



## Introduction

The STM32 family of 32-bit Flash microcontrollers based on the ARM Cortex™ M processor is designed to offer new degrees of freedom to MCU users. It offers a 32-bit product range that combines high performance, real-time capabilities, digital signal processing, and low-power, low-voltage operation, while maintaining full integration and ease of development.

The unparalleled and large range of STM32 devices, based on an industry-standard core and accompanied by a vast choice of tools and software, makes this family of products the ideal choice, both for small projects and for entire platform decisions.

The STM32 Demonstration Builder platform is a completely new way to deliver a demonstration that can also be fully or partially reused in real applications. It relies on a full set of software components, coming in flexible licensing schemes allowing easy reuse and redistribution. All these components are organized within a module architecture that allows them to be reused separately in standalone applications.

The versatility of the STM32 Demonstration Builder platform allows the dynamic addition of modules, granting access to common resources, including storage, graphical components and widgets, and memory management.

The STM32 Demonstration Builder platform is built around the STM32 graphical library and the FreeRTOS real-time operating system, and uses almost the entire STM32 capability to offer a large scope of usage.

This Demonstration supports STM32F2xx and STM32F4xx devices and runs on STM3220G-EVAL and STM3240G-EVAL evaluation boards from STMicroelectronics.

This document describes the usage of the demonstration and the different included modules. For more details about the demonstration builder architecture, please refer to the UM1550.

**Table 1. Applicable tools**

Type	Part numbers
Evaluation tools	STM3220G-EVAL,STM3240G-EVAL

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# 1 STM32 Demonstration Builder applications and features

The STM32 Demonstration Builder platform comes with the following applications and features.

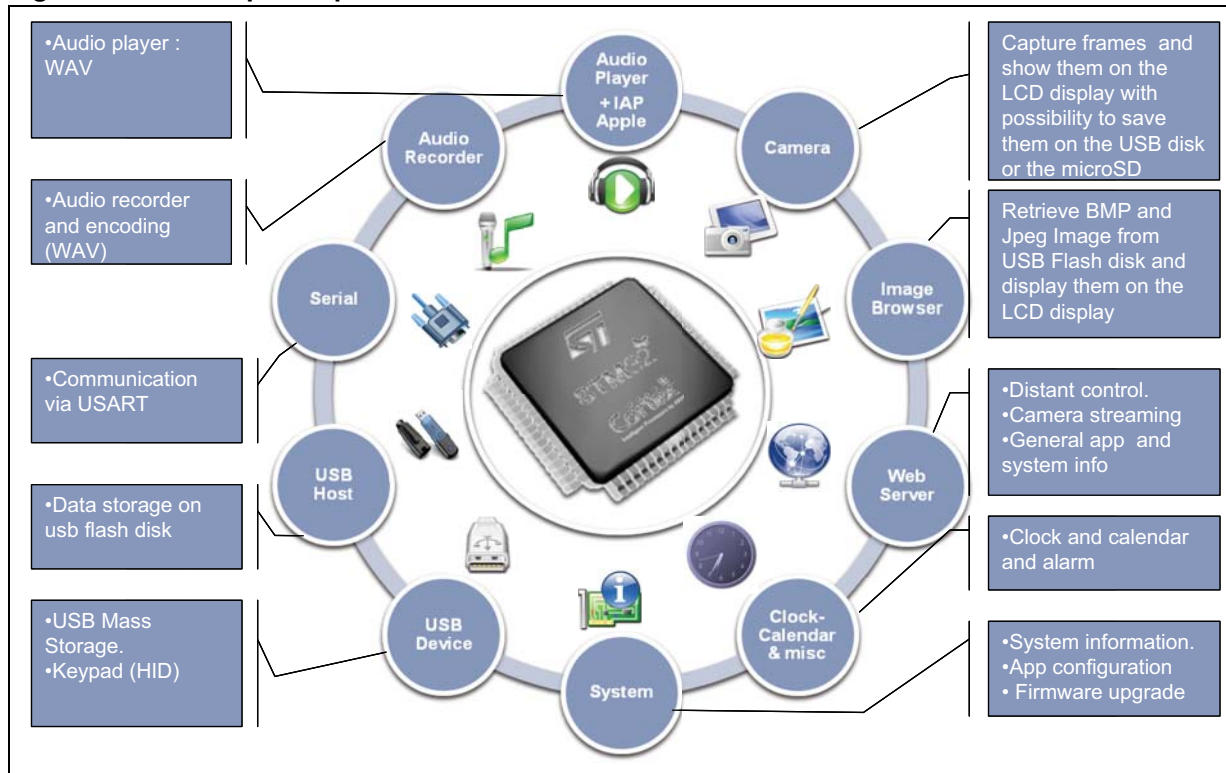
- An audio player with playlist and equalizer feature supporting the WAV audio format.
- An image browser capable of supporting and resizing BMP and JPEG formats and that can be used as background wallpaper.
- An audio recorder that allows voice recording in several formats and allows them to be stored in the SD card or the USB Flash disk with the possibility of playing back the recorded sample.
- A web server that allows communicating remotely with the board. The distant host can retrieve video streams from the board (IP Cam) and obtain system information.
- A clock and calendar to obtain the time, date and a set of alarms.
- USB device applications with a mass storage application based on the embedded SD card, HID application with touch pad.
- Serial: a graphical interface that allows text to be sent through the RS-232.
- System: features to obtain system information, set the general development platform settings and upgrade the firmware through the boot loader.
- A camera that can capture photos and save them in the predefined storage unit in BMP or JPEG format.

The STM32 Demonstration Builder platform also embeds a log console that allows you to track kernel and module messages as well as a file browser that allows you to explore the different storage units and directly launch the image browser and the audio player from selected files, depending on the file extension.

*Note: Throughout this document, STM32xxG-EVAL is used to refer to the STM322xG-EVAL board when the STM32F2xx device is used, and to the STM324xG-EVAL board when the STM32F4xx device is used.*

## 2 Development platform overview

Figure 1. Development platform overview



### 2.1 Hardware resources

The development platform firmware essentially uses the following two major peripherals, both of which are major features of the STM32F2xx and STM32F4xx devices.

- Ethernet (web server)
- USB on-the-go: the USB OTG FS is used in Host mode for the audio and image media storage while the USB OTG HS is used for the USB Human interface device and mass storage applications.

The firmware makes use of other STM32 peripherals for development platform purposes.

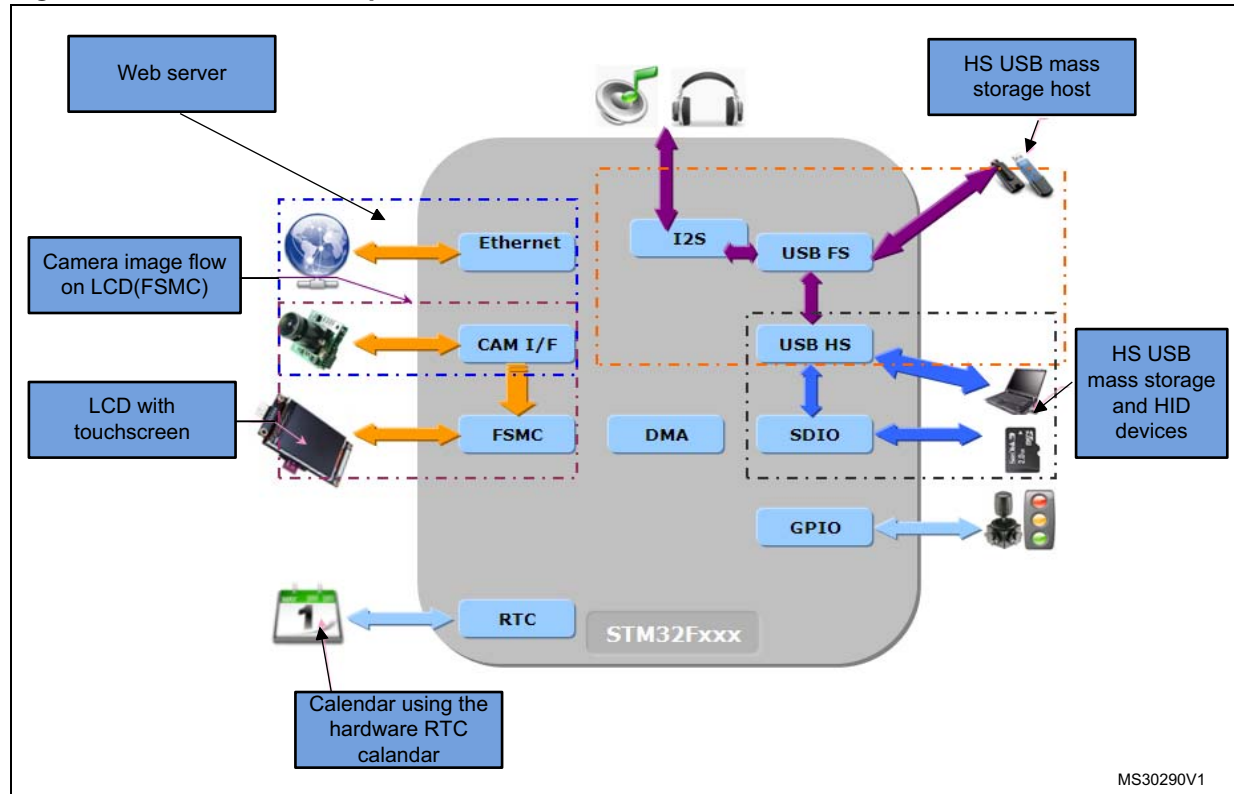
- User interface: color display, LEDs, event input (keys, touch screen).
- MicroSD via the SDIO interface for the USB device media storage application.
- I2S IP for the audio (wav) player.
- Digital camera interface (DCMI) for the camera application.
- RTC IP for the clock application.

Some other STM32 hardware features are used globally by the development platform application and the software environment (for example, the SysTick timer for RTOS, I2C for the I/O expander used by the touch screen...).



The camera application also uses the external SRAM embedded on the STM32xxG-EVAL board to store the camera frames via the DMA before they are output to the display through the GUI.

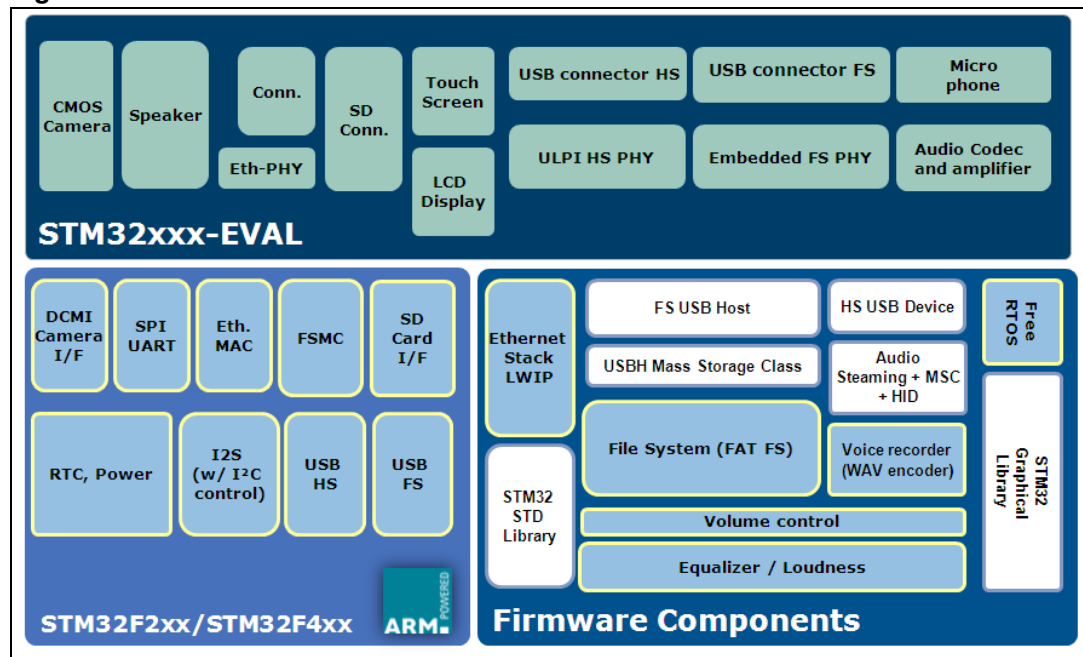
**Figure 2. Hardware description**



## 2.2 Software resources

*Figure 3* shows the different software and hardware resources used in the STM32 Demonstration Builder platform.

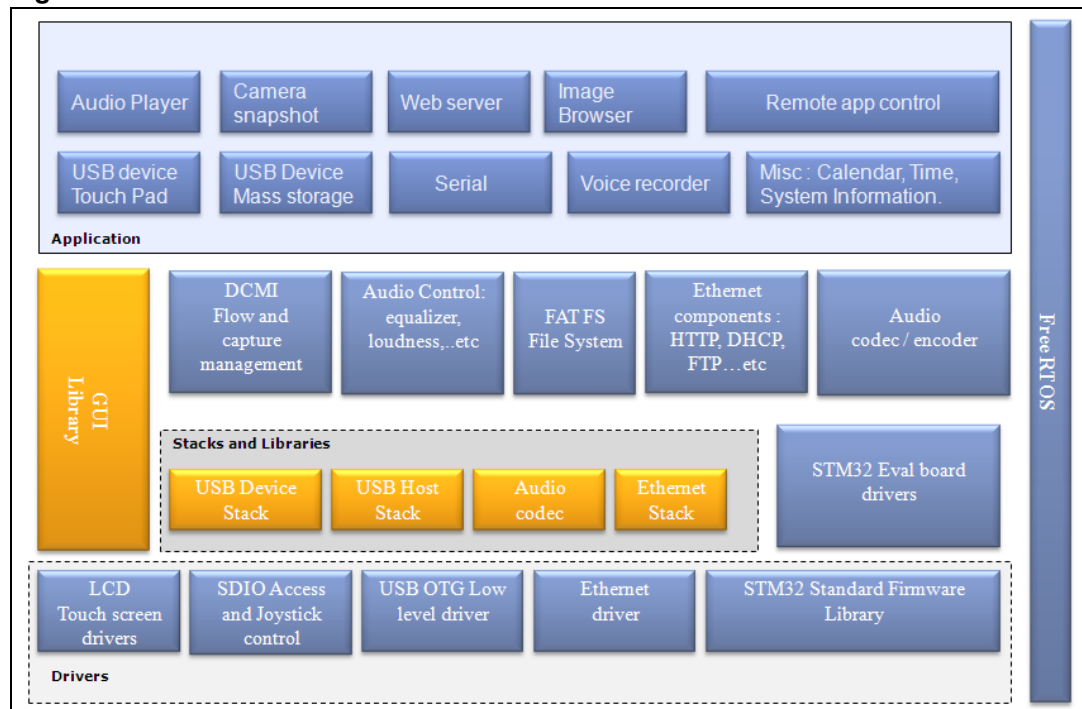
Figure 3. STM32 software and hardware resources



## 2.3 Firmware architecture

The development platform is built with a modular architecture based on a FreeRTOS real-time operating system and STM32 graphical library. The system configuration and the standard peripheral settings and configuration are made through the STM32F2xx/STM32F4xx standard peripheral libraries.

