IrScrutinizer documentation

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Note:
This is a reference manual. It is written for completeness and correctness, not for accessibility. For an easier introduction, see this tutorial.

Warning:
Sending undocumented IR commands to your equipment may damage or even destroy it. By using this program, you agree to take the responsibility for possible damages yourself, and not to hold the author responsible.

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013-11-12</td>
<td>Initial version.</td>
</tr>
<tr>
<td>2013-12-01</td>
<td>Next unfinished version.</td>
</tr>
<tr>
<td>2014-01-22</td>
<td>Version for release 1.0.0, still leaving much to be desired.</td>
</tr>
<tr>
<td>2014-06-07</td>
<td>Version for release 1.1.0, some fixes, much still to be done.</td>
</tr>
<tr>
<td>2014-09-21</td>
<td>Version for release 1.1.1, some more fixes and enhancements.</td>
</tr>
<tr>
<td>2016-01-13</td>
<td>Added description for user selectable character sets for import and export.</td>
</tr>
<tr>
<td>2019-08-09</td>
<td>Version for release 2.0.0. Not complete...</td>
</tr>
<tr>
<td>2020-05-03</td>
<td>Updated installation instructions.</td>
</tr>
<tr>
<td>2020-05-20</td>
<td>Minor updates for version 2.2.6.</td>
</tr>
<tr>
<td>2020-07-30</td>
<td>Updated building instructions.</td>
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Table 1: Revision history

1 Introduction
IrScrutinizer is a powerful program for capturing, generating, analyzing, importing, and exporting of infrared (IR) signals. For capturing and sending IR signals several
different hardware sensors and senders are supported. IR Signals can be imported not only by capturing from one of the supported hardware sensors (among others: IrWidget, Global Caché, Command Fusion, and Arduino), but also from a number of different file formats (among others: Lirc, Wave, CML, Pronto Classic and professional, RMDU (partially), and different text based formats; not only from files, but also from the clipboard, from URLs, and from file hierarchies), as well as the Internet IR Databases by Global Caché and by IRDB. Imported signals can be decoded, analyzed, edited, and visualized. A collection of IR signal can thus be assembled and edited, and finally exported in one of the many supported formats. In addition, the program contains the powerful IrpTransmogrifier IR-renderer, which means that almost all IR protocols known to the Internet community can be generated.

Written in Java (with the exception of three native libraries), most of the functionality of the program is available on every Java platform. The native libraries (DecodeIR and RXTX) are presently available for 32- and 64-bit versions of Windows, Linux (x86, amd-64, arm version 7), and MacOsX, and can with moderate effort be compiled for other platforms. (The library DevSlashLirc is available (and meaningful!) for Linux only.)

For someone with knowledge in the problem domain of IR signals and their parameterization, this program is believed to be simple to use. This knowledge is assumed from the reader. Other can acquire that knowledge either from the JP1 Wiki or, e.g., this link.

Note that screen shots are included as illustrations only; they may not depict the current program completely accurately. They come from different versions of the program, using different platforms (Linux and Windows), and using different "look and feels".

Sources are hosted on Github. Bugreports are enhancement requests are welcome (e.g. as issues), as is contributions (code, documentation, use cases, protocols etc.).

The present document is written more for completeness than for easy accessibility. For an easier introduction, see this tutorial.

Here are the current release notes.

1.1 Background

In 2011 I wrote an IR signal "engine" called IrpMaster. It can also be invoked as a command line program. Then a program called IrMaster was released, which among other things constitutes a user friendly GUI front end to IrpMaster. The present program, IrScrutinizer, was also based on IrpMaster, and adds functionality from IrMaster, in particular the possibility to collect IR signals, a vastly improved import and export facility, and edit collections of IR commands. IrScrutizer almost completely replaces IrMaster. The final version was released in February 2014, slightly ironically called version 1.0.0. No further development is planned.
The final version of IrScrutinizer is called 1.4.3, and is available here. Since version 2.0.0, the newer IR engine IrpTransmogrifier has replaced IrpMaster, DecodeIR, and Analyzer.

### 1.2 Copyright and License

The program, as well as this document, is copyright by myself. My copyright does not extend to the embedded "components", like Jirc. IrpTransmogrifier is using ANTLR4 and depends on the run time functions of ANTLR4, which is free software with BSD license. The "database file" IrpProtocols.xml is derived from DecodeIR.html, as well as many, many discussions with, and contributions from, members of the JP1 community, thus I do not claim copyright.

The program uses JCommander by Cédric Beust to parse the command line arguments. It is free software with Apache 2 license.

Icons by Everaldo Coelho from the Crystal project are used; these are released under the LGPL license.

The Windows installer was built with Inno Setup, which is free software by Jordan Russel. To modify the user's path in Windows, the Inno extension modpath by Jared Breland, distributed under the GNU Lesser General Public License (LGPL), version 3.

Serial communication is handled by the RXTX library, licensed under the LGPL v 2.1 license.

JSON handling is implemented using the "fast and minimal JSON parser for Java" by Ralf Sernberg, licensed under the Eclipse Eclipse Public License Version 1.0.

Lirc (Linux Infrared Remote Control) is according to its web site copyright 1999 by Karsten Scheibler and Christoph Bartelmus (with contribution of many others), and is licensed under GPL2. The parts used here have been translated to Java by myself, available here.

For Pronto Classic support, Tonto by Stewart Allen was used. It is licensed under the "Clarified Artistic License".

The program contains icons from Dangerous Prototypes and IrTrans. These are used exclusively in the context of these firms, and only used to illustrate their products.

The icons for JP1 and Lirc are also exclusively used to illustrate the community, their products, and files.

The program and its documentation are licensed under the GNU General Public License version 3, making everyone free to use, study, improve, etc., under certain conditions. File formats, their description in human- or machine-readable form (DTDs, XML Schemas), are placed in the public domain.
1.3 Privacy note

Some functions (Help -> Project Home page, Help -> IRP Notation Spec, Help -> Protocol Specs, Tools -> Check for updates) access the Internet using standard http calls. This causes the originating machine's IP-address, time and date, the used browser, and possibly other information to be stored on the called server. If this is a concern for you, please do not use this (non-critical) functionality (or block your computer's Internet access).

2 Overview

Next a high-level view of the different use cases will be given.

Analyze ("Scrutinize") individual IR Signal/Ir Sequence
An IrSignal or IrSequence can be captured from connected hardware, or imported from files in different formats, the clipboard, or from Internet databases. The IrSequence can be broken into a beginning-, repeat-, and ending sequence, and decoded, analyzed, and plotted. It can be exported in different formats, or sent to different transmitting hardware.

Analyze/edit/compose/export collections of IR signals ("remotes")
A collection of commands can be assembled either from individual IR signals (as above), captured several at a time, or imported from files in different formats, the clipboard, or from Internet databases. The collection and the individual commands can be edited as in a spreadsheet. It can be exported in a number of different formats.

Generate IR Signals from known protocols
IR Signals can be generated from the Internet's largest protocol data base, containing over 100 protocol. Necessary protocol parameter values are to be entered. Thus generated signals can be analyzed as single signals, incorporated into remotes, or exported to files — also from e.g. intervals of parameters.

3 Installation

3.1 Download

The latest official release is always available here. In addition, there are continuous integration builds, at least most of the time. These are build from a snapshot of the current sources. Because of this, they are more likely to be unstable, contain bugs, or even to be outright useless.

3.2 General

IrScrutinizer, and all but two of its third-party additions, are written in Java, which means that it should run on almost all current computer; Windows, Linux (including Raspberry Pi), Macintosh, etc. Many of the installation options come with its own contained Java, for the other options, the Java runtime (presently version 8 or later) must be installed.
The exception is the native part of RXTX, which are written in C, and invoked as shared library (.dll in Windows, .so in Linux, .jnilib in Mac OS X). For Linux, there is also the DevSlashLirc library. If the shared libraries are not available on for a particular platform it is not a major problem, as most parts of IrScrutinizer will work fine without it; just the serial hardware access, or the access to certain hardware will be unavailable.

