MadLab JellyBean

version 1.0

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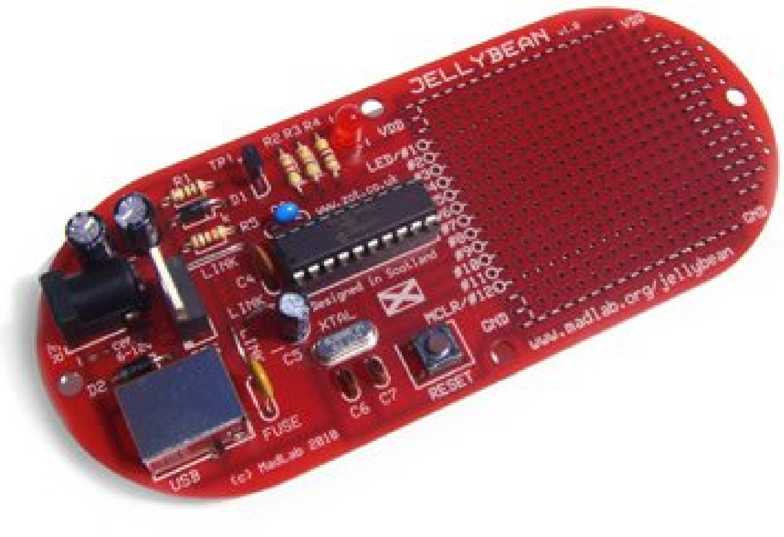
Introduction



Features:

- USB bus powered or externally powered with automatic switching between power sources. For many applications USB power is sufficient (100mA with the option to request 500mA). An external power source can be used when high currents are required for driving servo or DC motors etc. A self-resetting fuse is included to protect the USB host from over-current situations.
- 'sea of holes' for user circuits
- onboard pushbutton (processor reset or available to user programs) and onboard red LED
- integrated development environment using a dialect of the popular BASIC programming language which is simple for beginners to use yet powerful enough for many programming tasks
- comprehensive help with example circuits and component sources
- Wizard to configure peripherals and automatically generate BASIC code
- libraries support analogue and digital I/O, UART and SPI serial comms, PWM, timers, interrupts, servo and stepper motors, LCD
- fast - on a modern PC, a "hello world" type program compiles, downloads and executes in less than 1 second (and with a single key press)

System Requirements

IBM PC or compatible

Windows XP, Vista, 7 or later (with .NET Framework installed)

50MB free disk space

free USB port

USB cable (A male to B male)

(optional) mains power supply, 6-12V regulated dc, >= 300mA, 2.1mm, centre +

Installing JellyBean

The application software is provided online, along with all supporting documentation. Navigate to the webpage http://www.madlab.org/jellybean/ and download the zipped JellyBean application and unzip its contents. Connect a USB cable (not supplied) to the JellyBean board and a free USB port on your PC or hub (ignoring any Windows prompts for drivers). Run the setup.exe file and follow the on-screen instructions.

Note that administrator privileges are required to install the application.

If JellyBean is connected to the host PC during the installation process then its driver will automatically be installed. If not then Windows will run the "Found New Hardware Wizard" the first time the hardware is connected. In the latter case allow Windows to automatically locate the required driver.

In all cases ignore any prompts that the software has not passed Windows Logo testing or that Windows can't verify the publisher of this driver software and install anyway.

Updated versions of the application with bug fixes and new features will be posted periodically to the website. An archive of previous versions will also be maintained.

Quick Start

After installing the software and connecting JellyBean to the host PC, start the application. Select New in the File menu to open a new window for editing. Then type in the following lines:

```
loop:    toggle led
         pause 500
         goto loop
```

Select Compile in the Program menu (or click the gearwheel icon). A window should pop up showing no errors in the compilation. If there are errors then check the program lines are exactly as above.

After a successful compilation, select Download Memory in the Program menu (or click the down arrow icon). The program should be copied to the JellyBean board.

Once the program has successfully downloaded it should start automatically (if not click the green run icon) and the onboard LED should flash about once a second.

Menu Commands

File Menu

New

Opens a new BASIC program file for editing.

Open

Opens an existing BASIC program file from disk. The default file extension is *.bas*.

Close

Closes the current window. If the contents of a BASIC file have been modified and not saved then you are prompted to save the file.

Save

Saves the current BASIC file to disk. The file is saved as ASCII text.

Only BASIC files can be saved. If you want to save the contents of the Assembler window or Console window then cut and paste the text to an editor such as Notepad or Word.