Data used by the application is stored in the external USB Flash disk and the embedded MicroSD Flash through a FAT file system (FatFS).

**Figure 4. Firmware architecture**

The development platform application is built using the following software components.

- STM32F2xx Standard Peripherals Library
- STM32F4xx DSP and Standard Peripherals Library
- STM32 USB On-The-Go Host and Device Library
- STM32 graphical library and extension
- STM32 Audio Engine - Equalizer Library
- STM32 Audio Engine - Loudness Control Library
- STM32 Audio Engine - Mixer Library
- FreeRTOS
- LibJpeg library
- FatFS file system
- LwIP TCP/IP stack

## 3 Description of the demonstration startup process

### 3.1 Startup window

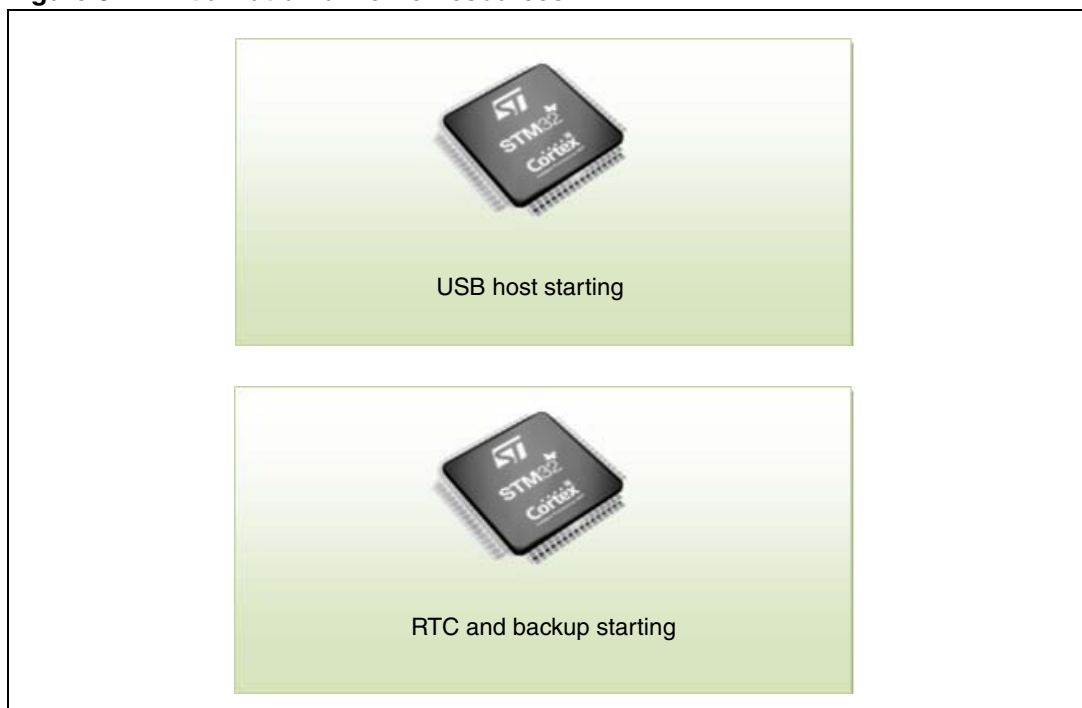
The first window, launched during the system's startup phase, indicates the STM32's and the BSP's (touchscreen, LEDs and SRAM) initialization phase.

**Figure 5. Startup window**



Once the STM32 is running and the basic peripherals are initialized, the other kernel resources are started (USB host, RTC and backup).

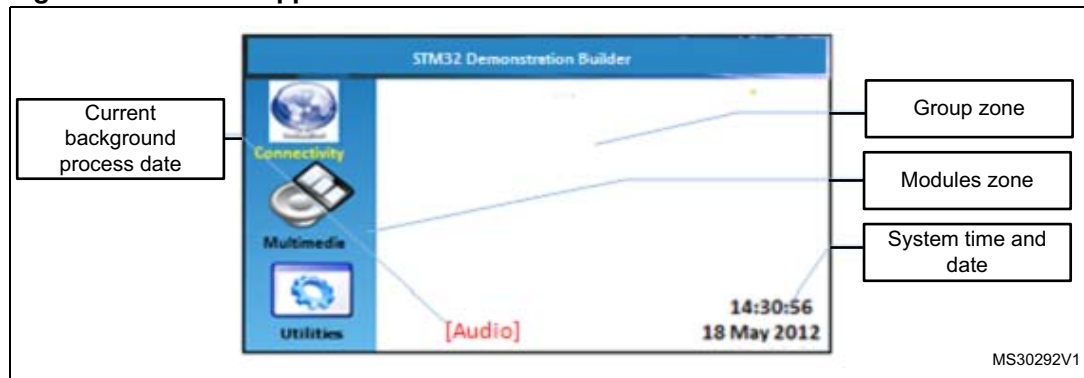
**Figure 6. Initialization of kernel resources**



## 3.2 Main menu windows

The various module applications are classified into three categories: *connectivity*, *multimedia* and *utilities*.

**Figure 7. Module applications**



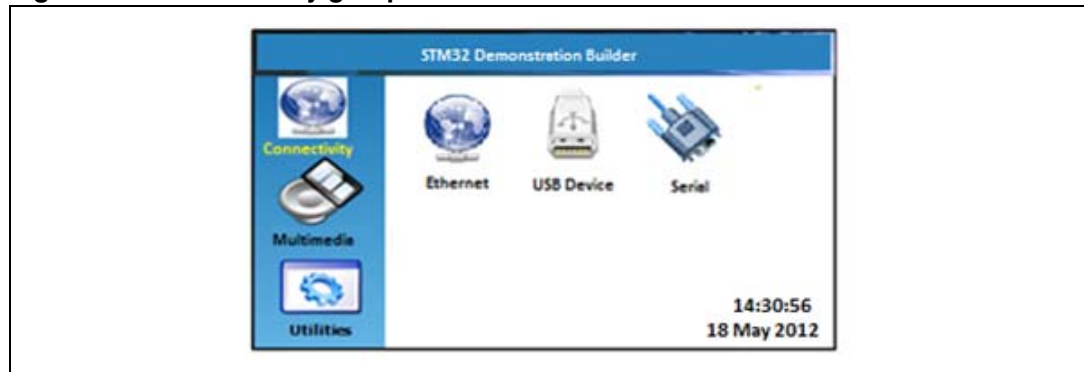
- **Modules Zone:** launches the module startup handler.
- **System Time and Date:** the update of the time and date are done by the kernel background task and can be re-adjusted in the **Calendar Modules > Settings** menu.
- **Group Zone:** contains the groups of modules. A group is a set of modules that have the same functions.

*Note:* The icons used in this demonstration are taken from [http://commons.wikimedia.org/wiki/Crystal\\_Clear](http://commons.wikimedia.org/wiki/Crystal_Clear)

### 3.2.1 Connectivity group window

The connectivity group contains the following modules.

**Figure 8. Connectivity group**

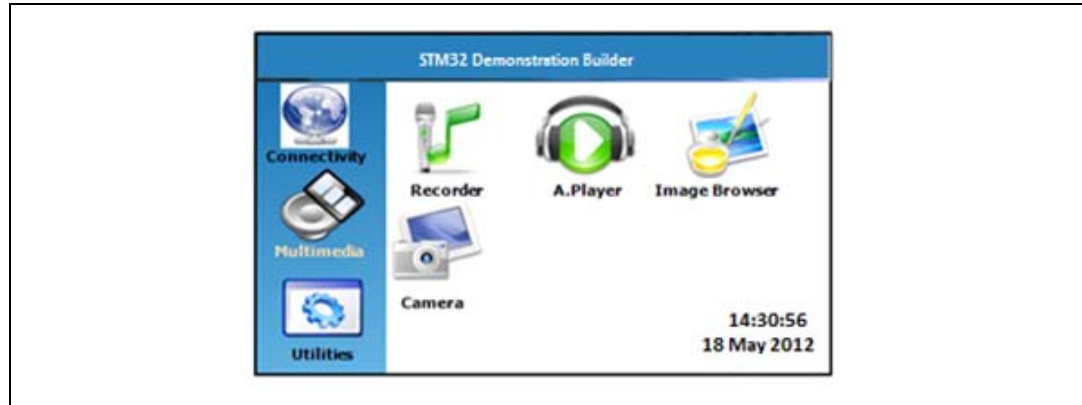


- **Ethernet** module: allows remote communication with the board over TCP/IP. The distant host can get video streams from the board (IP Cam) as well as system information.
- **USB Device:** set of USB applications based on the mass storage class using the embedded SD card and HID class using the embedded touchscreen.
- **Serial:** a graphical interface that allows sending ASCII characters through the RS-232.

### 3.2.2 Multimedia group window

The multimedia group contains the following modules.

**Figure 9. Multimedia group**

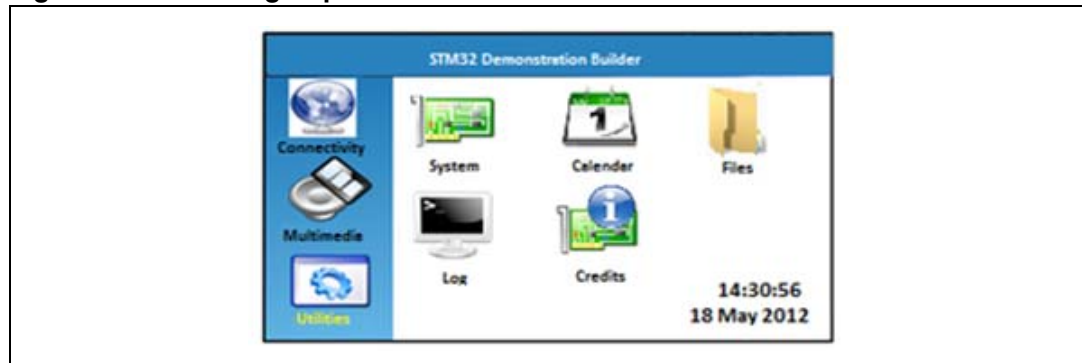


- **Audio Player:** playlist feature supporting WAV audio formats.
- **Image Browser:** capable of supporting and resizing BMP and JPEG formats and that can be used as background wallpaper.
- **Audio Recorder :** allows voice recording in the WAV format and saving it in the SD card or the USB Flash disk with the possibility of playing back the recorded sample.
- **Camera:** allows capturing a photo and saving it in the predefined storage unit in BMP or JPEG format.

### 3.2.3 Utilities group window

The utilities group contains the following modules.

**Figure 10. Utilities group**



- **System:** used to obtain system information, set the general development platform settings and upgrade the firmware through the boot loader.
- **Log:** displays the kernel and module messages.
- **Files:** system tool used to browse the different storage units and directly launch the image browser or the audio player from the selected file depending on the file extension.
- **Calendar:** used to get the time and date and to set alarms.
- **Credits:** shows license information.

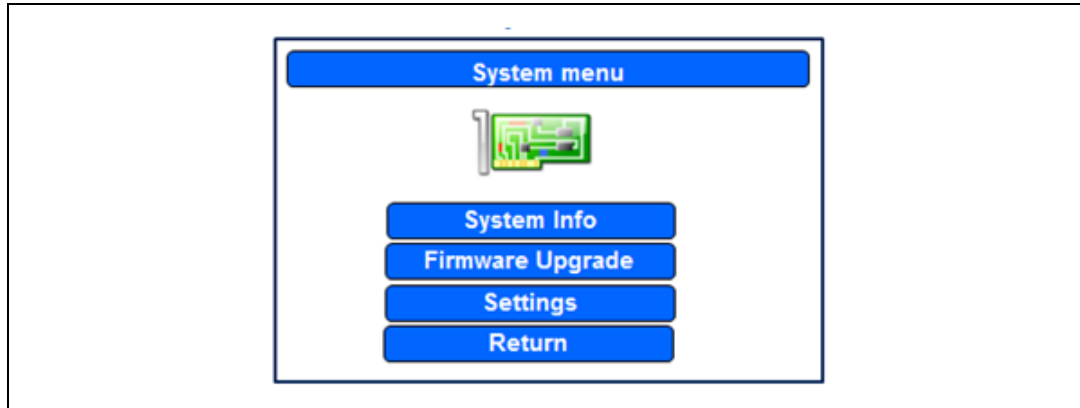
The *Utilities* and *Multimedia* group modules are described in more depth in [Chapter 4](#) and [Chapter 5](#).

## 4 Description of *Utilities* group applications

### 4.1 System module

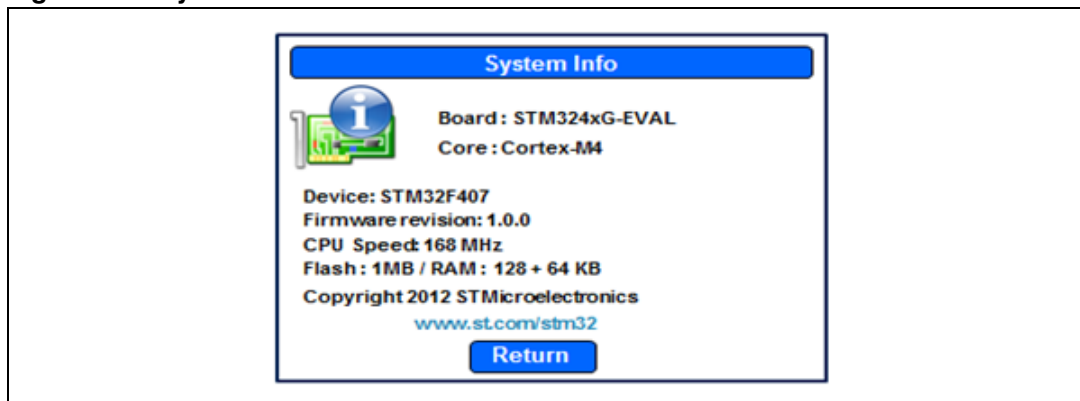
The main menu of the system module shows the following features and functionalities.

Figure 11. System module functionalities



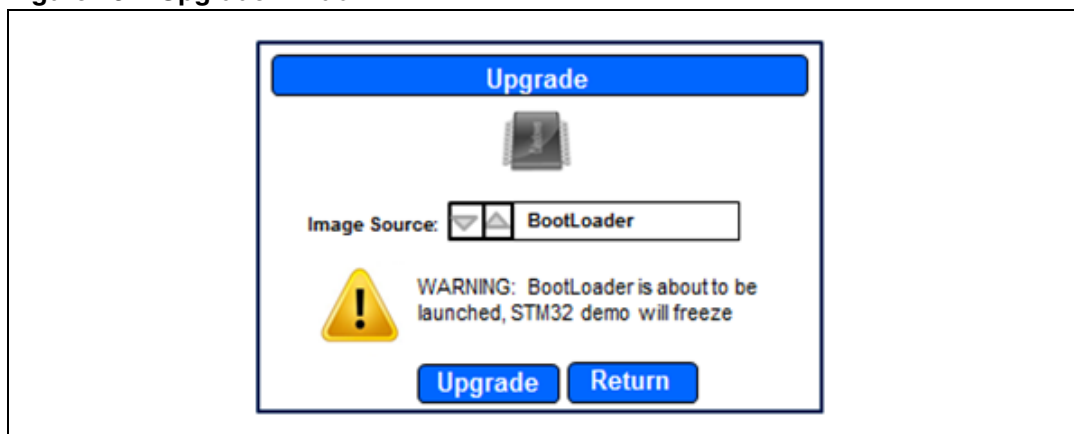
**System Info:** provides hardware and firmware revision information, such as board, core, STM32 device, current CPU speed and memory system size.