In all versions, IrScrutinizer behave civilized, in that the installation directory is not written to, and thus can be read-only as soon as the installation has taken place.

There are five different way of installing the program, described next.

### 3.3 Windows

Download the [Window setup file](#) and double click it. Select any installation directory you like; suggested is C:\Program Files\IrScrutinizer. Create the start menu folder, and the desktop icon. If administrator rights are present, the recommended installation location is in a subdirectory of Program Files. Otherwise the program can be installed in any directory writable by the current user. The setup comes with a Java runtime, but it is also possible to use a compatible, existing installation. IrScrutinizer can now be started from Start -> IrScrutinizer -> IrScrutinizer, or from the desktop icon.

Sometimes Windows will refuse to install programs from sources that it does not consider as trustworthy. It may then be necessary on Settings -> Apps & features to select on "Choose where to get apps" to something else than "The Microsoft store only".

If desired, the installer will associate .gir files with the program, allowing them to be opened by double clicking them.

The installer will also install the command line program [IrpTransmogrifier](#), which can be called as irptransmogrifier from a command line window.

To uninstall, select the uninstall option from the Start menu, or (on Windows 10, right click Start -> IrScrutinizer -> IrScrutinizer and select Uninstall). Or use the operating system's program management for de-installing (Settings -> Apps and Features). Very pedantic people may like to delete the properties file too, see [properties](#).

### 3.4 AppImage for 64-bit Linux

An [AppImage](#) is a distribution consisting of one large monolithic executable application that is downloaded, made executable, and run, without any installation in the classical sense. At this moment, only 64-bit x86 Linux is supported. It is believed to run on all modern, 64-bit x86 Linux distributions. Just download, make executable, and double click (or start from the command line). It comes with its own Java runtime.

To uninstall, just delete.
3.5 Mac OS X app

Download the disk image file (*.dmg). Mount it by double clicking. A mounted disk image "IrScrutinizer" will then appear on the desktop. Opening it will show an app, and a few documentation files. The app can just be dragged to the desktop, to the tray, to "Applications" or any other location the user prefers. IrScrutinizer now behaves like any other app in Mac OS X.

Sometimes the operating system will refuse to install or run programs from sources that it does not consider as trustworthy. It may then be necessary on System Preferences -> Security & privacy -> General to select on "Allow apps downloaded from" to "Anywhere".

To uninstall, just drag the program to the trash can.

The command line program IrpTransmogrifier is not supported in this mode. (For this, the generic binary distribution has to be used.)

3.6 Generic Binary

The generic binary version consists of all the Java classes packed in one executable jar file, together with supporting files, like all the compiled shared libraries for the different operating systems Linux (x64-32, x86-64, armv7), Windows (x86, 32 and 64 bits), and Macintosh. It can be used on all those systems. (In other environments, the shared libraries may be compiled with moderate effort.)

The generic binary distribution also can be used whenever using the setup.exe/app installation is not possible, not up-to-date, or just not desired. It can also be used to update an existing installation on, e.g., Windows.

First make sure that the Java runtime of correct version (currently version 8 or later) is installed.

To install, unpack in an empty directory of your choice; suggested (for Unix/Linux) is /usr/local/share/irscrutinizer. On Windows, the program can be started by double clicking the .jar file.

The rest of this section applies to Unix/Linux.

There are a few additional steps, which the script setup-irscrutinizer.sh can take care of. If this is not desired, or does not work, these steps will be described next.

Inspect the wrapper irscrutinizer.sh, and make changes if necessary.

It is recommended to make links from a directory in the path to the wrapper script, e.g.

```
ln -s /usr/local/share/irscrutinizer/irscrutinizer.sh /usr/local/bin/irscrutinizer
ln -s /usr/local/share/irscrutinizer/irscrutinizer.sh /usr/local/bin/irptransmogrifier
```
If your system comes with a natively and working RXTX, you should preferably use that. However, Fedora currently ships with unusable RXTX. See the comments in the wrapper irscrutinizer.sh.

The desktop file irscrutinizer.desktop should, if desired, be installed in /usr/local/share/applications alternatively ~/.local/share/applications.

The program can now be started either as a desktop program, or by typing irscrutinizer on the command line. Also the command line program IrpTransmogrifier can be started by the command irptransmogrifier. It is also possible to start the program by double clicking on the jar file. In case this brings up the archive manager, the desktop needs to be taught to open executable jar files with the "java" application. For this, select a jar file the file browser, select the properties, and select "java" as the application to "open with". (The details might vary.)

On Linux, it is general necessary to check, and possibly fix, the access to the serial devices. The previously mentioned wrapper does this.

On Gnome-like desktops, by copying the file girr.xml to the system's data base of known file types (normally located in /usr/local/share/applications), *.girr files can be opened in IrScrutinizer by double click. For this, follow this description.

To uninstall, just delete the files. Some may like to delete the properties file too.

### 3.7 Source distribution

Compiling the sources is covered in the Appendix. This generates the generic binary distribution file, which is installed as described above. Alternatively, it can be installed with the command

```make
make -f tool/Makefile install
```

possibly with sudo or as root.

### 3.8 Linux/Unix Serial device access

To access serial devices, including "serial" devices connected over USB, most current Linuxes require the current user to be a member of the group dialout, in some cases (e.g. Fedora) also the group lock. To grant user $USER this membership, typically a command like sudo usermod -aG dialout $USER, and/or sudo usermod -aG lock $USER is used.

It has been brought to my attention that Arch Linux (and likely others) still use the older name uucp for dialout.

Do not run this program as root (except possibly for debugging device access).
4 Concepts

For anyone familiar with the problem domain, this program is believed to be intuitive and easy to use. Almost all user interface elements have tool-help texts. Different panes have their own pop-up help. In what follows, we will not attempt to explain every detail of the user interface, but rather concentrate on the concepts. Furthermore, it is possible that new elements and functionality has been implemented since the documentation was written.

This program does not disturb the user with a number of annoying, often modal, pop ups, but directs errors, warnings, and status outputs to the console window, taking up the lower third of the main window. This window is re-sizeable. There is a context menu for the console, accessible by pressing the right mouse button in it.

In the upper row, there are six pull-down menus, named File, Edit, Actions, Options, Tools, and Help. Their usage is believed to be mainly self explanatory, with some the exceptions.

Options to the program are in general found in the Options menu, or its subordinate menus. Some parameters for particular export formats are found in the sub-panes of the "Export" pane. Also the hardware configuring panes contain user parameters.

The main window is composed of seven sub panes denoted by "Scrutinize signal" (for processing single signal), "Scrutinize remote" (for collecting several signals to one "remote"), "Generate" (generates IR signal from protocol name and parameters), "Import", "Export", "Sending Hardware", and "Capturing Hardware" respectively. These panels will be discussed in Section GUI Elements walk through

5 Analyzing a single IR Sequence or IR Signal

The pane "Scrutinize Signal" is devoted to the analysis of one single IR sequence.

To capture IR Sequences from a hardware sensor, first set it up and open it, see Section Capturing Hardware. An IR Sequence is captured by pressing the "Capture" button, and sending an IR signal to the selected hardware. Note that the hardware captures an IR Sequence, not an IR Signal. It consists of an (sometimes empty) start sequence, an unknown number of repeat sequences, and sometimes an ending sequence.

6 Adding new export formats

Only a few of the many export formats are defined in the main Java code, the rest are defined in files in the directory exportformats.d, located in the root of the install directory. By adding a file here, the user can simply add his/her own export formats according to own needs. An export format consists of a number of properties, together with a small "program" written in the transformation language XSLT, for transforming a Girr-XML-tree to the desired text format.
The rest of this section documents the format of these files, and is supposed to be read only when needed. Fundamental knowledge of XML and XSLT transformations are assumed.