Save As

Saves the current BASIC file with a new filename.

Page Setup

Allows printer settings such as page margins and orientation to be set up.

Print Preview

Previews the contents of the current window before printing.

Print

Prints the contents of the current window.

Exit

Exits the application.

Edit Menu

Undo

Undoes the last editor operation. Multiple levels of undo are available.

Redo

Redoes the last editor operation. Multiple levels of redo are available.

Note that there are some differences in the way Undo and Redo function depending on whether BASIC statements are coloured or not (see Editor Options below).

Cut

Cuts selected text to the clipboard. Only applicable to BASIC windows.

Copy

Copies selected text to the clipboard.

Paste

Pastes text from the clipboard. Only applicable to BASIC windows.

Delete

Deletes selected text. Only applicable to BASIC windows.

Select All

Selects all the text in the current window.

Find

Finds a text string in the current window. Options include matching case, matching whole words and search direction.

Find Next

Finds the next occurrence of the text string in the current window.

Replace

Replaces a text string in the current window with another text string. Only applicable to BASIC windows. Options include matching case, matching whole words, search direction and replace all.

Set Font

Allows the font face, style and size to be changed. Normally you would use a fixed pitch font where all the characters are the same width so that tabs line up neatly.

The standard Windows fonts that are fixed pitch are *Courier New*, *Lucida Console* and *Lucida Sans Typewriter*. Note that the Assembler, Compilation Results and Console windows always use a fixed pitch font but you can still change the size of the font in these windows.

Editor Options

Syntax highlighting - colours BASIC programs to make them easier to read (keywords in blue, constants in red, comments in green).

Show BASIC tips - displays pop-up help on syntax when the mouse cursor hovers over a BASIC keyword.

Tabs - sets the number of space characters between tab stop positions.

View Menu

Console

Opens the Console window for bi-directional communications with the program running on the JellyBean board.

The **PRINT** instruction allows text to be sent from your program to the Console window. This can be a very useful aid for debugging, as well as displaying other information.

Keys typed at the keyboard are sent to JellyBean (normal printing characters plus tab and return). Typed characters are then available for use by your program. See **RECEIVE USB** for more information.

Communications with JellyBean is via a virtual serial port. This makes it straightforward to interface other software to the board. Any application that can send data to a serial port can work with JellyBean (Windows Hyper Terminal for example).

The 'Clear' button clears the Console window. The 'Local echo' option causes characters typed at the keyboard to also appear in the Console window.

BASIC

Brings the BASIC window to the top if open. If multiple BASIC windows are open this command cycles through them in turn.

Assembler

Brings the Assembler window to the top if open.

Options Menu

Compiler Options

Default to 8-bit variables: If checked then implicitly-defined variables (those which have no associated **DIM** statement) are 8-bit by default. If unchecked, they are 16-bit.

You only need to use 16-bit counters or other variables in your program if their values can exceed 255. Programs compiled using 16-bit variables are roughly twice the size of 8-bit compilations, allow a smaller number of program variables in memory, and run more slowly.

Default to unsigned variables: If checked then implicitly-defined variables (those which have no associated **DIM** statement) are unsigned by default. If unchecked, they are signed. Signed variables are allowed to be negative, while unsigned variables are always positive. Note that there is a program memory overhead associated with the use of signed variables.

See **DIM** for how to override these settings on a case-by-case basis.

DIM variables before use: If checked, requires that variables are defined before use. If unchecked then variables are implicitly defined when first used.

It is good programming practice to define variables prior to use with DIM statements. This also ensures that mis-spellings in variable names are caught.

See **DIM** for more information.

Timers and Interrupts: If checked, enables background processing. There is a performance penalty involved with background processing and compiled programs will be larger by approximately 30% so this option is disabled by default. If you want to use timers or interrupts in your program then it must be enabled.

See **WHEN** for more information.

Display assembler: If checked, the compiler will generate assembly language that corresponds to a compiled BASIC program. This is useful for learning more about PIC assembly language and also gives the location of any compilation errors.

PIC Options

Master Clear Enable: If checked, enables the onboard pushbutton as a processor reset button. If not checked then MCLR (pin 12) is available as a general purpose input pin, doubled up with the pushbutton which is available for use in your programs.

Note that you can always reset the processor by clicking the Reset Device toolbar button.

USB High Power Device: Requests 500mA from the host PC as opposed to the standard 100mA of current. Note that there is no guarantee that the host will be able to deliver the required power. If connected to a bus-powered hub rather than a USB port on the host PC then high power will not be available.