Figure 12. System Info window



**Firmware Upgrade:** used to launch the firmware upgrade using the DFU protocol from the bootloader.



**Figure 13. Upgrade window**

When the **Upgrade** button is activated, the Demonstration Builder application jumps to the internal boot ROM memory (system memory) of the STM32 device. For more information about the boot loader, refer to AN260 "STM32™ microcontroller system memory boot mode".

Since the Demonstration Builder application runs in un-privileged mode, the jump process should be performed within an interrupt handler (supervisor mode). The jump is performed in the systick handler after cleaning up the resources shared with the boot loader code, in this case the USB OTG core.

**Figure 14. Bootloader startup window**

Once the boot loader is running, the Demonstration Builder application stops running and the upgrade module freezes. The board should be reset after the upgrade process. Note that during the firmware download, the upgrade page shows the following message.

**Figure 15. Bootloader process window**

**Settings:** general system settings allow you to:

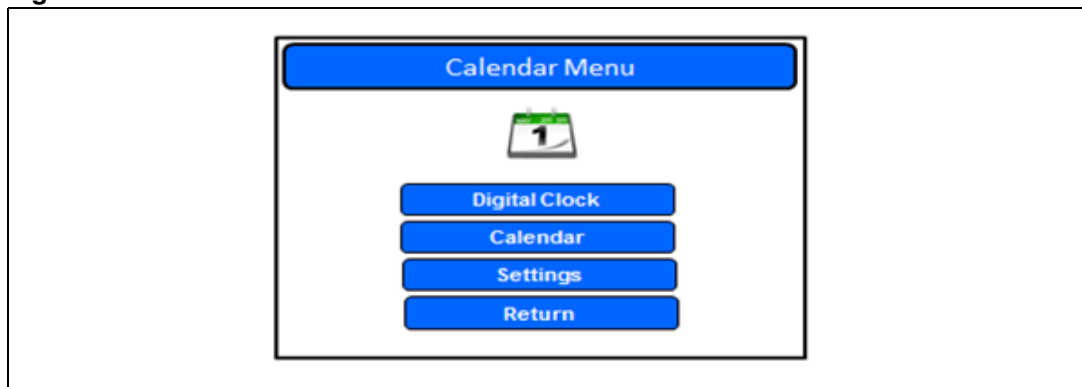
- Enable/disable the distant control feature for the modules supporting it.
- Enable/disable the background feature for the modules supporting it.
- Enable/disable the low-power mode.
- Enable/disable the LCD power saving.

*Note: Enabling the distant control feature will automatically enable the background feature. the background module feature can not be disabled when one of the background process is currently running.*

## 4.2 Calendar module

The main menu of the calendar module shows the following features and functionalities.

**Figure 16. Calendar module functionalities**



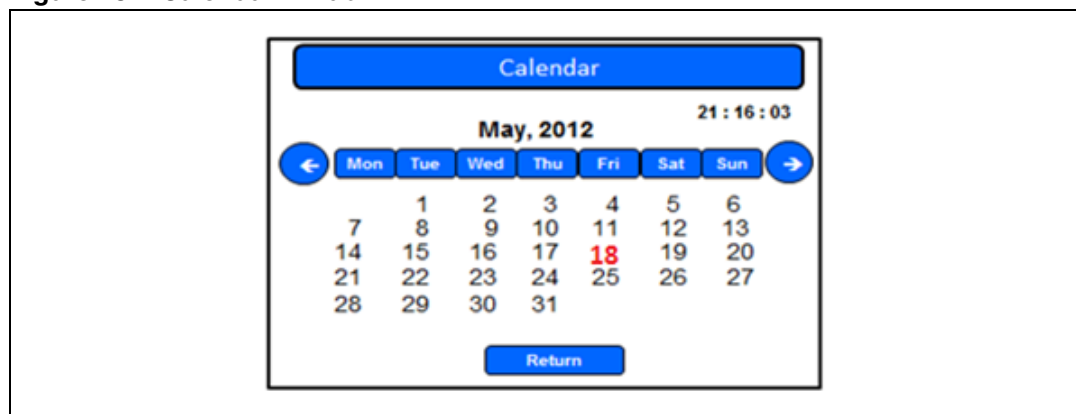
**Digital clock:** shows the clock and the date.

**Figure 17. Digital clock window**



**Calendar:** shows the current time and date in a calendar format with the possibility of changes months.

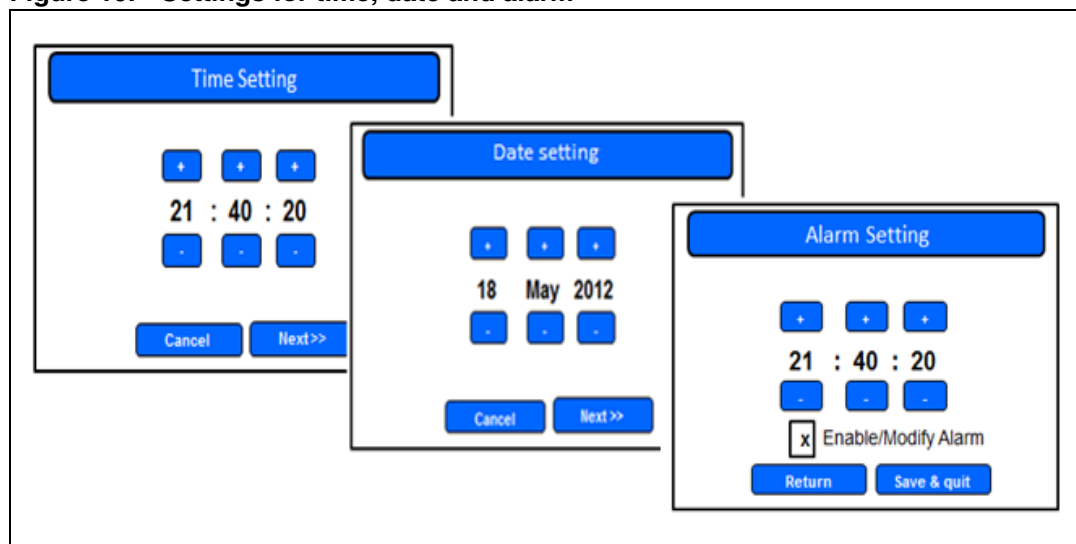
Figure 18. Calendar window



The calendar module is based on the RTC peripheral and the calendar widget is added as an extension to the STM32 embedded graphical library. For more information on the calendar widget, refer to UM1550 "STM32 Demonstration Builder Development Guide".

**Settings:** used to set the time, the date and the alarm.

Figure 19. Settings for time, date and alarm

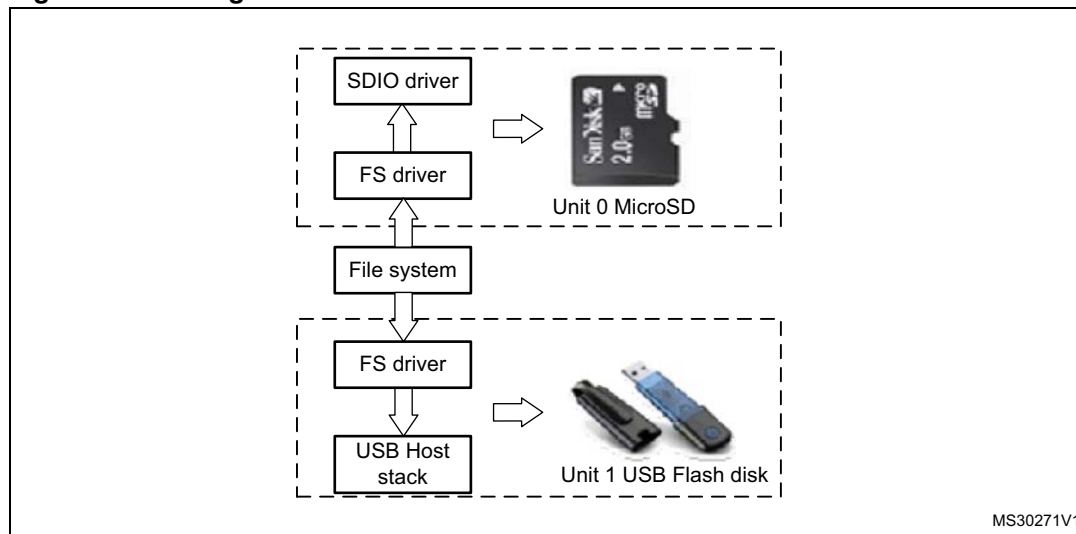


After setting the correct time and date, if an alarm is required the user can check the Enable/Modify Alarm box. Validate the new settings by clicking the Save & Quit button, or cancel the whole operation by clicking the Cancel button.

*Note:* To ease modification, the alarm time always takes the same setting as the time. The calendar module is based on the RTC peripheral. If the RTC startup failed (an RTC initialization failure message is seen in the startup screen or in the log console in run-time), the time is set to 00:00:00 and the date is set to January 1st, 2000.

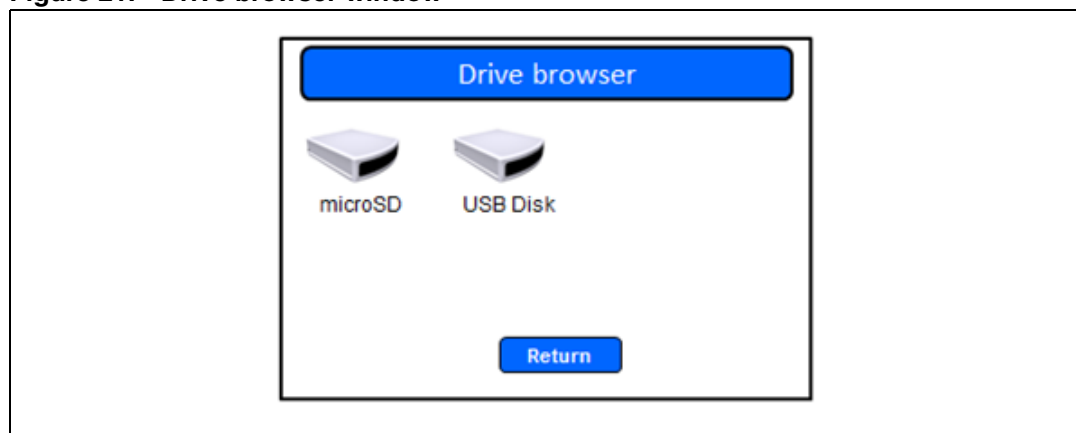
## 4.3 File manager module

The file manager module is a system utility based on the FatFS file system and uses two storage units as shown in [Figure 20](#).

**Figure 20. Storage units**

The USB disk Flash unit is identified as Unit 0 and available only if a USB disk Flash is connected to the USB FS connector. The MicroSD Flash is identified as Unit 1 and available only if the MicroSD card is connected. The units are mounted during the startup phase of the Demonstration builder application, and are automatically detected when the physical media is connected to the board.

The File Manager's main menu shows the two units seen by the system as logical drives.

**Figure 21. Drive browser window**

The two storage units can be used to play audio files, display images or save captured images from the camera. The two units are initialized during the Demonstration Builder's startup phase, and are available to all the modules during the Demonstration Builder's run time using the direct access feature implemented in the audio, image browser and camera modules. For more details about the direct access feature, refer to UM1550 "STM32 Demonstration Builder developer guide".

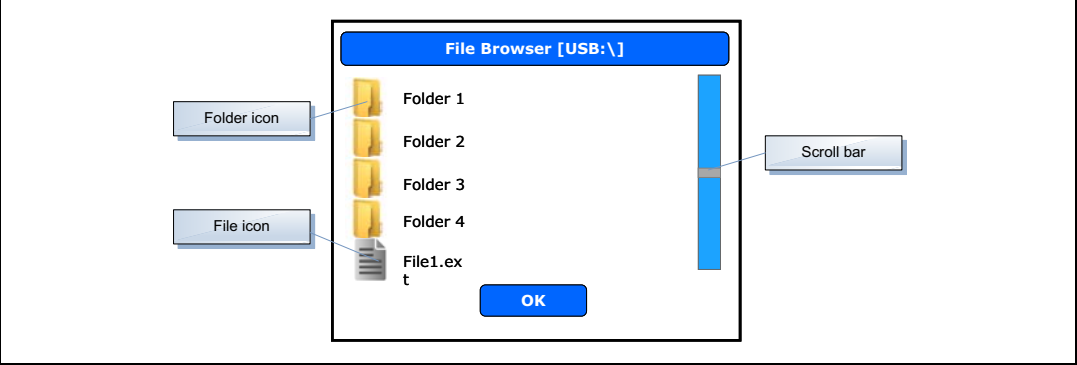
When trying to open a drive which is not ready or not present on the slot/connector, the following screen is displayed showing the failure of the browser to open the selected medium.

Figure 22. File Manager error window



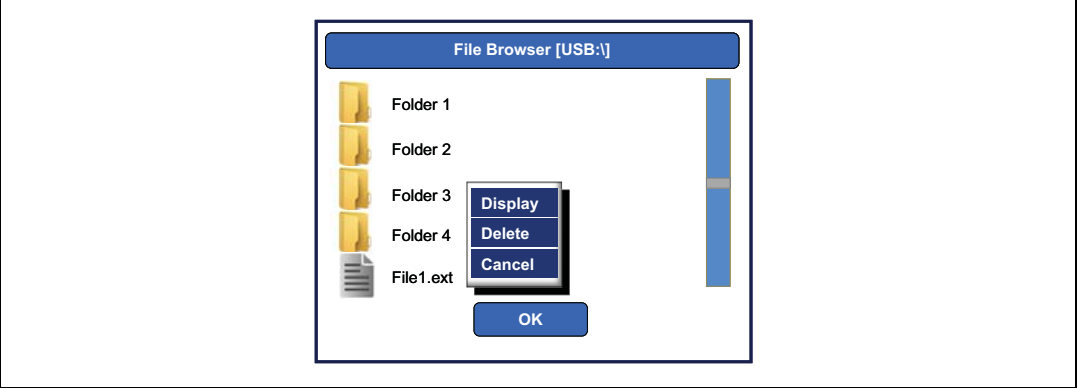
If the media is connected and ready, the content of the selected drive is displayed as a list.