### 6.1 Format of the files in exportformats.d

The file is an XML file read without validation. The syntax and semantics are believed to be essentially self explaining, or clear from the examples already in there. An export format is packed in an element of type `exportformat`. It contains the following attributes:

- **name**: Text string used for identifying the format.
- **extension**: Text string denoting preferred file extension (not including period) of generated files.
- **multiSignal**: Boolean (value: true and false). Denotes if several signals can be represented in one export, or only one.
- **simpleSequence**: Boolean, (values true of false). If true, the export really describes a sequence rather than a signal (with intro-, repeat-, and ending-sequences), therefore the user must explicitly state a particular number of repetitions for an export.

The element contains a single child element, namely the XSLT transformation, which is an element of type `xsl:stylesheet`, with attributes as in the examples.

The task of the transformation is to transform a Girr XML DOM tree in the "fat" format, with `remotes` as root element, into the desired text format. It may be advisable to use the already present formats as guide.

For testing and developing new export formats in this for, the main routine of the class `org.harctoolbox.irscrutinizer.exporter.DynamicRemoteSetExportFormat` may be used. It can be used to transform a Girr file(s) from the command line.

After editing or adding export format files, they can be reloaded either by re-starting the program, or by selecting Options -> Export formats database -> Reload.

### 7 Properties

Under Windows, the persistent properties are stored in `%LOCALAPPDATA%\IrScrutinizer\IrScrutinizer.properties.xml` (typically `%HOME%\AppData\Local\IrScrutinizer\IrScrutinizer.properties.xml`). Using other operating systems, it is stored according to the FreeDesktop specification. Per default, this is `$HOME/.config/IrScrutinizer/properties.xml`. It is not deleted by un-install or by an update of the program. If weird problems appear, for example after an update, try deleting this file, from the GUI File -> Set properties to...
default. There is a command line option --nuke-properties that can be used to conveniently delete the present property file, without remembering its exact name.

8 GUI Elements walk through

8.1 The "Scrutinize signal" pane

This panel is devoted to the analysis of a single IR signal or IR sequence. A (single) signal is either read from hardware using the "Capture" button (requires that the capturing hardware has been set on the "Capturing Hardware" pane), imported from a file (using the context menu in the data window, or through File -> Import -> Import as single sequence), or pasted from the clipboard. Also, some other panes can transfer data to this pane. The button "Capt. (cont.)" a tread is started, that continously captures signals from the hardware. Only the last signal is kept. For text import, the signal can be in either Pronto Hex format, raw format (indicated by a leading "+-"-sign), or in the UEI learned format. The signal is printed in the data window, in the preferred text format, which can be selected from the options menu. The text representation may be edited (assuming sufficient knowledge!), after which the edited signal is analyzed and plotted again by pressing the "Scrutinize" button. The signal may be sent to the sending hardware by pressing the "Transmit" button.

The plot can be horizontally zoomed by pressing the left mouse button and dragging. Printing and exported as graph are presently not implemented.

The menu entry Actions -> Enter test signal (or its accelerator, the F9 key) enters a test signal.

Using context menus, the result can be sent to the clipboard or saved to a file. The menu entry "clone plot" makes a clone of the plot. This can be used for comparing with subsequent plots.

Note that transforming the signal between different formats may introduce rounding errors. In rare cases, this may causing decoding to fail.

A Girr file can be dropped on the text- or plot windows. This will display the concatenation of the signals in the file.

8.2 The "Scrutinize remote" pane

This panel is devoted to the capturing/import/editing of a collection of IR signals, called "a remote" in the sequel. The panel contains two sub-panels: for parametric signals and for non-parametric, "raw", signals.

A "parametric" signal is determined by its protocol name, and the values of the protocol's parameters. A "raw" signal is determined by its timing pattern, and its modulation frequency. It may have one or many decodes, or none. Nevertheless, by definition, a raw signal is determined by its timing, not the decodes.
In both cases, the sub panes consists of tables with a number of columns. Every signal takes up a row in the table. The content of the individual cells (with the exception of its number and date) can be individually edited, like in a spreadsheet program.

In both tables, the right mouse button opens a context menu containing a number of ways to manipulate the table, its view, or the data contained therein. By enabling the row selector, the rows can be sorted along any of the present columns.

Clicking a row with the middle mouse button selects that row, and transmits it using the currently selected sending hardware.

To capture IR signals, first configure the hardware using the capturing hardware pane. Next press the Capture button. The program will now run the capturing in a separate thread, so the user just have to press the buttons of the remote. The signals will be received, interpreted, decoded, and entered on subsequent lines in the selected table (raw or parameterized). The capture thread will continue until the captured button is pressed again. (Note that this is completely different from the capture button on the "Scrutinize signal" panel.) The user may mix captures with other activities, like entering information (name, comments,...) in the table.

The export button exports the content of the currently selected table (raw or parameterized) according to the currently selected export format.

A Girr file can be dropped on the parameter as well as the raw table, which will import the contained signals.

The menu entry Actions -> Enter test signal (or its accelerator, the F9 key) enters a test signal, either as parametric signal, or as a raw signal.

### 8.2.1 The parametric table columns

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>A unique number assigned to the signal when creating. It is not editable and not exported.</td>
</tr>
<tr>
<td>Timestamp</td>
<td>A timestamp generated when the signal was entered or created. It is not editable and not exported.</td>
</tr>
<tr>
<td>Protocol</td>
<td>Name of the protocol. In the table, anything can be entered, however, to export, it has to match (case insensitively!) a known protocol.</td>
</tr>
<tr>
<td>D</td>
<td>The D parameter value, as defined in the protocol IRP.</td>
</tr>
<tr>
<td>S</td>
<td>The S parameter value, as defined in the protocol IRP.</td>
</tr>
<tr>
<td>F</td>
<td>The F parameter value, as defined in the protocol IRP.</td>
</tr>
<tr>
<td>T</td>
<td>The T parameter value, as defined in the protocol IRP.</td>
</tr>
</tbody>
</table>
**Misc. params**
All parameters not called D, S, F, or T, using syntax \textit{name}=\textit{value}, for example X=42 Y=73. (Note that there are no spaces around the equal ("=") sign, but between the assignments.

**Name**
Name of the command. This is in principle arbitrary, however, to be able to constitute a meaningful export to a target device, the names have to be unique.

**Comment**
A textual comment. In most export formats, it is transmitted to the export, and the target can treat it anyway it desires.

### 8.2.2 The raw table columns

- **#**
  A unique number assigned to the signal when creating. It is not editable and not exported.

- **Timestamp**
  A timestamp generated when the signal was entered or created. It is not editable and not exported.

- **Intro**
  The \textit{intro sequence} of the command.

- **Repeat**
  The \textit{repeat sequence} of the command.

- **Ending**
  The \textit{ending sequence} of the command.

- **Name**
  Name of the command. This is in principle arbitrary, however, to be able to constitute a meaningful export to a target device, the names have to be unique.

- **Decode**
  The result of feeding the signal to the decoder. Not editable, not considered as authoritative information; serves only for information.

- **Analyze**
  The result of feeding the signal to the analyzer. Not editable, not considered as authoritative information; serves only for information.

- **Comment**
  A textual comment. In most export formats, it is transmitted to the export, and the target can treat it anyway it desires.

- **Frequency**
  Modulation frequency in Hz.

### 8.3 The "Generate" pane

In the upper part of this pane, an IR protocol is selected, identified by name, and the parameters D ("device", in almost all protocols), S ("sub-device", not in all protocols),
F ("function", also called command number or OBC, present in almost all protocols), as well as T, "toggle" (in general 0 or 1, only in a few protocols). These number can be entered as decimal numbers, or, by prepending "0x", as hexadecimal numbers.

In IrpTransmogrifier and its documentation, the word "render" is used instead of "generate".

