1. Then, type

make -s -f Makefile.open-source

and see the open source files being built for the SHAWN simulator.

5. Subscribing to the iSense Mailing list

There is a mailing list for iSense users: isense@coalesenses.com. To subscribe, send an email with the subject "subscribe" to

isense @coalesenses.com

To unsubscribe again, send an email with the subject "unsubscribe" to

isense @coalesenses.com

6. *Install iShell*

- Download iShell from

  http://www.coalesenses.com/index.php?page=ishell-downloads
- Save it the desired destination directory (e.g. to C:\Programme\ishell)
- Execute iShell.exe

7. Using Eclipse for C development

7.1. Install Eclipse

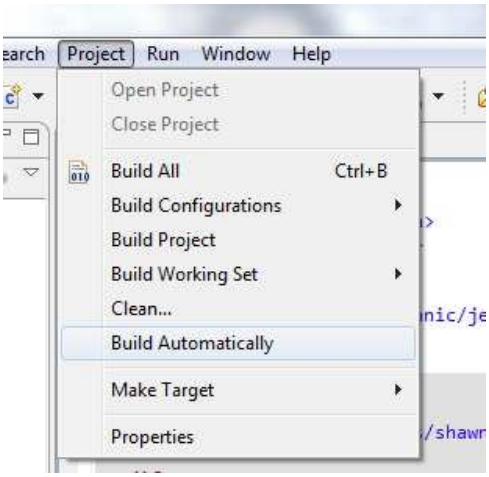
If you have not already installed Eclipse on your system install Eclipse IDE for C/C++ Developers:

Download the Eclipse ZIP-file (Eclipse IDE for C/C++ Developers) from http://www.eclipse.org/downloads/

Extract the content e.g. to C:\Programme\ and launch Eclipse.

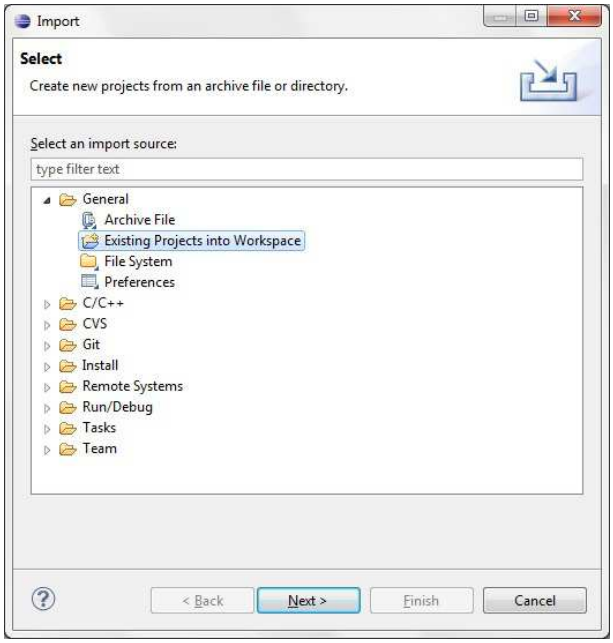
To change to the C++ Perspective, select "Window"→"Open Perspective" → "Other…" from the menu bar, and choose "C/C++ (default)".

We recommend to disable automatic building. Click on "Project" in the menu bar, and disable the option "Build Automatically".

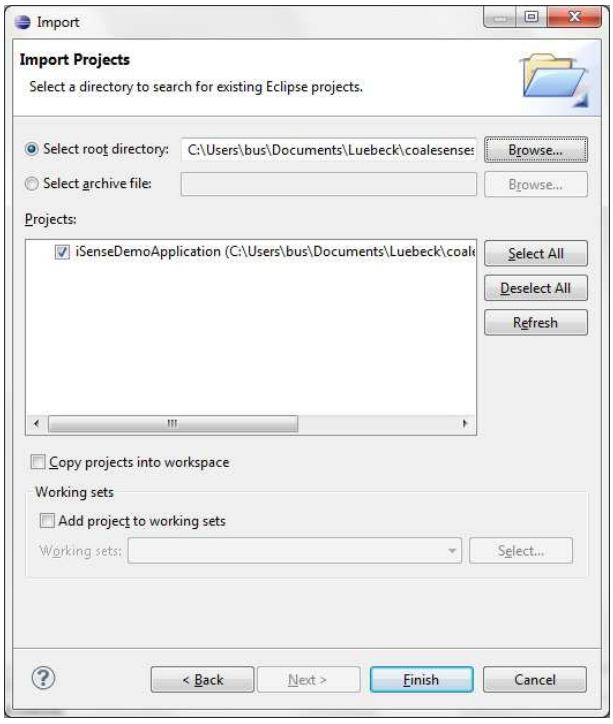


7.2. Import applications into Eclipse

Open Eclipse, and choose "File" → "Import" from the menu bar. Select "General" → "Existing Projects into Workspace".