If driving motors with USB power only then this option should normally be enabled.

If in doubt then power JellyBean from an external power supply.

Show USB Status: If checked, the onboard LED displays the status of the USB connection (off = not attached or program running, flashing = configuring, on = ready). The onboard LED is shared with pin 1 so it might not always be desirable to drive it high. If not checked then the LED is not used to display the USB status. Note that in either case the LED is available for use in your programs.

ID: a 12 hexadecimal-digit code used for identification purposes. Typically used to contain a software version number or date but can be put to any other use.

I/O Wizard

A Wizard to help with the configuration and set up of peripherals. A number of tabs are available to configure a range of devices such as liquid crystal displays, motors and UART communication ports.

Extensive help is provided within the Wizard.

Auto-download

If checked then programs are automatically downloaded after successful compilations.

Auto-run

If checked then programs are automatically run after downloading.

Checking both these options allows programs to be compiled, downloaded and executed all with a single F5 key press.

Program Menu

Reset Device

Resets the JellyBean board. Can be used to check that communications with the PC are working.

Device Info

Displays the ID programmed into the PIC (see PIC Options above). Also displays the version number of the bootloader firmware, whether Master Clear is enabled, whether requested USB power is low or high, whether the onboard LED shows USB status, whether code-protection is on, and the number of times the PIC memory has been fully programmed (from a minimum endurance of 10 000 times).

Compile

Compiles the current BASIC program into object code, ready for downloading, and optionally generates assembler code (if the 'Display assembler' option is checked in Compiler Options). A Compilation Results window displays the results of the compilation and any errors found.

A BASIC program must be successfully compiled without errors before it can be downloaded.

If there are multiple BASIC windows open then one particular window must be made topmost first.

Download Memory

Downloads a compiled program to the PIC.

Verify Memory

Verifies program memory in the PIC. Note that memory is automatically verified when downloaded, but this command provides an additional check.

Erase Memory

Erases the program memory in the PIC. It doesn't erase the bootloader firmware which is required for communications with the host PC.

Note that any downloaded program in memory will run automatically each time the board is powered. The Erase Memory command will prevent this.

Code Protect Memory

Protects the program memory in the PIC. This prevents the memory being read by an external PIC programmer and hence protects proprietary software.

Note that code protection cannot be undone. A code-protected PIC however can continue to be programmed and verified.

Run Program

Runs the program downloaded to the PIC.

Stop Program

Stops a running program. The onboard reset pushbutton doesn't stop a running program but restarts it instead (if Master Clear has been enabled).

Window Menu

Cascade

Cascades all open windows.

Tile Vertically

Tiles all open windows vertically.

Tile Horizontally

Tiles all open windows horizontally.

Arrange Icons

Arranges any iconic windows along the bottom of the screen.

Close All

Closes all open windows.

Help Menu

Contents

Displays the online help pages.

Function key F1 will also display help as is normal in Windows applications. If F1 is pressed while the cursor is within a keyword in a BASIC window then help on that keyword will be displayed. If F1 is pressed while the cursor is within an error message in the Compilation Results window then help on that error will be displayed.

Index

Index of online help pages.

Search

Search online help pages.

readme.txt

Late-breaking information.

BASIC Reference

Reference manual for the BASIC programming language.

Home Page

Accesses the JellyBean web home page.

About

Displays the copyright message and the software version number.

Toolbar

Button	Action	Menu equivalent
📄	Open new BASIC file	File|New
📂	Open existing BASIC file	File|Open
💾	Save BASIC file	File|Save
🖨	Print current window	File|Print
↶	Undo last edit	Edit|Undo
↷	Redo last edit	Edit|Redo
✂	Cut text to clipboard	Edit|Cut
⎘	Copy text to clipboard	Edit|Copy
📋	Paste text from clipboard	Edit|Paste
🔭	Find text	Edit|Find
🖥	Display Console window	View|Console
🔧	Set compiler options	Options|Compiler Options
▦	Set PIC options	Options|PIC Options
✨	Input/Output Wizard	Options|I/O Wizard
🔄	Reset device	Program|Reset Device
⚙	Compile BASIC	Program|Compile
↓	Download memory to PIC	Program|Download Memory
▶	Run PIC program	Program|Run Program
■	Stop PIC program	Program|Stop Program
?	Help table of contents	Help|Contents
🏠	JellyBean Home Page	Help|Home Page
⬅	Previous compiler error/warning	
➡	Next compiler error/warning	