By pressing "Generate", the signal is computed, and the middle window is filled with a textual representation, in the form selected by Options -> Output Text Format.

For protocols with a toggle, leaving it unassigned (T left empty) makes the rendering engine "toggle" in the sense that it changes its value on every invocation, in accordance with the IRP. The rendering engine is invoked not only by "Generate", but also by "Transmit", "Export", and the "To ..." buttons.

The Export button initiates an export to a file format selected by the Export pane. The three lower buttons transfer the signal(s) to the scrutinize signal panel, the raw remote table, or the parameterized panel.

8.3.1 Accessing a number of different parameter values

For the export and the transfer to the "scrutinize remote" tables, not only a single parameter value can be selected, but whole sets. The complete syntax and semantics is given in the IrpMaster documentation, we here just mention that e.g. 12:34 means all numbers between 12 and 34 (inclusive), and * denotes all possible values (as defined by the protocol's IRP notation).

8.4 The Import pane

The import pane allows for selective import of collection of IR commands. Both Internet data bases and file formats are supported. Import can take place from local files or even file hierarchies, from the clipboard, or from Internet URLs.

There are a number of elements common to most of the sub-panes, so these will be described next.

For file/URL based imports, there is a text field, named File or File/URL. For the latter case, an URL (like http://lirc.sourceforge.net/remotes/yamaha/RX-V995) can be entered, for subsequent import without downloading to a local disc. By pressing the "..."-Button, a file selector allows the selection of a local file. For files and URLs, the "Edit/Browse" button allows to examine the selected file/URL with the operating system’s standard command.

Several of the formats (the one based on text files, but not on XML (which carries its own character set declaration) allow the user to select the character set to be used for the import to be selected. This option is found as Options -> Import options -> Character Set...

Most of the file based importers support dropping a compatible file from the GUI on the import window.
If the option "Open ZIP files" (accessible from Options -> Import) is selected, zip files can be selected, opened, and unzipped "on the fly", without the need for the user to unzip to intermediate files. When pressing one of the "Load", "Load File/URL", or "Load from clipboard" button, the selected information is downloaded, and presented in the format of an expandable tree. By placing the mouse cursor over a command, additional information, like decode, is presented. A single command can be selected by mouse click, a sequence of adjacent commands by shift-click, a subset of not necessarily adjacent commands be selected by Ctrl-click, as usual from most GUIs. A single selected command can be transferred to the "Scrutinize signal" pane by pressing "Import signal". The "Import all" ("Import selection") button transfers all commands (the selected commands) to the "Scrutinize remote" pane, sub-pane "Parametric remote" (without overwriting already present commands), while the buttons "Import all/raw" and "Import selected/raw" transfer to the sub-pane "Raw remote".

The key "Transmit selected" transmits the (single) selected signal to the selected sending hardware.

The file based import formats allow a file to be "dropped" with the mouse on the main window.

### 8.4.1 Global Caché Database

Global Caché maintains a data base of IR signals, made available free of charge. "Contains over 100,000 Infrared codes for over 2,000 different remotes from over 500 manufacturers". To use from IrScrutinizer, an API Key has be be retrieved. This can be done from a Facebook, Google, or Yahoo account. After pressing the "APIKey" button, the API key is entered in the pop-up window. It is subsequently saved to the program's properties. To use, first select Select me to load to load the list of the manufacturers. Then select, in order, a manufacturer, a device type, and a setup code, the latter possibly by trial-and-error.

This data base is no longer maintained; replaced by the "Control Tower data base", described next.

### 8.4.2 Global Caché's Control Tower data base

This is the new data base from Global Caché. Unfortunately, non-premium users are not allowed to download codes using the API. For this reason, the program really only "browses" the data base.

To use its codes, log in with the browser (the "Web site" button goes to the home page), and have the code set mailed in CSV format (press "Send Code Set"). The mail received can be imported by the import text pane, raw subpane, Name col. = 1, Raw signal col = 2 (or 3), Field separator: comma.
8.4.3 The IRDB Database

**IRDB** is "one of the largest crowd-sourced, manufacturer-independent databases of infrared remote control codes on the web, and aspiring to become the most comprehensive and most accurate one."

To use, first select **Select me to load** to load the list of the manufacturers. Then select, in order, a manufacturer, a **device type**, and a **protocol**/parameter combination, the latter possibly by trial-and-error.

Pressing the "Load all" button transfers all present protocol/parameters combinations to the tree.

8.4.4 GIRR (the native format of IrScrutinizer)

The **GIRR format** is the native format of IrScrutinizer. The importer is capable of importing directory hierarchies.

8.4.5 LIRC

The **LIRC** import feature is based upon **JIRC**, which is basically a subset of LIRC translated into Java. The LIRC importer can even import a file system hierarchy by selecting the top directory as File/URL. (Importing the entire lirc.org database with over 100000 commands takes around 1 minute and 1GB of memory.)

8.4.6 CML

The CML format is the format used by the RTI Integration Designer software. Many CML files are available in Internet, in particular on **RemoteCentral**. Particularly noteworthy is the "megalist" by **Glackowitz**. IrScrutinizer can import these files to its import tree, making every remote a nodes in the tree. Note that there is no need to unzip such a file; IrScrutinizer will unzip it on the fly.

8.4.7 Command Fusion

The native format that Command Fusion uses, file extension **.cfir**, can be imported here.

8.4.8 RemoteMaster

The **JP1 community** has a large data base of parametric IR commands. IrScrutinizer has support for importing RMDU files for RemoteMaster. Unfortunately, the signals are stored as parameters for so-called executors, with sometimes different parameterization ("hex", "ecf") than the IRP protocols. Translating these files to one of the known protocol/parameter format is nothing but straightforward. It uses protocol information contained in protocols.ini. IrScrutinizer reads this file, and can do some computations, for example on NEC1 protocols, but not on all protocols.
For signals without recognized protocol name, importing as raw signals, or to "Scrutinize signal", is not possible. However, they can always be imported as parametric signals, possibly for manual edit.

### 8.4.9 Pronto Classic (CCF format)

Many [Pronto CCF files](http://www.remotecentral.com) are available in Internet, in particular by [Remote Central](http://www.remotecentral.com). IrScrutinizer can read in these files to its import tree, even preserving the Pronto "devices" as nodes in the tree.

### 8.4.10 Pronto Prof. (XCF format)

Pronto Professional XCF files are found for example at [Remote Central](http://www.remotecentral.com). IrScrutinizer can read in these files to its import tree, even preserving the Pronto "devices" as nodes in the tree.

This is not extensively tested.

### 8.4.11 ICT IrScope format

The ICT format, introduced by Kevin Timmerman's IrScope, contains the timing pattern, the modulation frequency, and optionally a name ("note") of one or many IR signals.

### 8.4.12 Text format

In the Internet, there are a lot of information in table-like formats, like Excel, describing the IR commands of certain devices. IrScrutinizer has some possibilities of importing these — after exporting them to a text format, like tab separated values (tsv) or comma separated values.

#### 8.4.12.1 Raw

The sub-pane allows for the parsing of text files separated by a certain characters, like commas, semicolons, or tabs. The separating characters is selected in the "Field separator" combo box. The column to be used as name is entered in the "Name col." combo box, while the data to be interpreted either as raw data or CCF format, is entered in the "Raw signal col.". If the "... and subsequent columns" is selected, all subsequent columns are added to the data.

#### 8.4.12.2 Raw, line-based

This pane tries to interpret a line-based file as a number of named IR commands, using heuristics.
8.4.12.3 Parameterized

The sub-pane allows for the parsing of text files separated by a certain characters, like commas, semicolons, or tabs. The separating characters is selected in the "Field separator" combo box. The column to be used as name is entered in the "Name col." combo box, while protocol name and the parameters D, S, and F are entered in their respective combo boxes. They are parsed in the number base selected.