Figure 23. Content of selected drive



The **Up folder icon** allows you to return to the parent folder. The **Folder icon** allows you to browse the selected folder. If the **File icon** is selected, a contextual menu is displayed on the top right of the selected file and indicates the possible actions relative to the file extension.

Figure 24. Contextual menu



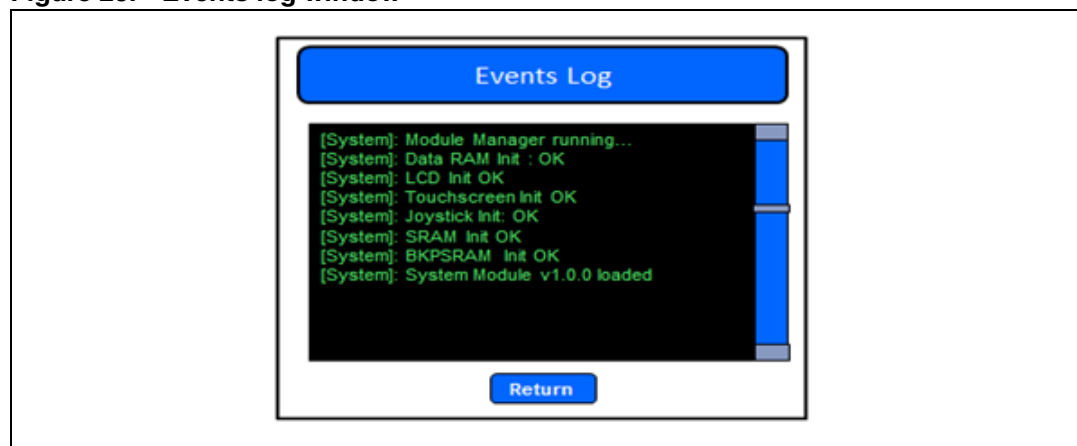
If the selected file extension is "bmp" or "jpg", the first item in the contextual menu is **Display**. If the extension is "wav", the first item in the contextual menu is **Play**. If the file is not supported by any module application, the first item is omitted and only the **Delete** and **Cancel** actions are displayed.

The scroll bar appears automatically when the number of available items on a folder exceeds the maximum possible displayed lines and disappears when it is not the case.

## 4.4 Log module

The log module is a system utility that saves the system and module messages in the console cache. The scroll bar allows you to parse the entire message list in the cache.

**Figure 25. Events log window**



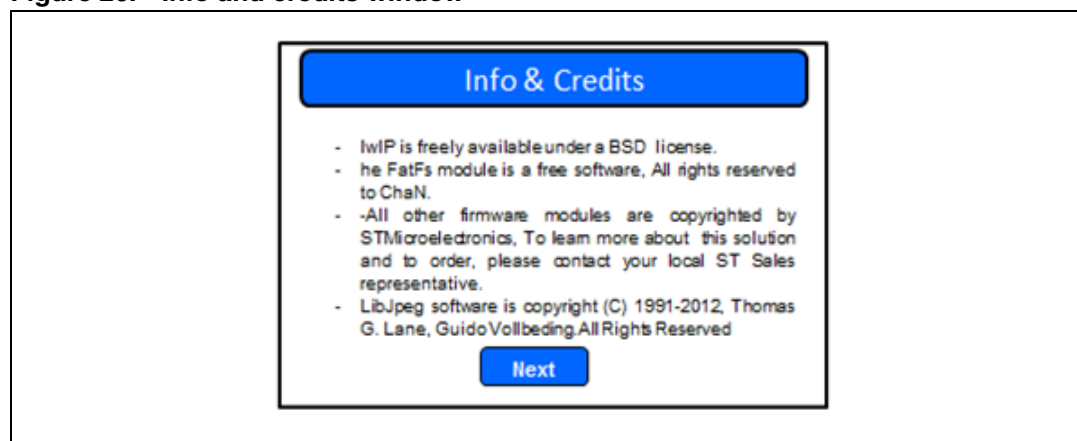
The console module exports the macro `CONSOLE_LOG (msg)` to allow any module to log event messages in the console.

If the console cache is full, the first messages at the top of the cache are removed and the new messages are added at the bottom.

## 4.5 Credits module

The credits module is a system utility that allows you to view the license agreement of the various firmware components.

**Figure 26. Info and credits window**



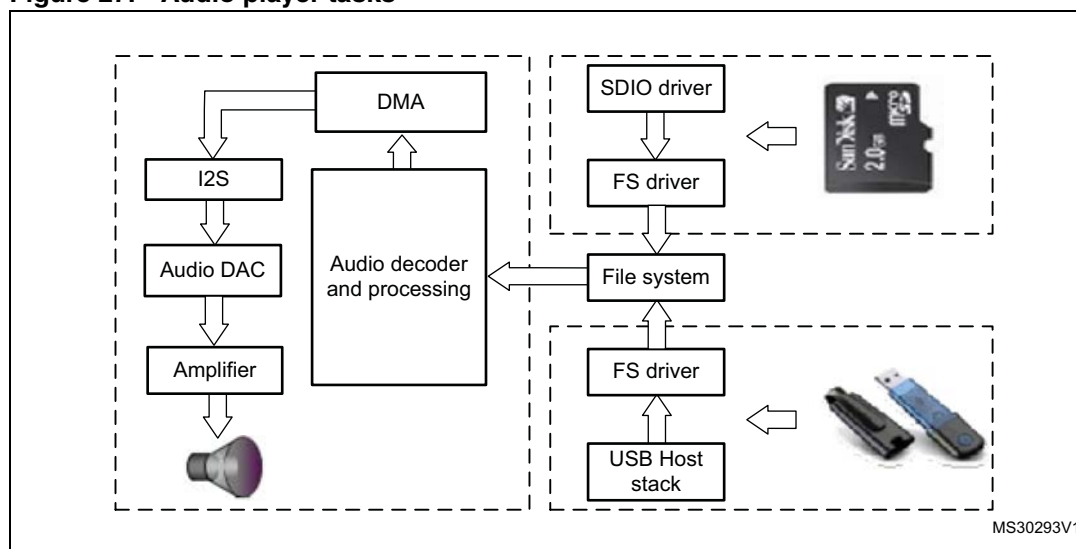
## 5 Description of *Multimedia* group applications

### 5.1 Audio player module

The audio player module provides a complete audio solution based on the STM32F2xx and STM32F4xx devices, and delivers a high-quality music experience. It supports playing music in WAV format but may be extended to support other compressed formats such as MP3 and WMA audio formats, music tag extraction, audio effects (equalizer, loudness control ...) and a user interface through the LCD display and touch screen. The audio player is managed by two tasks.

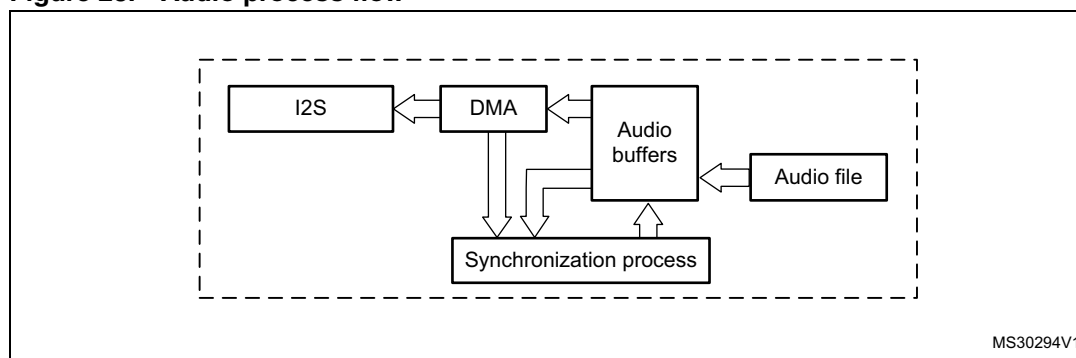
- Audio player GUI task: updates the GUI information (progress bar, status..)
- Audio player buffering task: reads an audio frame from the mass storage device, decodes it, and then performs pre-processing (equalizer, loudness...) if any. This task is gated by the I2S DMA end-of-transfer interrupt.

**Figure 27. Audio player tasks**



The transfer from the decoded buffers to the I2S interface is performed through the DMA. As such, the CPU is free to execute other tasks in parallel.

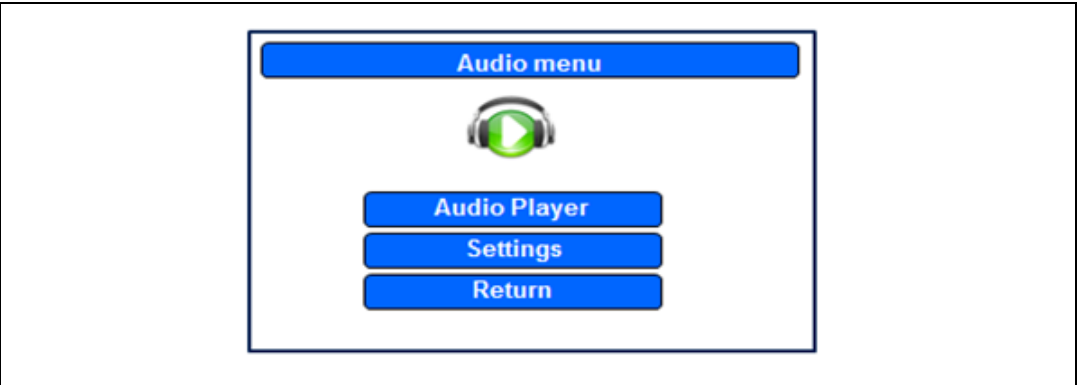
**Figure 28. Audio process flow**



While the DMA is outputting a buffer, the application manages the read/decode process of other buffers. Multi-buffering is used for this module.

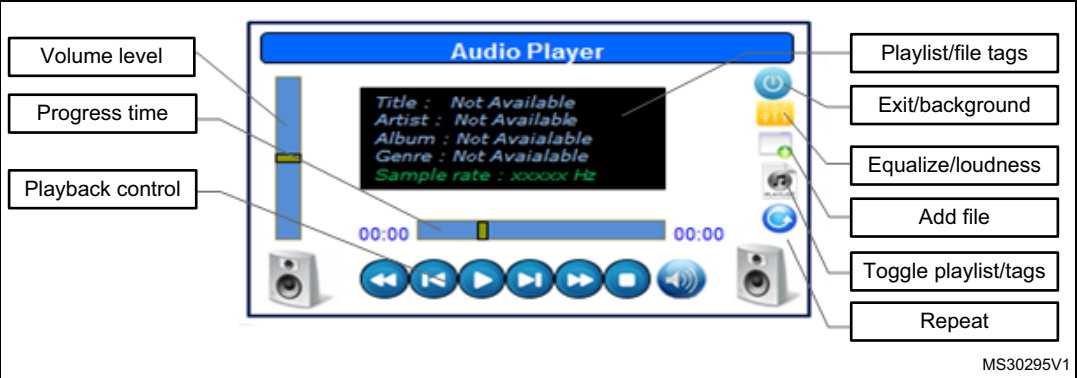
The audio player can be launched from the parent group or from the file manager module when an audio file is selected. The module is based on the I2S peripheral and the WAV decoder layer. The main menu of the audio player module shows the following features and functionalities.

Figure 29. Audio player functionalities



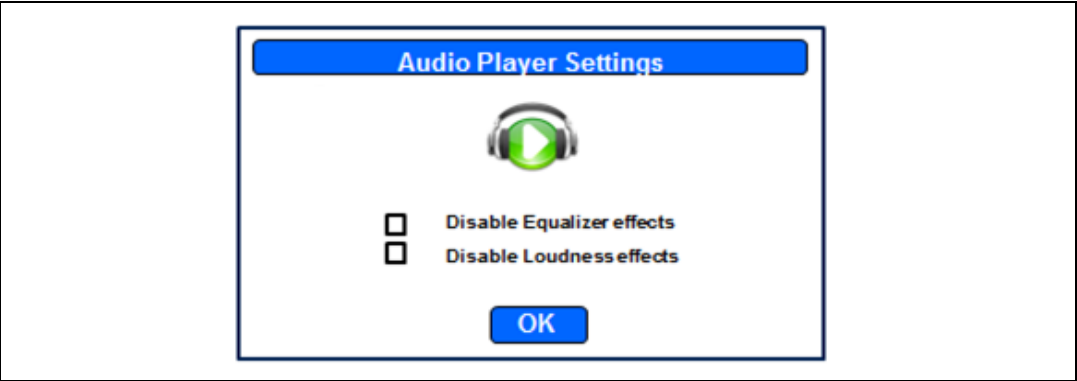
**Audio Player:** a graphical interface that controls the audio playback actions.

Figure 30. Audio player graphical interface



**Settings:** used to modify the configuration of the audio player and enable/disable related features.

Figure 31. Audio player settings





The audio player supports a *background* feature. The graphical interface can be deactivated while the audio process runs in background mode, thus allowing another module to run simultaneously.

To switch to background mode, the user must click on the exit button (see [Figure 30](#)). A contextual menu appears.

**Figure 32. Switching to background mode**

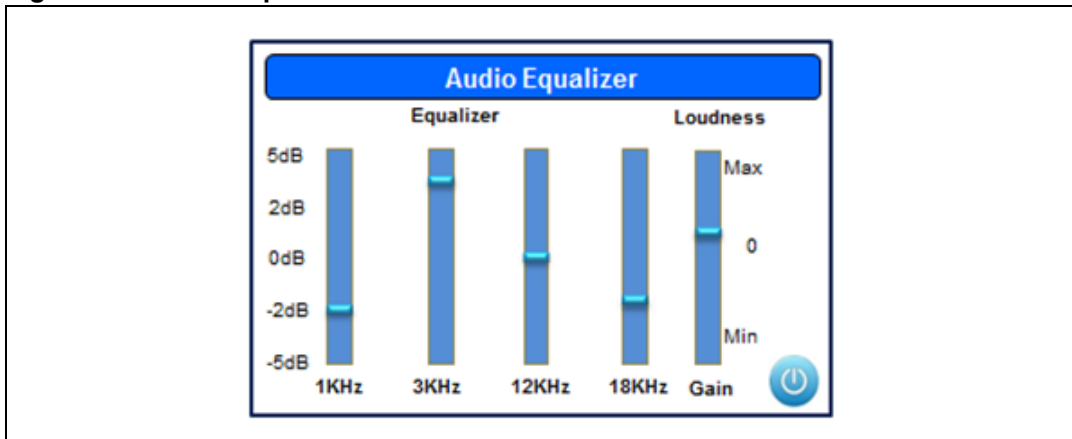


- **Close:** turns off the audio player.
- **Background:** disables the graphical interface and keeps the audio background process running.
- **Cancel:** abandons the user action.

To restore the graphical interface, the user has to relaunch the audio player from the multimedia group or select an audio file in the file browser and click on play in the contextual menu as described in [Section 4.3: File manager module](#).

The user can adjust the loudness and the equalizer settings by activating the audio equalizer frame.