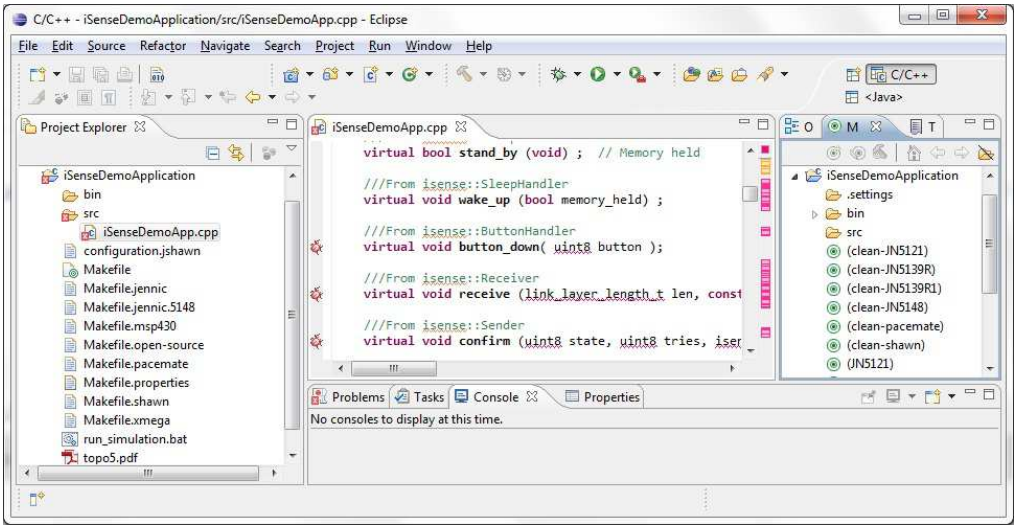


Select the folder of the application to be imported from the iApps folder (e.g. iSenseDemoApplication for the simple demo application) and DO NOT SELECT "Copy to workspace".