8.4.13 Wave

This pane imports and analyzes wave files, considered to represent IR signals. The outcome of the analysis (sample frequency, sample size, the number of channels, and in the case of two channels, the number of sample times the left and right channels are in phase or anti-phase) is printed to the console.

8.4.14 IrTrans

IrTrans' configuration files (.rem) can be imported here.

8.5 The Export pane

Using the export pane, export files can be generated, allowing other programs to use the computed results. Single signals (from the "Scrutinize signal" pane), collections of signals (from the "Scrutinize remote" pane), or generated signals can be exported. Exports can be generated in a number of different formats. Some (Girr and text) can contain both the Pronto format and the "raw" format (timings in microseconds, positive for pulses, negative for gaps), as well as other formats. These formats, together with Wave, Lirc, and Pronto Classic, are built-in in the program. However, it is possible to define new export formats by extending a configuration file, see Adding new export formats.

The file names of the exports are either user selected from a file selector, or, if "Automatic file names" has been selected, automatically generated.

The export is performed by pressing the one of the Export buttons. The "..."-marked button allows for manually selecting the export directory. It is recommended to create a new, empty directory for the exports. The just-created export file can be immediately inspected by pressing the "Open last file"-button, which will open it in the "standard way" of the operating system. (Also available on the actions menu.) (Girr exports become a special treatment in order not to invoke another instance of the IrScrutinizer. They are copied to a temporary .txt file.) The "Open" button similarly opens the operating systems standard directory browser (Windows Explorer, Konquastador, Nautilus,...) on the export directory.

Some export formats (presently Wave, mode2, and Lintronic) export an IR sequence rather than an IR signal (consisting of an intro sequence, an repetition sequence (to be included 0 or more times), and an (most often empty) ending sequence). When using these formats, the number of repetition sequences to include can be selected.
The character set used for the export can be selected through Options -> Export options -> Character set... Note however that this makes sense only for text based formats, including XML.

Some export formats have some more parameters, configured in sub panes. These will be discussed in the context of the containing formats.

The formats presently implemented will be described next, in alphabetical order.

#### 8.5.1 AnyMote

Generates a configuration file for the [AnyMote IR remote control app](https://www.anymote.com/) for Android and iOS.

#### 8.5.2 Arduino/Raw

Generates a complete C++ sketch for the Arduino. This uses one of the three Arduino Infrared libraries IRremote, IRLib, and Infrared4Arduino. As the name suggests, the raw form of the signals are used.

#### 8.5.3 Arduino/Infrared4Arduino

Generates a similar C++ sketch for the Arduino as in the raw case, but tries to use the parametric form whenever possible, i.e., whenever the protocol is one that can be generated by the underlying infrared library. This version supports Infrared4Arduino only.

#### 8.5.4 Arduino/IRremote

Like the preceding, but supports the IRremote library instead.

#### 8.5.5 C

Generates a C code fragment consisting of declarations of the signals in raw- and CCF format. Intended mostly as an example.

#### 8.5.6 Girr

The program's native format, based on XML. Very flexible and extensible. Can contain information like the raw format, CCF format, UEI learned format, and the Global Caché sendir format. [Documentation](http://forrest.apache.org/). There are some extra parameters that can be configured in subpanes, described next:

#### 8.5.6.1 The Girr sub-pane

A style sheet can be selected to be linked in into the exported Girr file. The type of style file (presently xslt and css) can also be selected.
"Fat form raw" can be selected; this means that the raw signals are not given as a text string of alternating positive and negative numbers, but the individual flashes and gaps are enclosed into own XML elements. This can be advantageous if generating XML mainly for the purpose of transforming to other formats.

8.5.7 ICT
The ICT format, introduced by Kevin Timmerman's IrScope, contains the timing pattern, the modulation frequency, and optionally a name ("note") of one or many IR signals.

8.5.8 irplus
Generates a configuration file for the Android ID remote irplus.

8.5.9 IrToy
A text version of the following

8.5.10 IrToy-bin
Generates a binary file "in IrToy format" that can be send to the IrToy using the program irtoy.exe, see this thread.

8.5.11 IrTrans
This export format generates .rem files for the IrTrans system, using its CCF format.

8.5.12 Lintronic
Simple text protocol for describing a single IrSequence.

8.5.13 Lirc Raw
The Lirc-exports are in lircd.conf- raw format. These use the raw Lirc format, except for a few well known protocol (presently NEC1 and RC5). They can be concatenated together and used as the Lirc server data base. Can also be used with WinLirc.

8.5.14 Lirc
Like "Lirc Raw", but recognizes a large number of the protocols, for which lircd.conf files in "cooked" (opposite of raw) are generated. For other protocols, it falls back to the raw form.

8.5.15 mode2
A primitive debugging "signal format" used by Lirc, consisting on interleaved on- and off durations.
8.5.16 Pronto Classic

This format generates a CCF configuration file to be downloaded in a Pronto, or opened by a ProntoEdit program.

8.5.16.1 The Pronto Classic sub-pane

A Pronto Classic export consists of a CCF file with the exported signals associated to dummy buttons. The Pronto (Classic) model for which the export is designed is entered in the combo box. Screen size of the Pronto is normally inferred from the model, but can be changed here. The button size of the generated buttons is also entered here.

8.5.17 RemoteMaster

Produce a rudimentary device update (.rmdu file) for RemoteMaster. After importing, RemoteMaster will have the parameters, but not an executor, nor button assignments. These have to be entered manually in RemoteMaster. The procedure is described in detail here.

8.5.18 Spreadsheet

Simple tab separated value export format for importing in a spreadsheet program. This format is mainly meant to demonstrate a simple format in XSLT, more than a practically useful format.

8.5.19 Text

The text format is essentially the Girr format stripped of the XML markup information.

8.5.20 TV-B-Gone

Variant of the C format, this format generates C code for the TV-B-Gone.

8.5.21 Wave

IR sequences encoded as wave audio files.

8.5.21.1 The Wave sub-pane

Parameters for the generated Wave export (except for the number of repeats) can be selected here.

8.6 The "Sending HW" pane

The sub-panes of this pane allows for the selection and configuration of the deployed IR sending/capturing hardware.
Note that there is exactly one selected device, corresponding to the selected sub-pane of the "Sending HW" pane. This device may be opened or not. An opened device may be selected or not. There may be more than opened device.

The currently selected ports etc. are stored in the properties, thereby remembered between sessions. So, for future sessions, only opening the preferred device is necessary.

8.6.1 The "Global Caché" pane.

IrScrutinizer automatically detects alive Global Caché units in the local area network, using the AMX Beacon. However, this may take up to 60 seconds, and is not implemented in very old firmware. Using the "Add" button, the IP address/name of older units can be entered manually.

The "Browse" button points the user's web browser to the selected unit.

The reported type and firmware version serves to verify that the communication is working.

"Stop IR"-Button allows the interruption of ongoing transmission, possibly initiated from another source.

The user can select one of the thus available Global Caché units, together with IR-module and IR-port (see the Global Caché API specification for the exact meaning of these terms).

8.6.2 The "Lirc" pane

To be fully usable for IrScrutinizer, the Lirc server has to be extended to be able to cope with CCF signal not residing in the local data base, but sent from a client like IrScrutinizer, thus mimicking the function of e.g. a Global Caché. The needed modification ("patch") is in detail described here, sources here. However, even without this patch, the configuration page can be used to send the predefined commands (i.e. residing in its data base lirc.conf). It can be considered as a GUI version of the irsend command.

The Lirc server needs to be started in network listening mode with the -l or --listen option. Default TCP port is 8765.

When selecting the Lirc sub-pane, the therein selected Lircd is inquired for its version and its remotes. If successful, the "Remote" and "Command" combo boxes should now be enabled. After selecting a remote and one of its command, it can be sent to the Lirc server by pressing the "Send" button.