**Figure 33. Audio equalizer window**



Four frequency bands are handled by the equalizer: 1 kHz, 3 kHz and 18 kHz, and may be adjusted between -5 db and 5 db.

### 5.1.1 Audio player module features

The audio player embeds the following features.

- Full user interface for equalizer and loudness: GUI, touch screen.
- File browser: SD card and USB key.
- Playlist management.
- Playback features: Play, Pause, Stop, Fast Forward/Rewind, Next, Previous, Repeat Single/All, Volume, Mute, Progress Bar...
- File information display (title, artist, album...)
- Graphic equalizer
- Background playing (multi-task)

### 5.1.2 Supported audio formats

The audio player supports all wav PCM audio files with the following configurations.

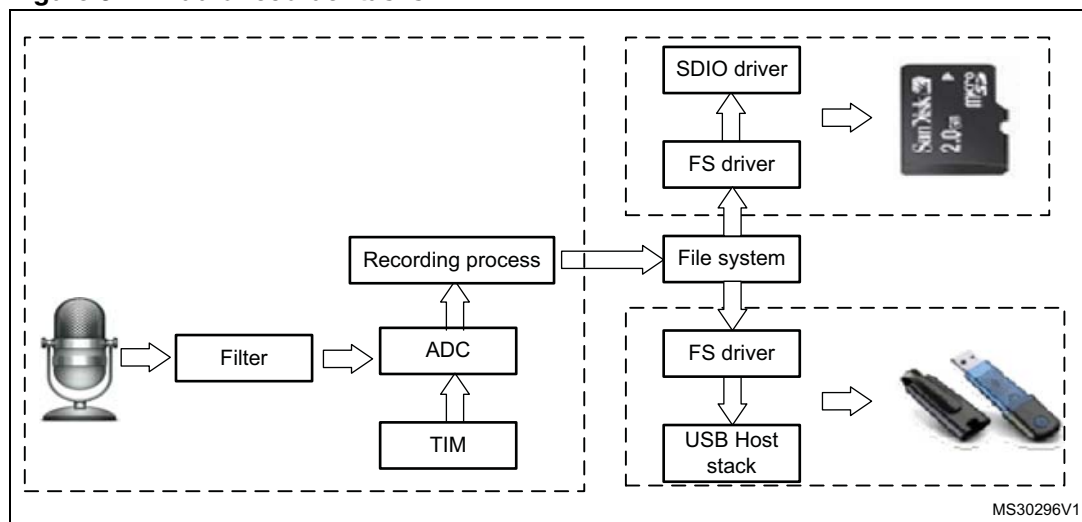
- Sample rate: 8 to 96 kHz.
- Channel number: stereo/mono
- Audio data format: 16 bits

## 5.2 Audio recorder module

The audio recorder module can be used to record audio frames in WAV format, save them in the storage unit and play them later. The audio recorder is managed by two tasks.

- Audio recorder GUI task: updates the GUI information (progress bar, status...).
- Audio recorder buffering task: gets the recorded frame from the ADC peripheral (triggered by a timer), encodes it and writes it to the storage unit (USB disk Flash).

**Figure 34. Audio recorder tasks**



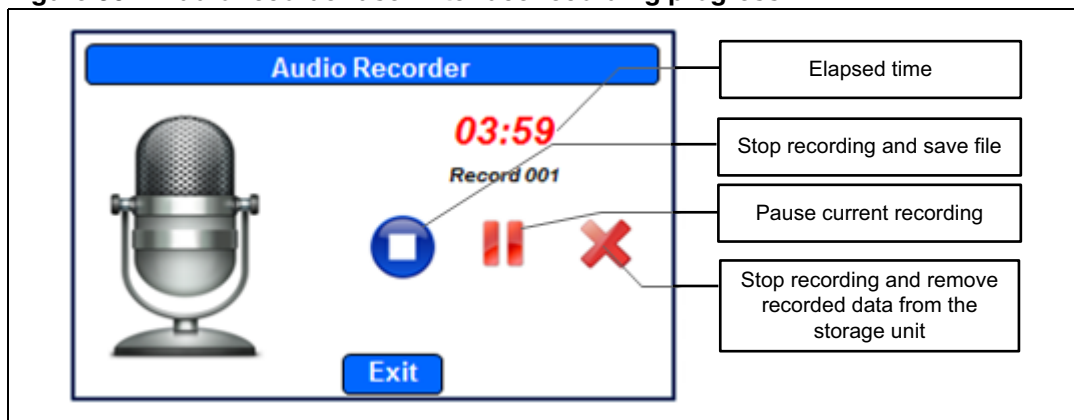
The audio recorder does not have a main menu and the recording interface frame is displayed when the application is launched from the multimedia group frame.

Figure 35. Audio recorder user interface window



When the recording process is started, the audio recorder's action buttons change so as to allow the user to control the progress.

Figure 36. Audio recorder user interface recording progress



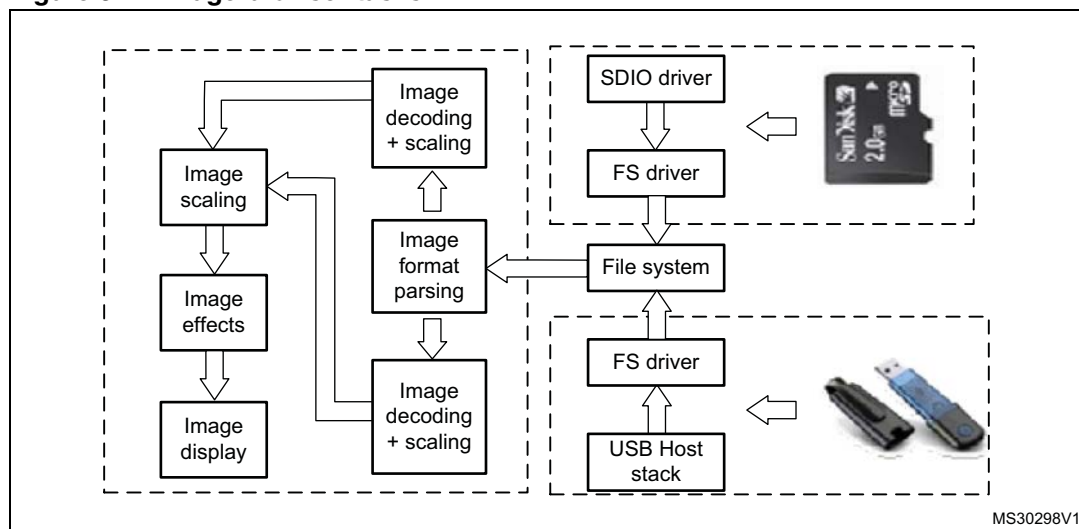
### 5.3 Image browser module

The image browser module supports BMP and JPEG formats. It also has scaling and image effects features.

The BMP and JPEG images are stored in the storage units. The source folder for the browser and the display time, if enabled, can be selected and configured in the browser setting frame. Once the image format has been identified, the parser calls the adequate decoder, scales the image to fit to the display zone, applies the image effect selected in the image effects frame, and then displays the processed image on the image browser frame.

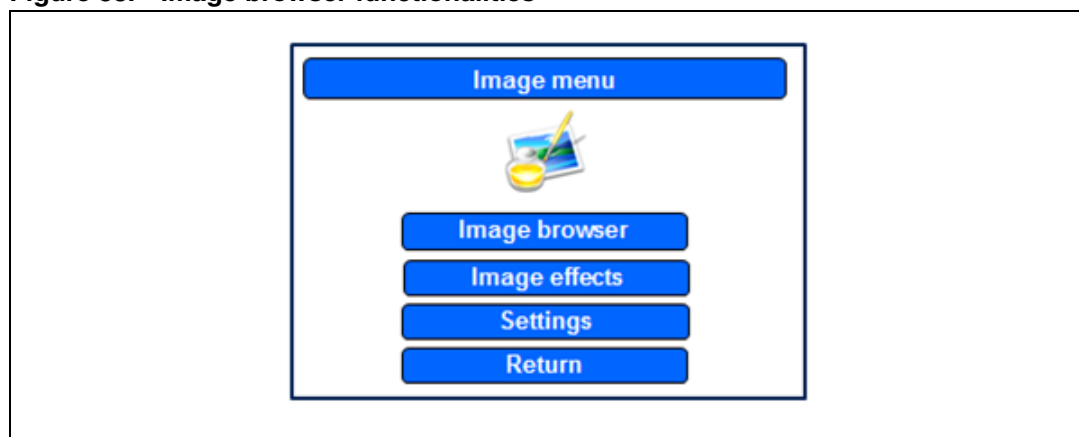
Regarding the JPEG decoder, the *LibJpeg* library is used and configured to support images with a smaller size than the 1024 x 768 resolution for RAM resources, but can be changed by increasing the size of the heap memory.

Figure 37. Image browser tasks



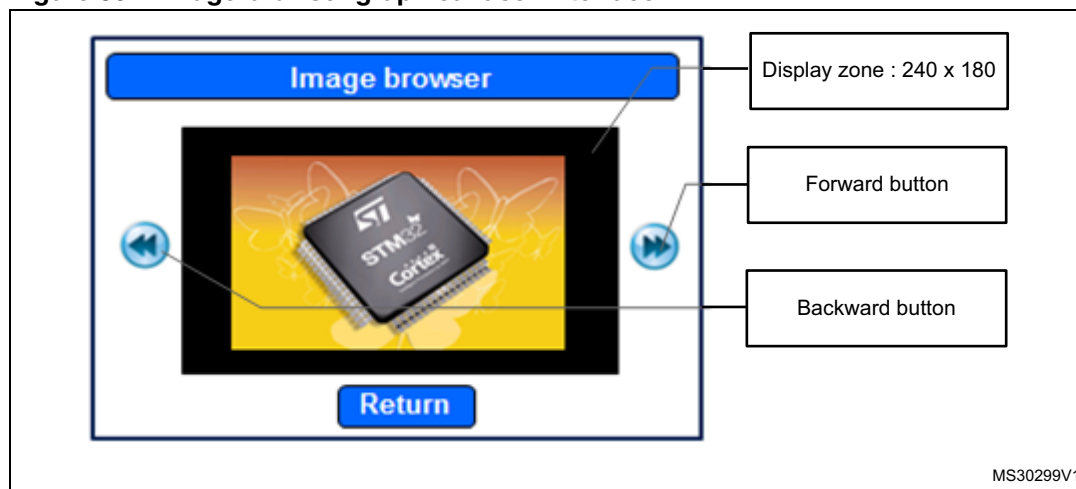
The module can be launched from the parent group or from the file manager module (see [Section 4.3: File manager module](#)) when an image file is selected. The main menu of the image browser module shows the following features and functionalities.

Figure 38. Image browser functionalities



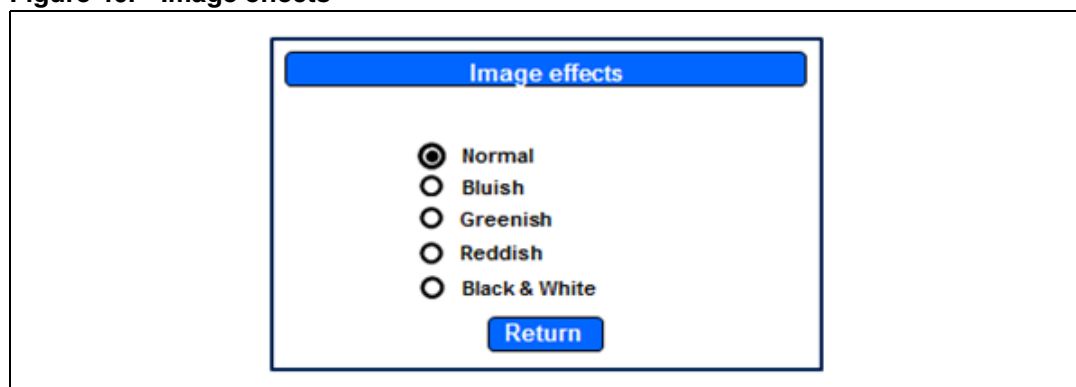
**Image browser:** the image browser frame allows you to display the available images in the selected folder, after decoding, scaling and applying the image effect. The forward and backward actions are available only if the automatic advance checkbox is unchecked in the settings frame.

Figure 39. Image browser graphical user interface



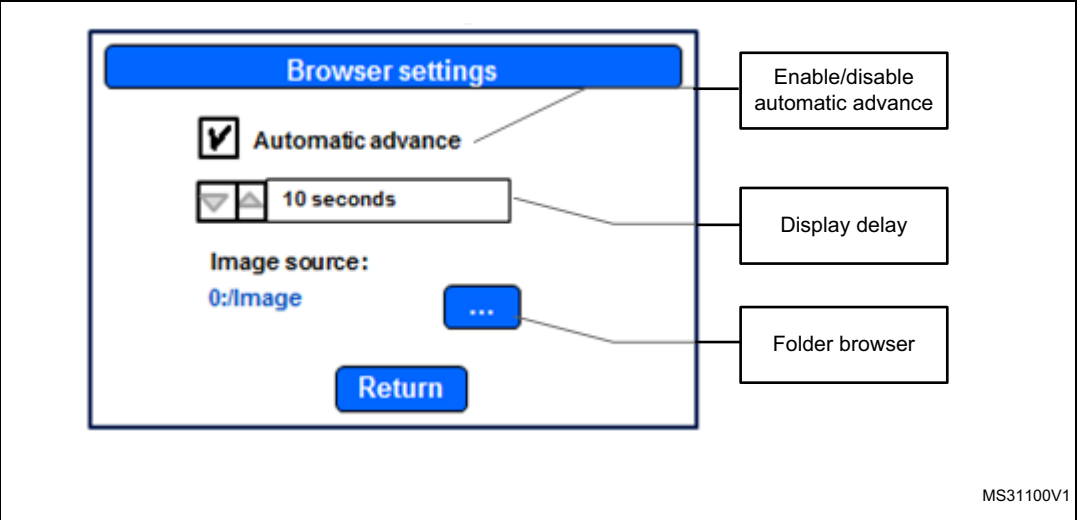
**Image effects:** the image effects frame allows you to apply an effect on the displayed image. The available effect are: Normal, Bluish, Greenish, Reddish and Black & White.

Figure 40. Image effects



**Settings:** the settings frame allows you to select the source folder for the image browser and to configure it so as to enable/disable the automatic advance feature. If the automatic advance feature is enabled, you can select the image display delay among the following predefined values: 2 seconds, 5 seconds and 10 seconds.