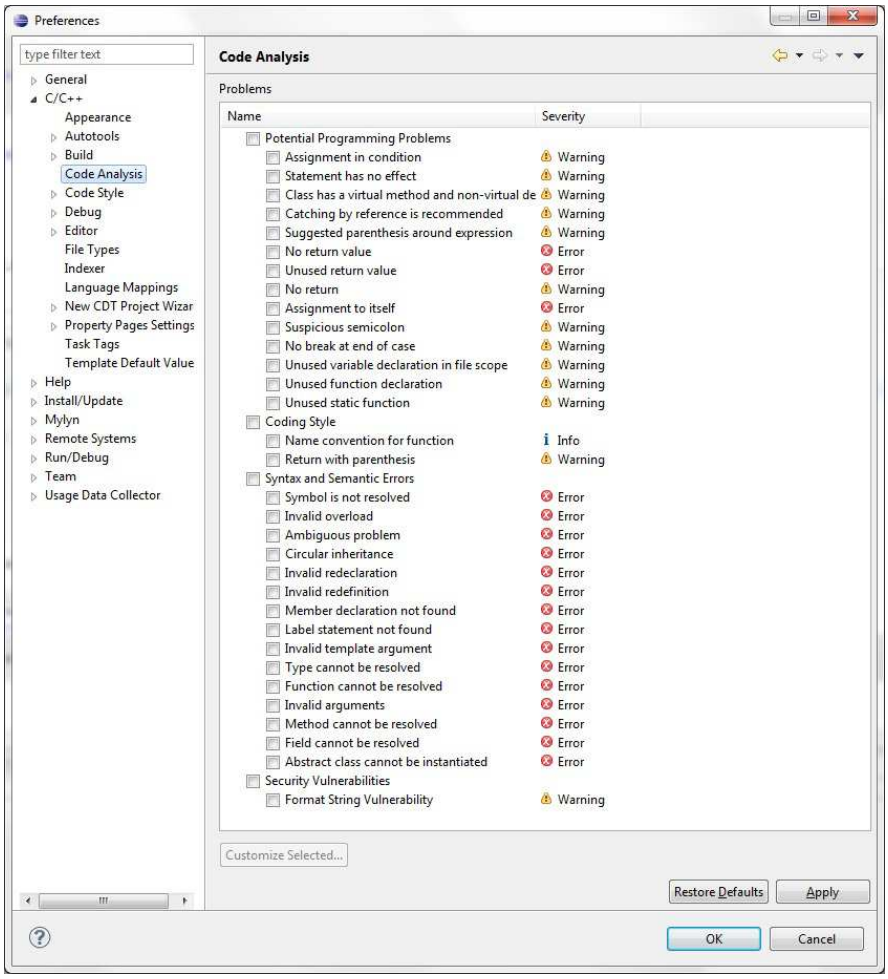


Click on "Finish" in finish the import. If the application appears disabled in the "Projects:" list, this commonly indicates that a project with the same name has already been imported into Eclipse before (no two projects with the same name can be imported into Eclipse at the same time).

In some cases, you experience large numbers of supposed errors indicated by Eclipse. It might display little bug symbols at left border of the file editor window and indicate error on the right border (see below).

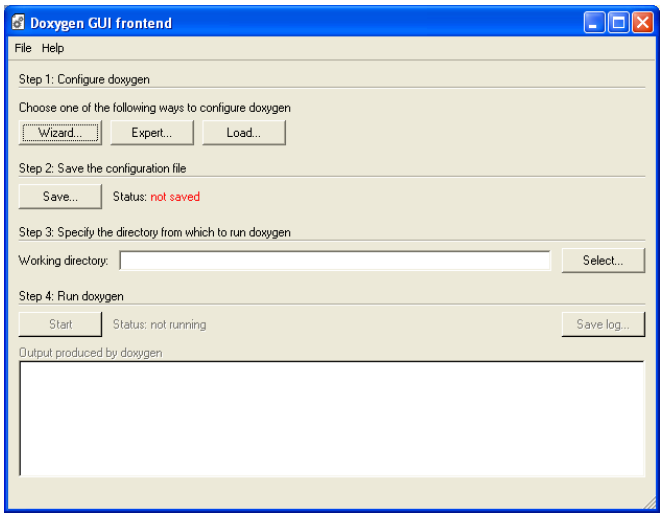


To disable this overcautious code analysis, select “Window” from the menu bar, and choose “Preferences”. In the preferences dialog, go to “Code Analysis” in the “C++” section, and disable “Potential Programming Problems”, “Coding Style”, “Syntax and Semantic Error”, and “Security Vulnerabilities”.



8. How to install doxygen

- Download Graphviz from http://www.graphviz.org/ and install it to C:\Programme\Graphviz (or similar)
- Download Doxygen from http://www.stack.nl/~dimitri/doxygen/download.html#latestsrc and install it
- Start the Doxygen GUI (Doxywizard).



Click on the „Load“ button to load the configuration file doxygen.new from isense_sdk/iSense

- now choose click on the „Expert“ button, go to the „Dot“ tab, and adapt the DOT_PATH to the bin directory of your GraphViz installation
- Save the configuration, use a new filename (for not committing your updated configuration file.
- To generate documentation, click on „Start“, and wait for the process to finish

9. Installing the iSense Gateway Module USB Driver for Windows

- Go to http://www.ftdichip.com/Drivers/VCP.htm
- In the table, click on "setup executable" (in the “Windows” row at the "Comments" Column at right), and save the executable file on your computer.
- Install the driver

10. Troubleshooting

Problem	**Solution**
The command “make” was not found	
	Go to www.cygwin.com. Download and run the Setup.exe. In the section “Devel”, search for make. If the entry of make is set to skip, change it to install by clicking on “skip” until a version number is visible.

Problem	**Solution**
Flashing the nodes sometimes fails somewhere in the middle. It works fine on the second try.	
	Probably the program that is already running on the node crashed, and hence the watchdog is not set back periodically. Hence the device is reset by the watchdog after some time, then hangs up again, and so on. When you start programming at a certain point in time, the watchdog may reset the device while programming. To prevent that, reset the device before starting the programming.

11. References

[1] coalesenses iShell User Guide, online available at http://www.coalesenses.com/download/UG_ishell_v1.3.pdf

[2] coalesenses Writing iSense Applications User Guide, online available at http://www.coalesenses.com/download/UG_writing_isense_applications_1v1.pdf

[3] coalesenses iSense Core Module User Guide, online available at http://www.coalesenses.com/download/UG_CM10X_1v0.pdf

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