After entering another IP-Address or name, and port (stay with 8765 unless a reason to do otherwise), pressing the "Reload" button will update the Lirc server with its known remotes and their commands (however, not the version).

Transmitting other signals to Lirc works only if the Lirc server has the above described patch applied.
8.6.3 /dev/lirc (Linux only)

On Linux, so-called mode-2 capable IR hardware using the /dev/lirc device, can be accessed directly, both for sending and receiving. When connected, and in some cases after loading suitable drivers, a device file /dev/lircn (for n = 0, 1, 2,...) will be created. Of course, this must be read- and/or writeable by the current user; in e.g. Fedora this is the case for member of the group lirc.

After opening the device, its properties will be listed. See the man page lirc(4) for an explanation.

Although not a priori impossible, to my knowledge no /dev/lirc device implements frequency measurement.

8.6.4 The "IRTrans" pane

The configuration of IRTrans is similar to Lirc, so it will be described more briefly.

Enter IP name or -address and select an IR port (default "intern"). If the Ethernet IRTrans contains an "IR Database" (which is a slightly misleading term for an internal flash memory, that can be filled by the user), its commands can be sent from this pane. By pressing the "Read" button, the known remotes and commands are loaded, and the version of the IRTrans displayed. The selected command can now be sent by the "Send" button. (However, this functionality is otherwise not used by IrScrutinizer.)

The IRTrans module is then accessed using the UDP text mode.

8.6.5 The "IrToy" Pane

Using this pane, the IrToy (version 2) can be used to transmit IR signals. The firmware versions 2.0, 2.1, 2.2, as well as the in-official "2.4" work. (These are identified by a version string like V220 etc.) However, only version 2.2 has been exhaustively tested.

The ending timeout for receive is 1.7 seconds, and cannot be changed. This is not optimal for most IR signal capture use cases.

8.6.6 The "CommandFusion" Pane

Using this pane, the CommandFusion learner can be used to transmit and capture IR signals.

After connecting the Command Fusion learner to a USB port, select the the actual (virtual) serial port in the combo box, pressing "Refresh" if necessary. "Open" the port thereafter.

8.6.7 The "Girs Client" (previously "Arduino") Pane

Using this pane, a Girs server (e.g. running on an Arduino equipped with a suitable hardware) can be used to transmit and capture IR signals. The server can be connected to
a serial port, or through Ethernet to the local area network, connected by a TCP socket.
For the Arduino, the sketch GirsLite (or Girs) can be used.
The serial port may sometimes be finicky. Sometimes disconnecting and reconnecting the
device may help.
To use the device connected to a real or virtual serial port, select the port in the combo
box, pressing "Refresh" if necessary. "Open" the port thereafter. The opening of LAN
connected device is similar.
Normally, the Girs server uses the Girs analyze command to capture IR signals, which
is normally deploying a non-demodulating sensor, providing a frequency measurement. If
this is not desired (for example when the non-demodulating sensor is missing), selecting
"Use receive for capture", instead the receive command will be used, which normally
uses a demodulating sensor. In this case, no frequency measurement will be produced,
and instead the fallback frequency (selectable/changeable as Options -> Fallback
frequency) will be used.

8.6.8 The "Audio" Pane
As additional "hardware sending device", IrScrutinizer can generate wave files, that
can be used to control IR-LEDs. This technique has been described many times in
the Internet the last few years, see for example this page within the Lirc project. The
hardware consists of a pair of anti-parallel IR-LEDs, preferably in series with a resistor.
Theoretically, this corresponds to a full wave rectification of a sine wave. Taking
advantage of the fact that the LEDs are conducting only for a the time when the forward
voltage exceeds a certain threshold, it is easy to see that this will generate an on/off
signal with the double frequency of the original sine wave. (See the first picture in the
Lirc article for a picture.) Thus, a IR carrier of 38kHz (which is fairly typical) can be
generated through a 19kHz audio signal, which is (as opposed to 38kHz) within the realm
of medium quality sound equipment, for example using mobile devices.
IrScrutinizer can generate these audio signals as wave files, which can be exported
from the export pane, or sent to the local computers sound card. There are some settings
available: Sample frequency (44100, 48000, 96000, 192000Hz), sample size (8 or 16 bits)
can be selected. Also "stereo" files can be generated by selecting the number of channels
to be 2. The use of this feature is somewhat limited: it just generates another channel
in opposite phase to the first one, for hooking up the IR LEDs to the difference signal
between the left and the right channel. This will buy you double amplitude (6 dB) at the
cost of doubling the file sizes. If the possibility exists, it is better to turn up the volume
instead.
Most of "our" IR sequences ends with a period of silence almost for the half of the total
duration. By selecting the "Omit trailing gap"-option, this trailing gap is left out of the
generated data – it is just silence anyhow. This is probably a good choice (almost) always.
Note that when listening to music, higher sample rates, wider sample sizes, and more
channels sound better (in general). However, generating "audio" for IR-LEDs is a
completely different use case. The recommended settings are: 48000kHz, 8bit, 1 channel, omit trailing gap.

### 8.7 The "Capturing HW" pane

The sub-panes of this pane allow for the configuration of capturing hardware. Selecting a sub-pane also selects the associated hardware, if possible. The hardware can also be selected from the tool bar, Options -> Capturing hardware. In many cases, one piece of hardware can be used both for sending and capturing. In these cases, it is in generality opened and closed under the "Sending hw" pane, but still needs to be selected for capturing.

It is unfortunately not possible to have e.g. one IrToy for sending and another one for capturing.

Note that by e.g. selecting non-existing hardware or such, there is a possibility encounter long delays, or even to "hang" the program.

After configuring and opening the capturing hardware, the “Test” button can be used for testing the configuration without switching pane.

### 8.7.1 Capturing parameters

Capturing an IrSequence is governed by the parameters ..., which can be accessed in the Options -> Timeouts submenu. They all use the unit milli seconds. Unfortunately, not all hardware respect these parameters.

- **beginTimeout**
  When capturing starts, this determines how long the capturer is waiting for the first flash. Default is 3000ms.

- **captureMaxSize**
  This is the maximal duration the capturing hardware will accept. Default is 1000.

- **endingTimeout**
  The silence period required at the end of an IrSequence. Default is 300ms.

### 8.7.2 IrWidget

Plug the IrWidget it into the computer. Check that the operating system has assigned a port to it, and note which one it is. On Windows: open the device manager, and check that there is one “USB Serial Port” under Ports. Note the port number (e.g. COM8). On a Linux system, it likely shows up as a device like /dev/ttyUSB0. If the port does not show up, a suitable driver needs to be installed. If the correct port is already visible in the combo box, just press "Open". Otherwise, press "Refresh", which makes the program determine the currently available serial ports. Select the correct one. Press "Open". which should now remain "pressed". The port can be closed again by another press, but there is not much reason to do so, unless another capturing hardware should be used, or the IrWidget should be used from another program.
8.7.3 Global Caché capture

IrScrutinizer automatically detects alive Global Caché units in the local area network, using the AMX Beacon. However, this may take up to 60 seconds, and is not implemented in very old firmware. Using the "Add" button, the IP address/name of older units can be entered manually.

For this to work, port 9131/udp must be open in a used firewall.

The "Browse" button points the browser to the selected unit.

The reported type and firmware version serves to verify that the communication is working.

8.7.4 Lirc Mode2

mode2 is a program from the Lirc distribution, that prints timing information in a simple text format to standard output. (Note that in Lirc terminology, there are really three meanings of the term "mode2".) IrScrutinizer can read a stream in this format, either on its standard input, or from a program run in an internal subprocess. This way, effectively any Lirc mode2 driver can be used to capture IR signals for Lirc (assuming "normal" modulation frequency). This makes IrScrutinizer a viable replacement of the irrecord program.

Since the /dev/lirc interface is much better and cleaner, the mode2-interface is scheduled for removal.