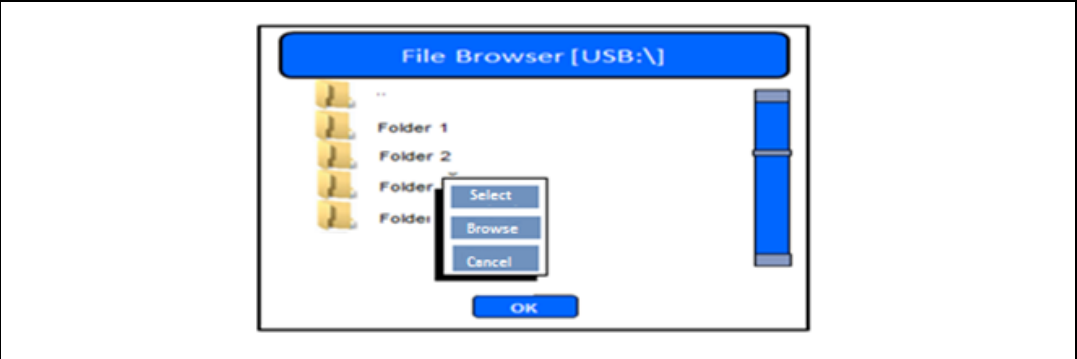
Figure 41. Browser settings



The **Folder Browser** action uses the file manager module to explore the storage units and select the source folder through the **FILMGR\_DirectEx** method using the direct access feature.

For more information about the direct access feature, refer to UM1550 "STM32 Demonstration Builder Developer Guide". A contextual menu is displayed when each folder icon is clicked that enables the user to either select, browse or cancel.

Figure 42. File browser window



**Select:** sets the selected folder as the source path for the images.

**Browse:** shows the content of the selected folder.

The Image browser supports the following image formats.

Table 2. Image formats

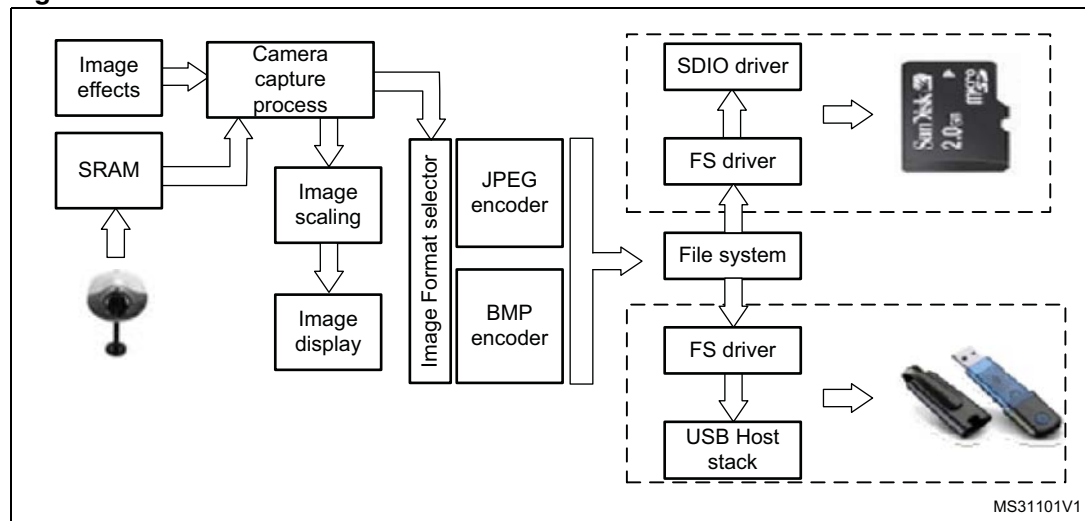
	Resolution	Compression	Bpp
BMP	160 x 120 to 1024 x 768	No	16/24
JPEG	160 x 120 to 1024 x 768	Yes	16/24

## 5.4 Camera module

The camera module retrieves the raw data and displays it on the LCD with the possibility of saving the captured frame in a BMP or JPEG format in the storage units. The destination folder and the capture image format can be selected and configured in the camera setting frame.

The camera module uses the DCMI interface (16 bits) to capture the data frame from the camera and put it in the external SRAM in QVGA mode (320 x 240), after applying the image effect defined in the settings frame. Once the data is in the external SRAM, it is resized to QQVGA 160x120 format and displayed in the camera capture display zone. If the capture is activated, the DCMI is temporary suspended and the last available image on the external SRAM is converted into a 24-bit Bpp format and then encoded and saved to a BMP or JPEG format in the destination folder following the parameters set in the camera settings frame.

**Figure 43. Camera module**



For the JPEG encoder, the *LibJpeg* library is called and the following parameters are used.

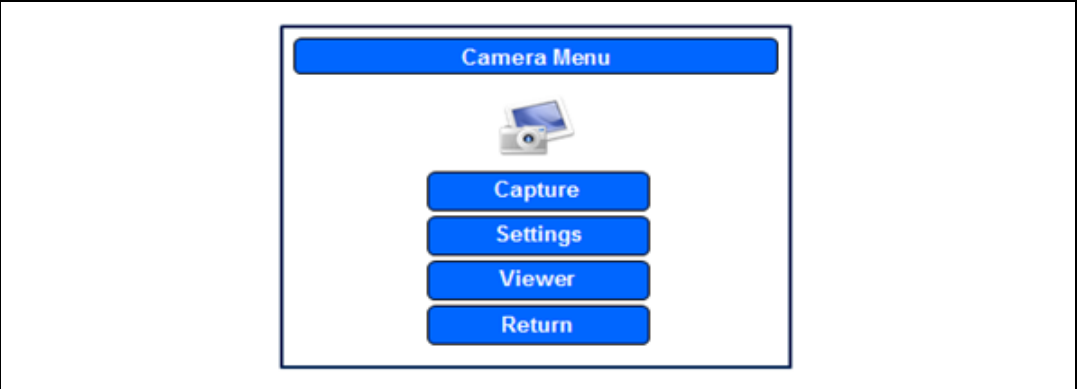
- Resolution : 320 x 240
- BPP: 24
- Color space: RGB
- Quality : 100%

For the BMP format, a bmp header with the following parameters is added to the top of the raw data (24 bits) and then saved to the selected storage unit.

- Resolution : 320 x 240
- BPP: 24
- Format: RGB
- Compression : No

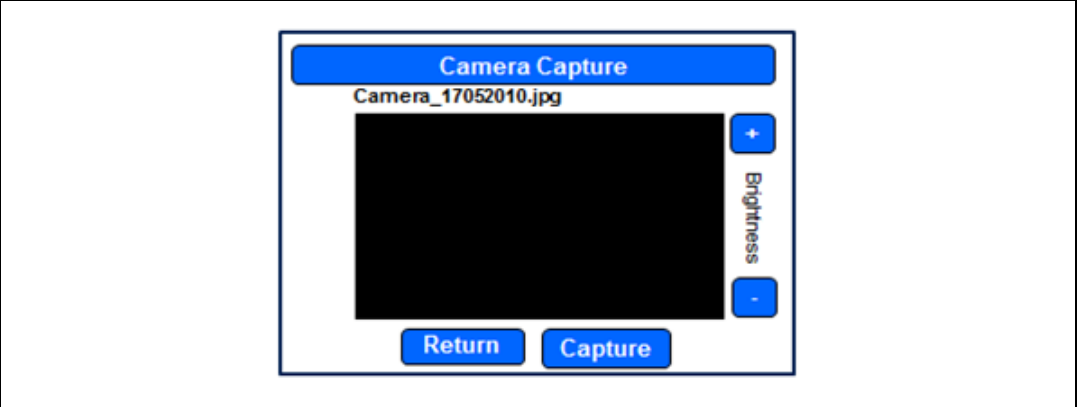
The main menu of the camera module shows the following features and functionalities.

Figure 44. Camera module functionalities



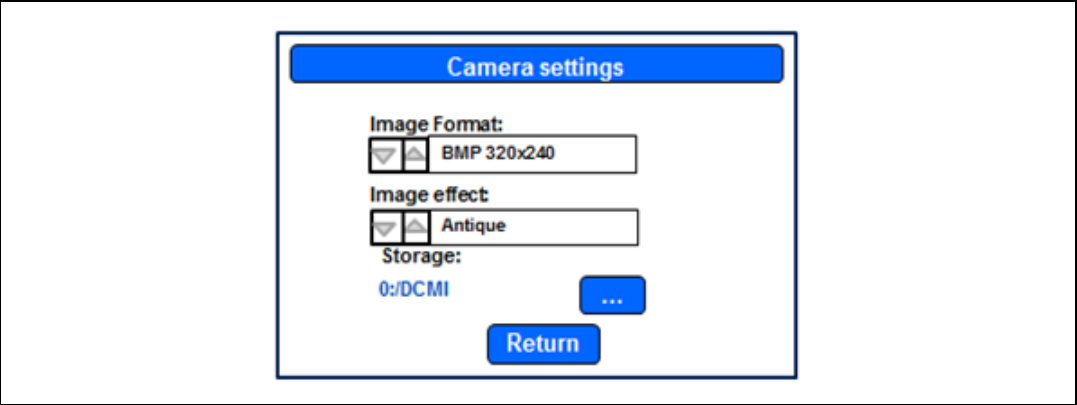
**Capture:** displays the frames captured by the camera and allows the user to capture photos and save them in the storage units. The user interface also offers the possibility of modifying the brightness of the camera. When the captured image is saved, the name of the file is displayed at the top of the image display frame.

Figure 45. Camera capture window



**Settings:** used to select the image format to be saved in the storage units, the image effects and the destination folder.

Figure 46. Camera settings window

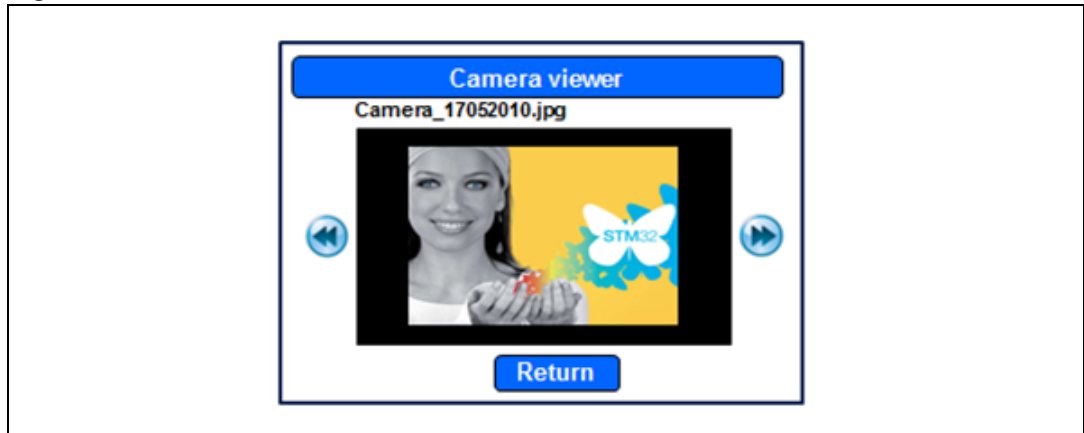


**Viewer:** displays the last captured images available in the camera capture folder. The forward and backward actions allow you to navigate within the available images. The



camera viewer is an image browser feature that uses the same graphical resources as the image browser modules and that is accessible through the *IMAGE\_CameraView*.

**Figure 47. Camera viewer window**



## 6 Description of *Connectivity* group applications

### 6.1 Ethernet module

The Ethernet module is a part of the connectivity application group. It is based on a webserver application that offers the following three features.

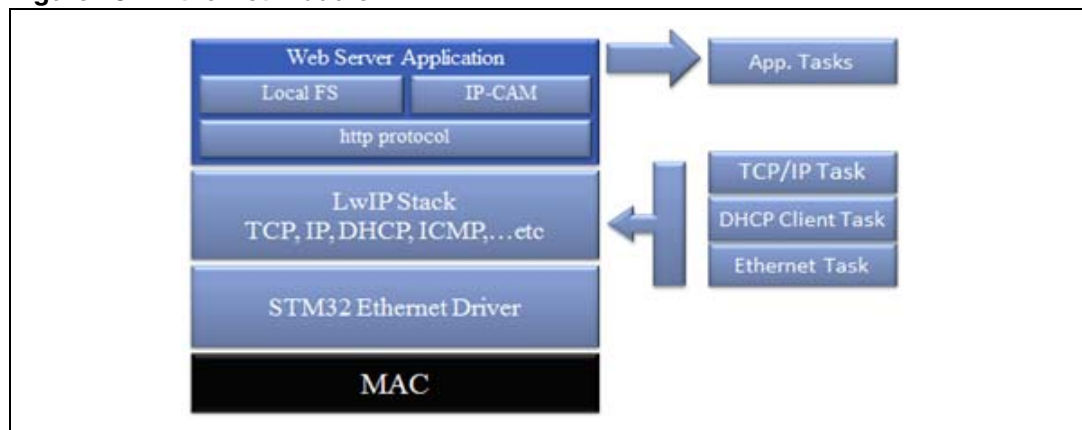
- Static system information: general information about STM32 devices stored in the STM32 Flash using a local file system.
- Dynamic system information: information about RTOS tasks and their status.
- IP-CAM feature: sends video frames captured using the DCMI interface over the Ethernet interface.

The Ethernet module is based on the following three components.

- TCP/IP stack based on LWIP needed to transfer the data over Ethernet.
- FreeRTOS real-time operating system.
- Image capturing sensor and storage data feature to store data in the external SRAM.

When the system is first turned on, the camera is configured as per the parameters selected by the user. The webserver application consists of four tasks: one for TCP/IP activity, one for the DHCP startup, one for the Ethernet module GUI update and the last for preparing the data and the image to be transferred over Ethernet.

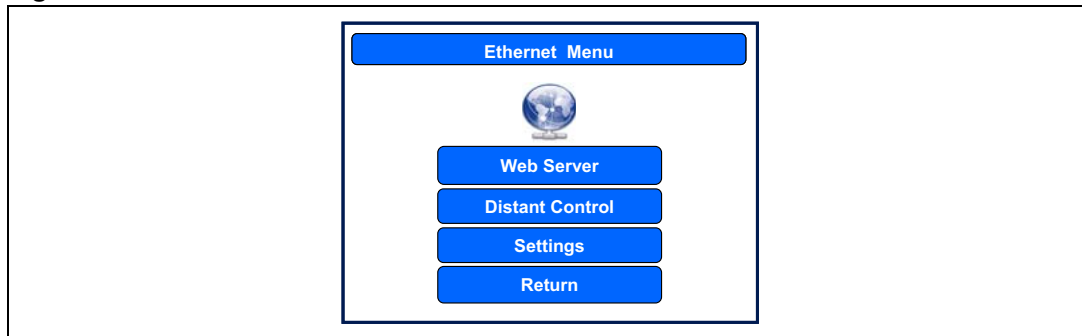
**Figure 48. Ethernet module**



To begin with, the LWIP task is initialized, followed by the initialization of the HTTP. Here the application runs as an HTTP web server. For HTTP, the reserved port number is 80. As such, the application binds to port number 80 that the server "listens to" or expects to receive requests from a Web client. The application runs the scheduler which periodically monitors the respective tasks.

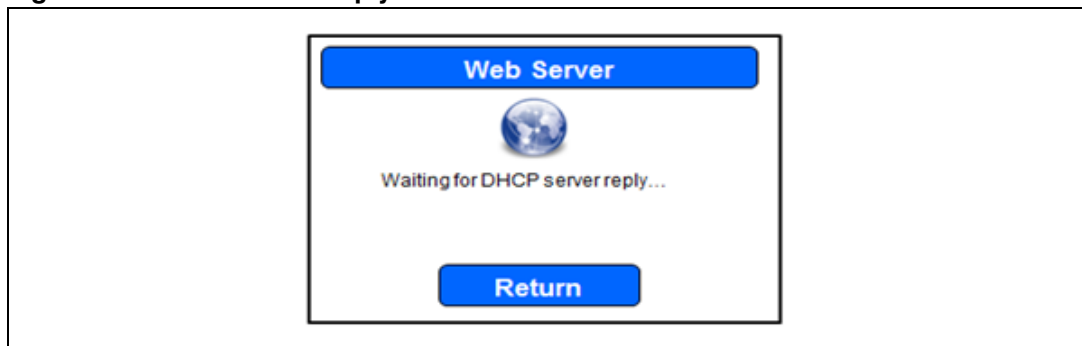
For the IP-CAM feature, the camera provides the inverted image in the buffer in RGB565 format. To display the image perfectly, the application should swap the image row-wise.

The main menu of the Ethernet module shows the following features and functionalities.

**Figure 49. Ethernet module functionalities**

**Web Server:** starts by showing the initialization frame to indicate the following:

- Ethernet initialization status and speed.
- DHCP process status1- waiting for DHCP server reply...
- IP address assigned by DHCP server.
- Static IP address.
- Ethernet cable connection/disconnection status.
- Running process information.

**Figure 50. DHCP server reply window**

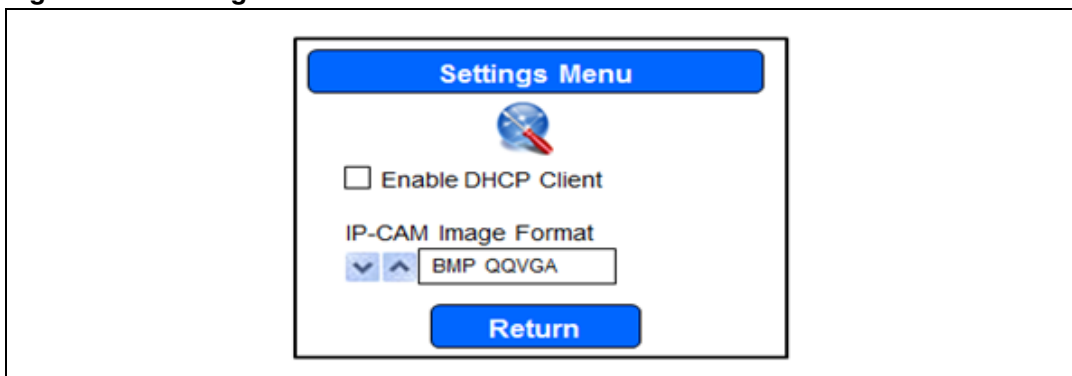
If the initialization phase failed (unplugged cable, connection cannot be established), the initialization frame indicates an error asking the user to check the hardware connection.

**Figure 51. Ethernet initialization failure**

Once the initialization phase has been completed, and an IP address has been assigned to the STM32xxG-EVAL board, the user can connect to the application through a web browser.

**Settings:** enables/disables the DHCP protocol and the IP-CAM image format.

**Figure 52. Settings menu window**



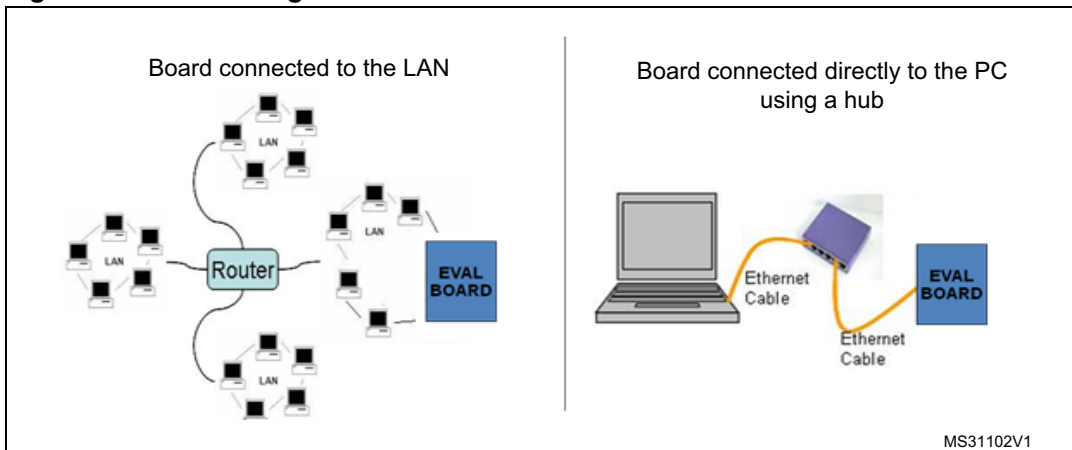
**Distant Control:** when clicked, the Ethernet main menu is closed and the Ethernet web server/remote control starts working as a background task.

### 6.1.1 Using the webserver application

Before launching the webserver application:

- ensure the camera is perfectly fitted on the board.
- ensure that all the jumpers are correctly connected.
- connect the board to the LAN (local area network) using an Ethernet cable or connect the board directly to the PC using an Ethernet switch/hub to test the functionality of the board as shown in [Figure 53](#).

**Figure 53. Connecting the board**



Once the IP address is assigned (through DHCP or assigned statically), the user can view the image captured by the camera through a computer on the network using a standard web browser.

To obtain the system information data or the image in a web browser, you must type the IP address of the board in the address bar of the browser as shown in [Figure 54](#).

Figure 54. Viewing an image in the web browser



## 6.1.2 Webserver functions

The webserver holds the following functions.

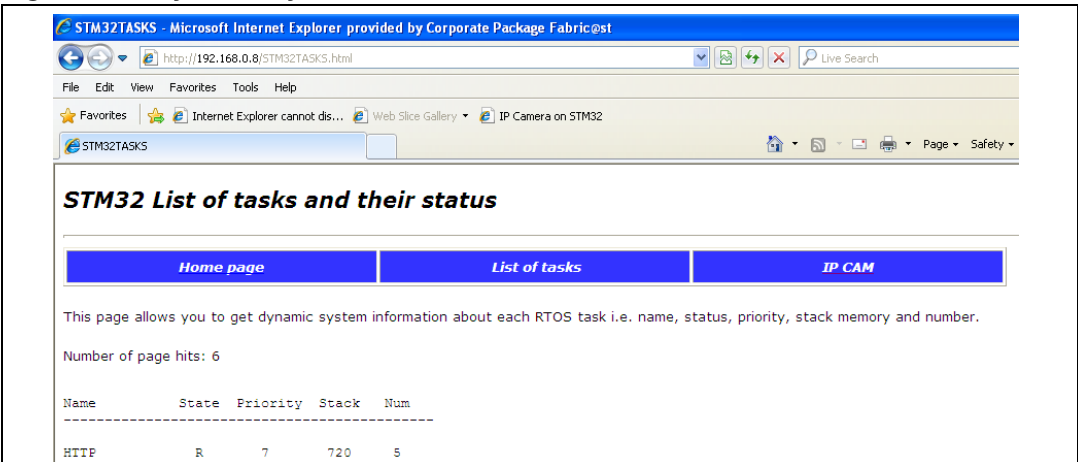
**Static system information:** general information about STM32 devices stored in the STM32 Flash using a local file system.

Figure 55. Static system information



**Dynamic system information:** information about RTOS tasks and their status.

**Figure 56. Dynamic system information**



**IP-CAM feature:** sends captured video frames using the DCMI interface over the Ethernet interface.

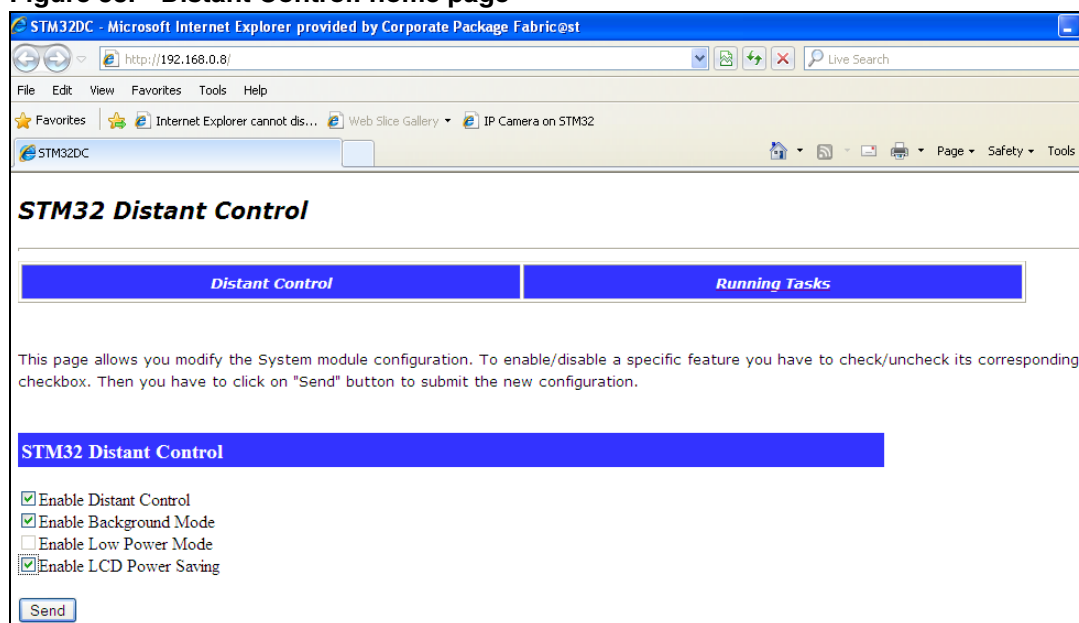
**Figure 57. IP-CAM feature**



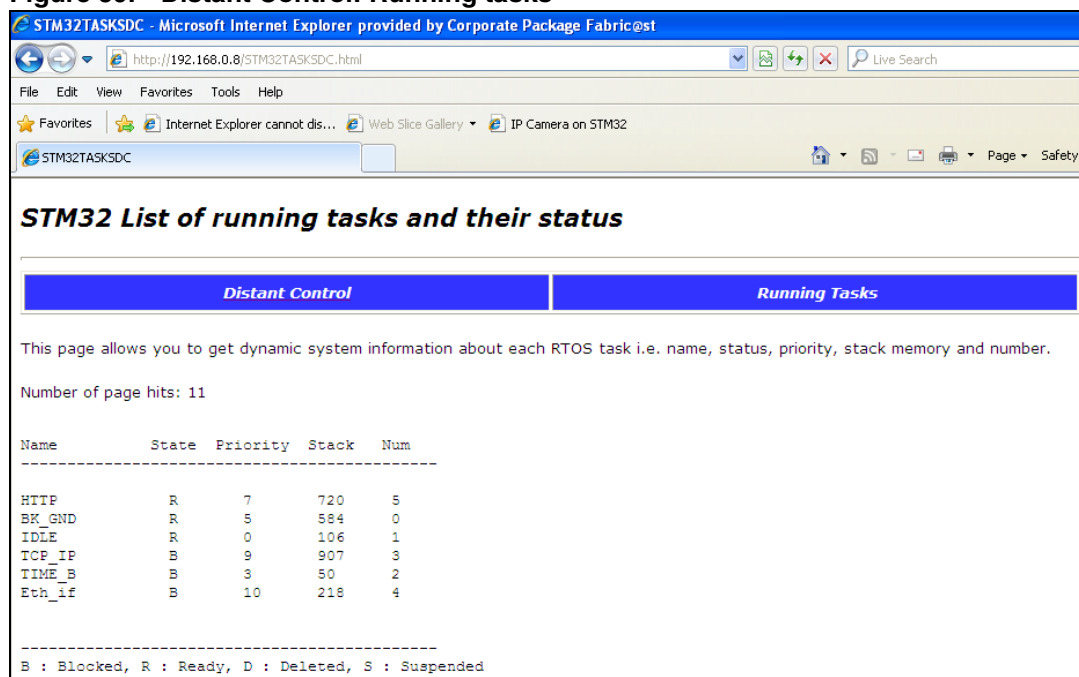
### 6.1.3 Distant Control functions

The Distant Control holds the following functions.

**Change system configuration:** Allows you to modify the System module configuration. To enable/disable a specific feature, first check/uncheck its corresponding checkbox as shown in the figure below. Then click the "Send" button to submit the new configuration.

**Figure 58. Distant Control: home page**

**Running tasks information:** information about RTOS tasks and their status. This page allows you to get dynamic information about RTOS running tasks and their status, including name, status, priority, stack memory and number.

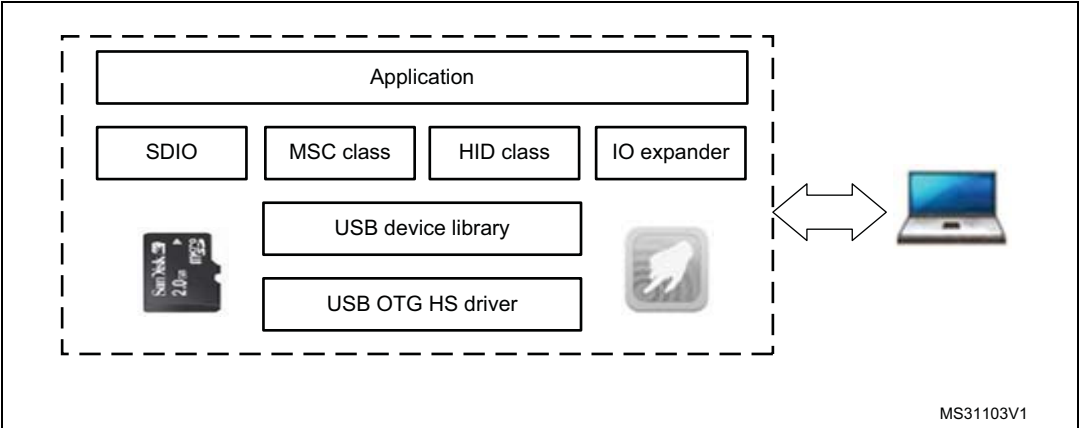
**Figure 59. Distant Control: Running tasks**

This page is automatically updated every second.