8.7.4.1 Standard input

To use with standard input, the program can be started for example with a command like

```
$ mode2 --driver default | irscrutinizer &
```

As capturing device "Lirc Mode 2" and the subpane "Standard input" is selected.

8.7.4.2 Command in sub-process

In theory, any program that prints information in the mode2 format can be used. The command line for the program with possible parameters is to be entered as command. With the Start button, a sub-process is started, running the given command line. The "Stop" button stops the sub-process.

8.7.5 /dev/lirc (Linux only)

The device should be opened on the "Sending hw" pane, and if desired, selected here for capturing.
8.7.6 Girs client (previously Arduino)

The device should be opened on the "Sending hw" pane, and if desired, selected here for capturing.

8.7.7 IrToy

The device should be opened on the "Sending hw" pane, and if desired, selected here for capturing.

8.7.8 Command Fusion Learner

The device should be opened on the "Sending hw" pane, and if desired, selected here for capturing.

8.8 Key bindings and accelerators

TODO.

9 Command line arguments

Normal usage is just to double click on the jar-file, or possibly on some wrapper invoking that jar file. However, there are some command line arguments that can be useful either if invoking from the command line, or in writing wrappers, or when configuring custom commands in Windows.

Girr files given as command line argument will be imported to the "parametric remote" table. Accordingly, if the system is configured to associate *.girr with IrScrutinizer, these files can be opened by double clicking them.

The options --version and --help work as they are expected to work in the GNU coding standards for command line interfaces. Use the --help-command to see the complete list of command line parameters. The -v/--verbose option set the verbose flag, causing commands like sending to IR hardware printing some messages in the console.

The option --nuke-properties makes the program delete the property file, and exit immediately.

For automating tasks, or for integrating in build processes or Makefiles or the like, it is probably a better idea to use IrpTransmogrifier instead, which has a reasonably complete command line interface.

IrpTransmogrifier as command line program can be invoked with the AppImage installation by calling it using the name irptransmogrifier (through copying or linking).

The MacOS App does not support calling IrpTransmogrifier; install the generic binary version if needed.
The program delivers well defined and sensible exit codes.

### 10 Questions and Answers

#### 10.1 How do I verify the integrity of my downloads?

On the official download site, the checksums (using the MD5, SHA-1, and SHA-512 algorithms) are available in the files checksums.md5, checksums.sha1, and checksums.sha512. With appropriate software, these can be used for validating the downloaded files.

To prevent from tampering of both the program files and the checksum files, the checksum files are also PGP signed with the cryptograph key for Bengt Martensson <barf@bengt-martensson.de>”, fingerprint 5F492CB76BEB2E6B1CAA63A3EE1F17D4ECF8AF9C. The full key can be downloaded here, or found in the program as Tools -> Author's Public PGP key. (For practical reasons, the shapshot releases are, in general, not signed.)

How to check these checksums and signatures differ between different programs and operating systems, and is therefore not described here. However, searching on the Internet will yield many descriptions.

#### 10.2 My virus program says that your program contains virus or malware.

My programs do not come with virus. Downloading from un-official sites are discouraged, in particular if they do not keep the signed checksum files. (Most likely, they do not.)

First check the integrity of the downloaded files as described in the previous question. Assuming that the problem remains, this is a problem with your virus program, and not with the present program, and it should be handled as such. If it is a release version, please inform the author of the virus program, and/or create a white list. What you do not need to do, is to tell me, or "the world". Remember, it is a problem with the virus program, not with my software.

#### 10.3 Can I run more than one instance simultaneously?

Yes, you can fire up several instances, for example, one for sending and another for receiving the sent signals. The only problem is that the properties are read from/written to the same file, so the instance that ends last will overwrite the properties of the first one. This does not have to be a problem. However, if this is an issue, you can start the program with the --properties **filename**, pointing to an alternative properties file. For example, with Windows, you can duplicate the icon, and edit the command line on one of those.
10.4 I miss DecodeIR!

Support for DecodeIR was removed, not just hidden and deprecated, because keeping it would increase maintenance and installation effort substantially. For accessing DecodeIR, it is recommended to install version 1.4.3 (which is the final release with DecodeIR) in parallel to the current one, see the previous answer for details.

10.5 Firewall issues?

Except for the usual HTTP(S) ports, the program uses some TCP and UDP ports for communicating with some of the supported hardware. These are:

- For GlobalCache this is TCP port 4998. Its discovery beacon uses UDP port 9131.
- Lirc uses a TCP port, per default 8765.
- IrTrans uses a UDP port, per default 21000.
- AGirs on an ethernet connected board uses a TCP port, per default 33333.

TODO: describe configuration of firewall/packet filter on Windows and others. (Help welcome!)

10.6 Does IrScrutinizer completely replaces IrMaster?

Almost. Using MakeHex as renderer (or more correctly, its Java version) is not implemented. (The practical usage of this feature is probably very limited, and IrMaster is still available, should it ever be needed.) The "war dialer" is also not implemented, but see next question. For the wave export, some rarely used options (the possibility to select big-endian format (for 16-bit samples), the possibility not to half the carrier frequency, and the possibility to select sine (instead of square) for modulation) have been removed. Finally, there is some stuff that simply works differently, like the export function.

10.7 How do I emulate the war dialer of IrMaster?

Use "Scrutinize remote" -> Parametric Remote. Fill in the table with signals to be tested, either using the pop-up button (right mouse in the table) Advanced -> Add missing F's, or from the Generate pane, using suitable parameter intervals (see this), and transfer them using the "To parametric remote" button. Then test the candidate signals one at a time by transmitting them, using suitable sending hardware. The comment field can be used for note taking.

A "war dialer" like in IrMaster may be implemented in a later version.

10.8 Can I use this program for conveniently controlling my favorite IR controlled device from the sofa?

No, the program is not meant for that. While you definitely can assemble a "remote" on the "scrutinize remote" panel, and transmit the different commands with mouse
commands (appropriate hardware assumed), the program is intended for developing codes for other deployment solutions.

Check out JGirs, which is an IR server implementing the Girs specification. It can be considered as "IrScrutinizer as a server".

10.9 The pane interface sucks.

Yes. There are several use cases when the user would like to see several "panes" simultaneously. Also, it should be possible to have several windows of the same sort (like the "scrutinize signal") simultaneously. Replacing the top level panes with something "Eclipse-like" (sub-windows that can be rearranged, resized, moved, iconized) is on my wish list.

10.10 What about the "fishy" icon?

It is a Babel fish, as found in The Hitchhiker's Guide to the Galaxy, having the property, that "... if you stick one in your ear, you can instantly understand anything said to you in any form of language". This symbolizes the program's ability to "understand" a large number of different IR formats.

10.11 I did something funny, and now the program does not startup, with no visible error messages.

Try deleting the properties file. (Note the command line option --nuke-properties which will do exactly that, without having to manually find the file or its name.) If that does not help, try starting the program from the command line, which may leave hopefully understandable error message on the console.

10.12 (Windows) When I double click on the IrScrutinizer symbol, instead of the program starting, WinRar (or some other program) comes up.

The program that comes up has "stolen" the file association of files with the extension .jar. Restore it. (Allegedly, WinRar can gracefully "unsteal" file associations.)

10.13 (Windows) Why is the program so slow at start-up?

Normal start up time is a few seconds, about the same time as it takes for (e.g.) a web browser to start. If it takes considerably longer than that, the problem is almost surely hardware related, i.e., the program looks for possibly non-existent hardware. To fix this, make sure that the selected capture- and sending devices (these are save between sessions!) do not correspond to something non-existent. The most "innocent" settings are: capture: Lirc mode 2, and sending: Audio port. These are also the defaults when the program starts up for the first time. Also, consider deleting possible "junk devices" in the Windows device manager under COM & LPT (unused Bluetooth-to-serial ports etc.).
10.14 (Linux) I get error messages that lock files cannot be created, and then the Arduino and IrToy hardware do not work.