## 6.2 USB device module

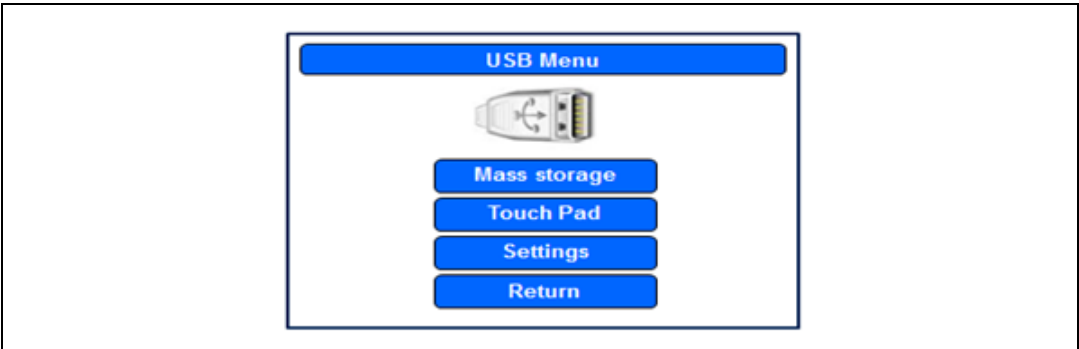
The USB device module is also part of the connectivity application group. It includes mass storage device application using the MicroSD Flash and an HID device that operates as a touchpad. The USB device module uses the USB OTG HS peripheral as the USB OTG FS is used for the US disk Flash storage unit.

Figure 60. USB device module



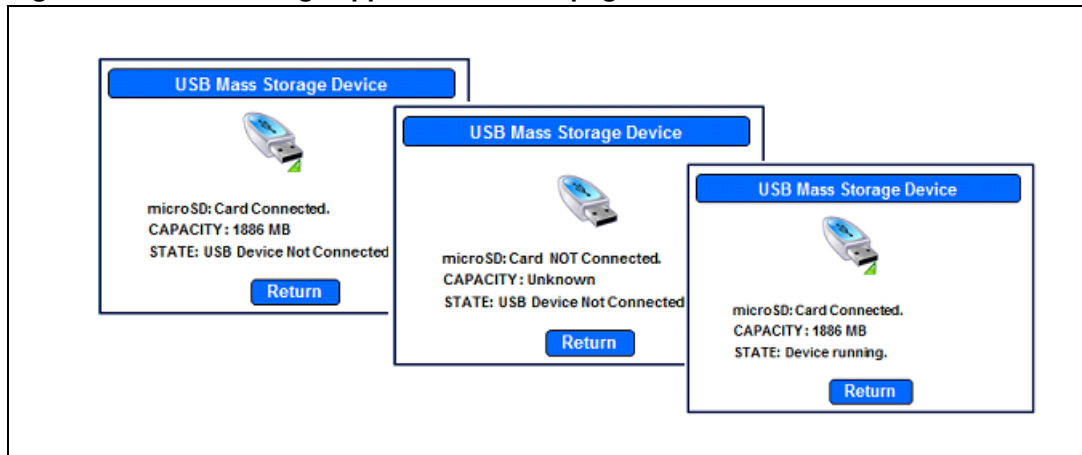
The main menu of the USB device module shows the following features and functionalities.

Figure 61. USB device functionalities

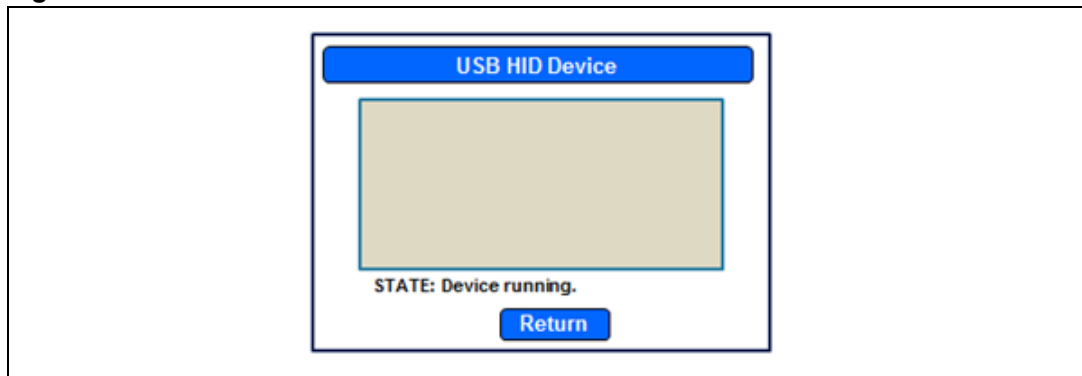


**Mass storage:** launches the mass storage application and shows the status page to indicate the MicroSD’s connection state and the USB’s power and configuration states.



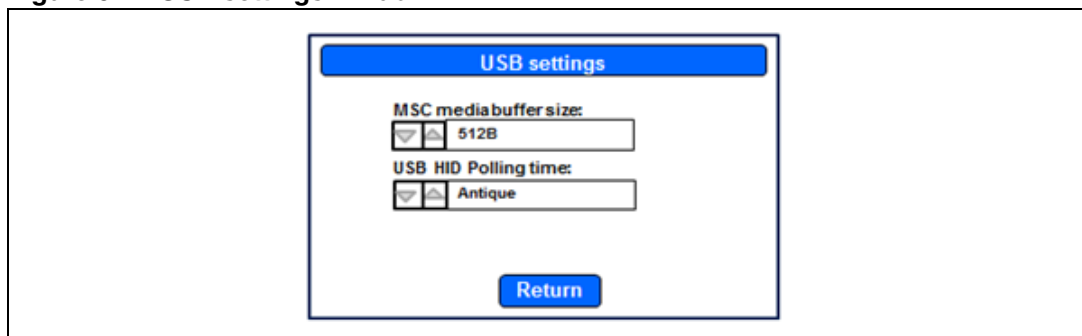
**Figure 62. Mass storage application status page**

**Touch Pad:** launches the HID application and shows the status page to indicate the USB power and configuration state.

**Figure 63. USB HID device**

The touchpad is a touch-sensitive interface zone that senses the position of a user's finger to provide cursor movement.

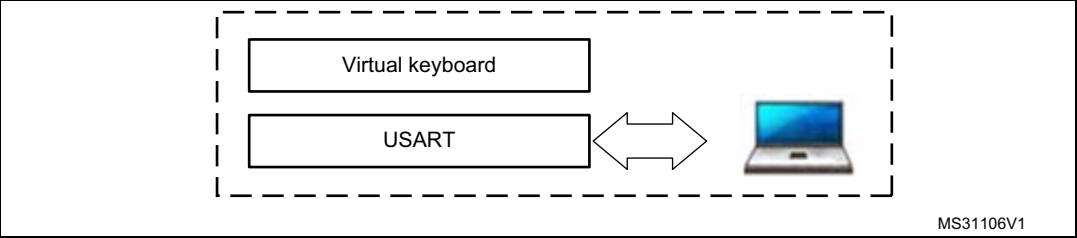
**Settings:** allows changing the mass storage media buffer size to enhance the write and read performance. Also used to define the HID's polling time.

**Figure 64. USB settings window**

6.3 Serial module

The serial module allows the user to send an alphanumeric ASCII text through the USART peripheral.

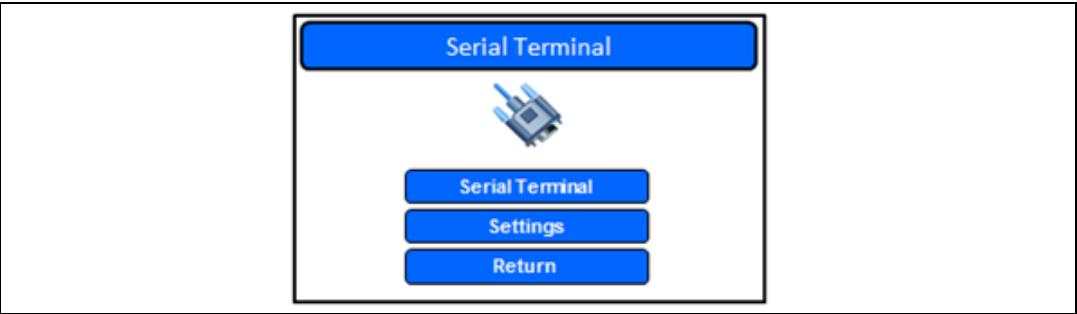
Figure 65. Serial module



The main menu of the serial module shows the following features and functionalities.

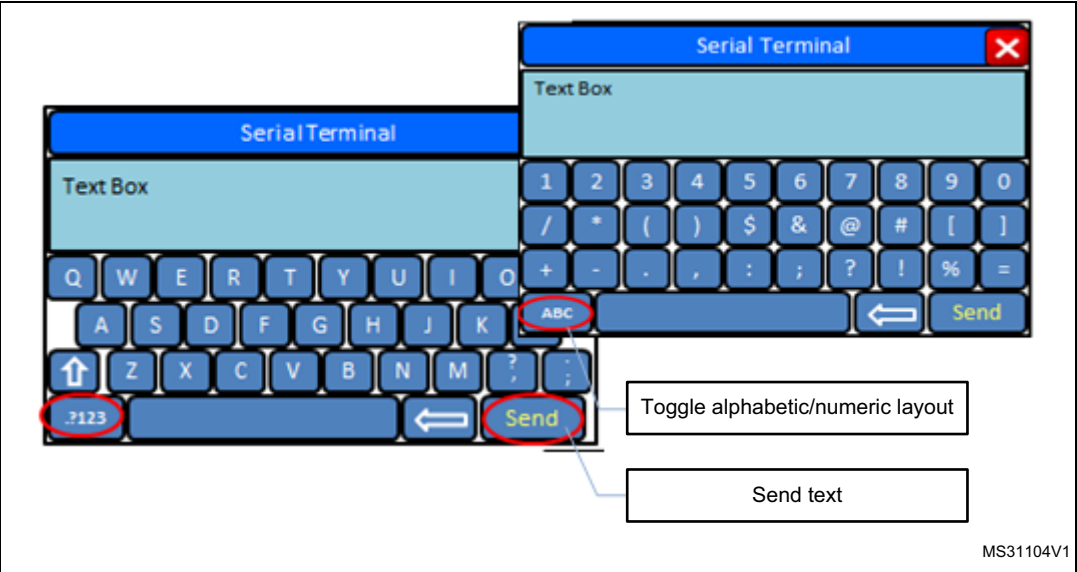
*Note: The Serial module shares some H/W resources with the SD card. Launching the serial terminal will close all the processes using the SD.*

Figure 66. Serial module functionalities



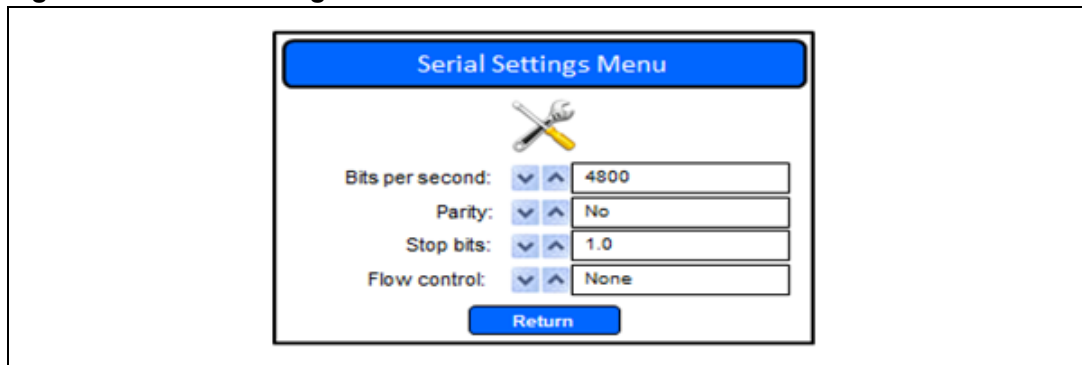
**Serial Terminal:** a graphical interface with an alphanumeric virtual keyboard with lowercase and uppercase support, used to send ASCII characters to the host over the USART peripheral.

Figure 67. Serial terminal



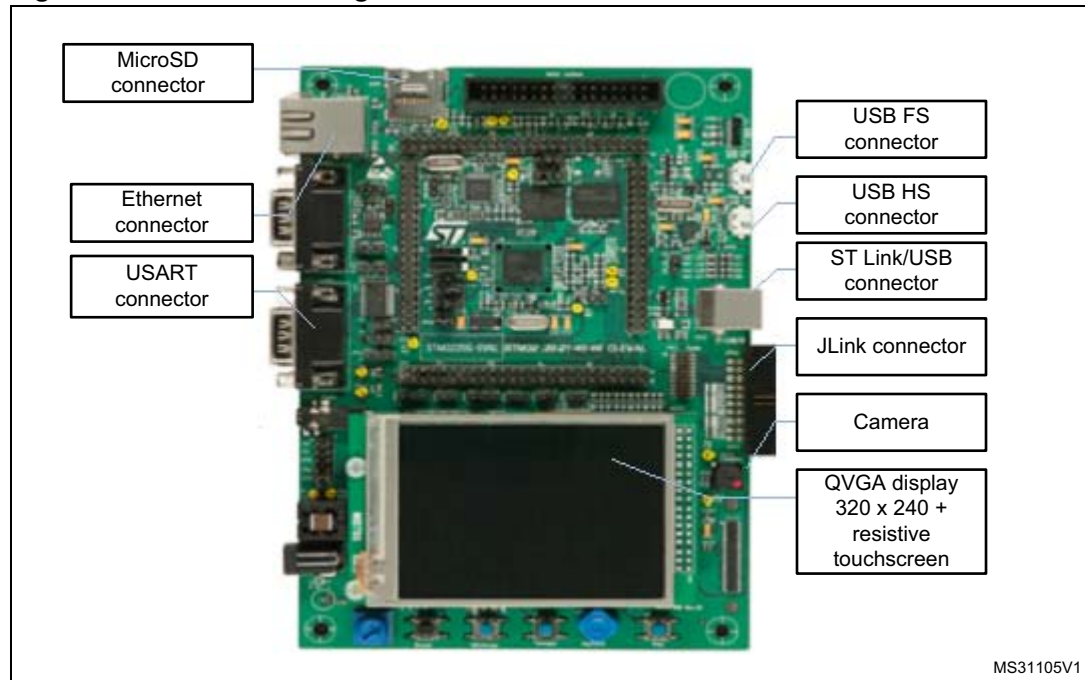
**Settings:** used to change the configuration of the serial communication.

**Figure 68. Serial settings window**



## 7 Hardware configuration

Figure 69. Hardware configuration



### 7.1 Required accessories

In addition to the STM32xxG-EVAL board, the Demonstration Builder requires the following accessories (provided with the EVAL board package):

- USB Flash disk.
- MicroSD card.
- Headphones with male jack connector.
- Micro-AB to standard receptacle A connector.
- Micro-AB to standard plug A connector.

## 7.2 Jumper configuration

**Table 3. Configuring the jumpers**

Jumper	Usage	Configuration	Note
JP5	Ethernet	2 <->3	25 MHz clock provided by MCO
JP6	Ethernet	2 <->3	MII interface mode enabled
JP8	Ethernet	Open	MII interface mode enabled
JP16	microSD	1 <->2	
JP19	RTC	2 <->3	RTC powered by embedded battery
JP31	USB OTG HS	Fitted	USB OTG HS Selected
SW1	Boot mode	1 <->2	Boot from User Flash
SW1	Boot Mode	1 <->2	Boot from User Flash

## 8 Revision history

**Table 4. Document revision history**

Date	Revision	Changes
06-Aug-2012	1	Initial release.

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