When starting IrScrutinizer, or by pressing the "Refresh" button, error messages occur like

```java
check_group_uucp(): error testing lock file creation Error details:Permission denied check_lock_status: No permission to create lock file.
```

(and a number of them...) The problem is that the library rxtx (like some other program accessing a serial interface) wants to create a lock file in a particular directory. This is/was traditionally /var/lock, which is often a symbolic link to /var/run/lock. This directory is normally writable by members of the group lock. So your user-account should probably be a member of that group. (How to perform this is different in different Linux distributions.) The rxtx library delivered with IrScrutinizer expects the lock directory to be /var/lock. However, recently some Linux-distributions (e.g. Fedora 20), instead are using /var/lock/lockdev as its lock directory (while /var/lock still is a link to /var/run/lock. To solve this, I recommend, if possible, installing rxtx provided by the Linux distribution used, i.e. not using the one with IrScrutinizer. For example, on Fedora, the command is

```
sudo dnf install rxtx
```

which installs the library in /usr/lib/rxtx or /usr/lib64/rxtx, depending on the operating system. (Other distributions uses other commands, for example apt-get on Debian-like systems.) Finally, the correct installation directory of the library (librxtxSerial-2.2pre1.so) has to be given to the JVM running IrScrutinizer. For this, see the wrapper irscrutinizer.sh and the comments therein, and make the necessary adaptations.

10.15 What is on the splash screen?

From left to right, a Global Caché iTach Flex, an IrToy, and a low-cost clone of an Arduino Nano, the latter equipped with a non-demodulating IR detector (TSMP4138) for capturing and an IR diode (SFH415) for sending. These are all hardware which work well with IrScrutinizer, both for sending and capturing.

10.16 Do you solicit or accept donations?

No.
11 Appendix. Building from sources

"IrScrutinizer" is one subproject within harctoolbox.org. It depends on several other subprojects within harctoolbox. The repository IrScrutinizer consists of this subproject.

The released versions are found on the download page. The development sources are maintained on my GitHub repository. Forking and pull requests are welcome!

I go to great lengths ensuring that the program runs equally well on all supported platforms. I do not care too much that all aspects of the build runs equally well on all platforms. I build with Linux (Fedora), the continuous integration build runs on Travis (Ubuntu). Other platforms are treated step-motherly.

11.1 Dependencies

As any program of substantial size, IrScrutinizer uses a number of third-party components. All of these are also free software, carrying compatible licenses. The dependent packages need to be installed also in the host-local Maven repository in order for the build to work. In some cases (basically the ones with a version not ending with -SNAPSHOT), the packages are uploaded to the Maven central repository, and will be automatically downloaded to the local host by a Maven invocation.

There are some scripts to aid downloading and building, described next. It is assumed that git and Maven are installed and available as commands git and mvn respectively.

Of course, it is also possible to manually download or clone these packages from my Github repositories, then build and install them locally by mvn install.

11.1.1 IrpTransmogrifier, Girr, HarcHardware, Jirc

These are all Java packages that are required to build IrScrutinizer. HarcHardware requires RXTX. They can be downloaded and built by the script common/scripts/build-harctoolbox-project.sh, using an argument of IrpTransmogrifier, Girr, HarcHardware, or Jirc. See the file .travis.yml for the complete commands.

11.1.2 DevSlashLirc

This library is used to access /dev/lirc-hardware. It is used by the Linux version only. It is a Java JNI library, written in Java and C++. It is written by myself, and available here.

The subdirectories native/Linux-amd64, native/Linux-i386, and native/Linux-arm contain compiled versions for the x86_64, x86_32, and ARM processors respectively.
The package can be downloaded, and the Java part built, by the script common/scripts/build-harctoolbox-project.sh using the argument DevSlashLirc (see .travis.yml for an example).

### 11.1.3 RXTX

The serial communication packate RXTX is also included in the source package. This builds a shared library and a jar file. On Linux, if there is a system supported RXTX (librxtxSerial really), it should be preferred, in particular since it knows the preferred lock directory for the present operating system. The distribution contains pre-compiled binaries for Linux, Windows, and Mac OS X, both in 32- and 64-bit versions. To compile the C sources, see the sub-directory rxtx-pre2h and the instructions therein.

Note that the system supplied RXTX jar on many system (e.g. Fedora 21) has some issues (version number incompatible with the shared library, does not recognize the /dev/ttyACM*-ports required by IrToy and many Arduinos, unflexible library loading), so using our RXTX jar together with the system supplied shared library can be sensible.

### 11.1.4 JCommander, minimal-json

Normally, these components are downloaded and installed automatically by maven.

### 11.1.5 Tonto

Tonto can be downloaded and installed by the script common/scripts/build-tonto.sh. It requires the Apache ant build system to be installed as the command ant. (On Fedora, instead the command sudo dnf install tonto can be used.) Note that the shared library libjnijcomm, which is required by the Tonto program for communicating with a Pronto remote through a serial interface, is not required for use with IrScrutinizer, and can therefore be left out. Using the option -n to the script (see .travis.yml for an example), the script will not try to build and install the shared library.

### 11.2 Building

As of version 1.1.2, the Maven "software project management and comprehension tool" is used as building system. Modern IDEs like Netbeans and Eclipse integrate Maven, so build etc can be initiated from the IDE. Of course, the shell command mvn install can also be used. It creates some artifacts which can be used to run IrScrutinizer in the IrScrutinizer/target directory.

Two additional shell tools are needed. These are:

- The unix2dos and dos2unix utilities, typically in the dos2unix package.
- The icotool utility, typically in the icoutils package.
11.3 Windows setup.exe creation

For building the Windows setup.exe, the Inno Installer version 6 is needed. To build the Windows setup.exe file, preferably the work area should be mounted on a Windows computer. Then, on the Windows computer, open the generated file IrScrutinizer/target/IrScrutinizer_inno.iss with the Inno installer, and start the compile. This will generate the desired file IrScrutinizer-version.exe.

Alternatively, the "compatibility layer capable of running Windows applications" software application Wine (included in most Linux distributions) can run the ISCC compiler of Inno. The Maven file IrScrutinizer/pom.xml contains an invocation along these lines, conditional upon the existence of the file ../Inno Setup 6/ISCC.exe.

11.4 Mac OS X app creation

The Maven build creates a file IrScrutinizer-version-macOS.dmg. This file can be directly distributed to the users, to be installed according to these instructions.

The icon file IrScrutinizer.icns was produced from the Crystal-Clear icon babelfish.png in 128x128 resolution, using the procedure described here.

11.5 AppImage creation

To build the x86_64 AppImage, define bundledjdk_url_sans_file and bundledjdk in pom.xml to point to a suitable JDK distribution file. If a file with name given by bundledjdk is not present in the top level directory, it can be downloaded by the script tools/get-jdk-tar.sh. Then the maven goal make-appimage (which will be invoked during a normal build) will build an appimage for x86_64.

11.6 Test invocation

For testing purposes, the programs can be invoked from their different target directories. IrScrutinizer can be invoked as

```
$ java -jar target/IrScrutinizer-jar-with-dependencies.jar
```

or, if the shared libraries are required, with path-to-shared-libraries denoting the path to a directory containing the shared libraries.

```
$ java -Djava.library.path=path-to-shared-libraries -jar target/IrScrutinizer-jar-with-dependencies.jar
```

IrScrutinizer can also be started by double clicking the mentioned jar file, provided that the desktop has been configured to start executable jar with "java".
11.7 Installation

Maven does not support something like `make install` for deployment installing a recently build program on the local host. Instead, the supplied `tools/Makefile` can install the program to normal Linux locations (in the Makefile `INSTALLDIR`),

```
sudo make -f tools/Makefile install
```

Equivalently, the just created generic-binary package `IrScrutinizer/target/IrScrutinizer-*-bin.zip`) can be installed using [these instructions](#).