

OSIL Microcontroller Programmer

Version 1.2-1

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1 Introduction

The microcontroller programmer is a PC application which works in combination with a bootloader on the hardware to enable the device firmware to be updated.

The bootloader serves two purposes. Firstly it ensures that the firmware is valid by comparing the onboard firmware against a pre-calculated checksum. If this test fails the firmware will not start and a message is output on the device's serial port. The device will remain in the bootloader mode which allows it to be programmed using this tool.

Secondly, the bootloader allows the user to update the firmware. To do this a command is sent to the device to force the device to remain in bootloader mode. After this command is sent the bootloader mode can only be left by sending a run command from the programmer.

The programmer is a cross platform application, and can be supplied for Windows or Linux on request.

In order to ensure data integrity, the system uses checksums for a number of operations to ensure that the firmware written to the device is the same as that which was sent by the developer.

The first checksums are at the file level. The Intel hex description contains a checksum for each line of data, and the programming stage will not proceed if any of these checksums are incorrect for the data contained.

The second level of checksum is at the communication level. Each message sent to the device is checked against a CRC-16 checksum to ensure valid data. Messages will be automatically retried if the checksum fails during programming.

The third level of checksum is on the whole firmware itself. The checksum is calculated on the PC and transmitted to the device. This verifies that the data written to the microcontroller memory is correct. This checksum is then stored in the last two bytes of the microcontroller memory and used to verify the integrity of the firmware at startup.

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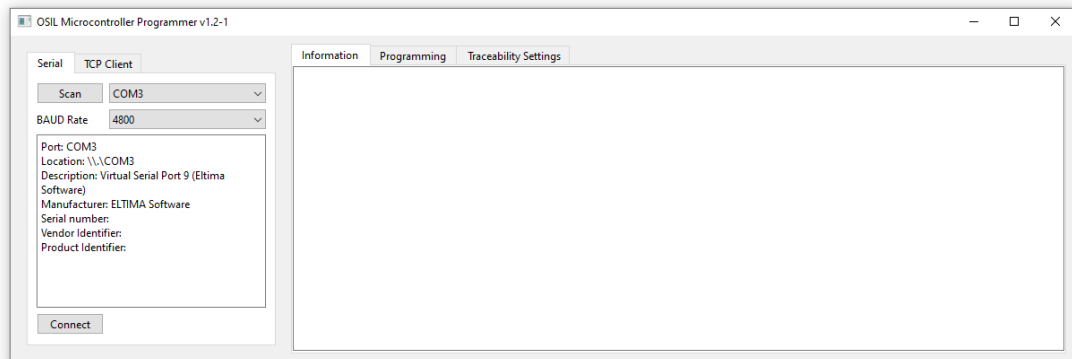
2 Installation

Installation is done by simply running the installer and following the prompts. The installer is named “uCProgrammer-1.2-1-Setup” where 1.2-1 is the version number. Different versions of hardware and software are not guaranteed to be compatible.

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3 Usage

The programmer has one window from which all functions are accessed. On opening the application, the window below is shown:



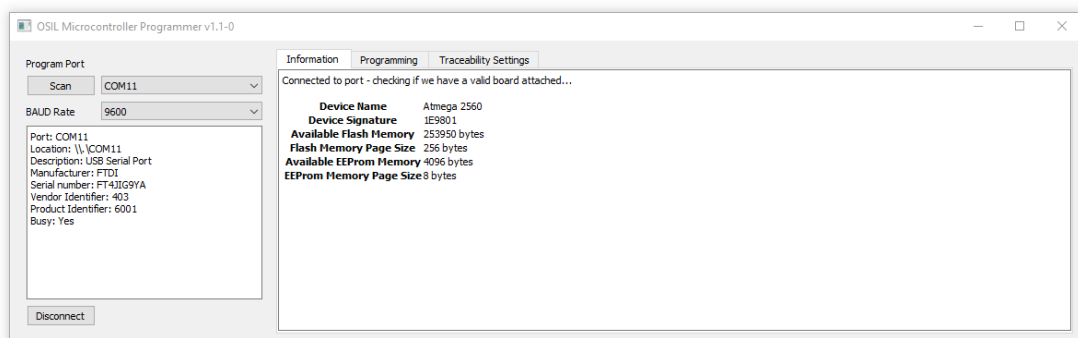
This can be thought of as two areas, the left hand panel dealing with communication and the right hand section dealing with programming. The large panel on the right-hand side provides information about the connected device, and explanation of what the software is currently doing.

The device must be powered, connected via serial cable or TCP server, and in bootloader mode. The process to enter bootloader mode is device specific, please refer to the device manual for the specific procedure. When the device boots into the bootloader the following message will be written to the serial IO port:

“Use the OSIL software update tool to communicate with the bootloader.”

This is indication that the device is in bootloader mode. The only way to exit this mode is to use this programming application.

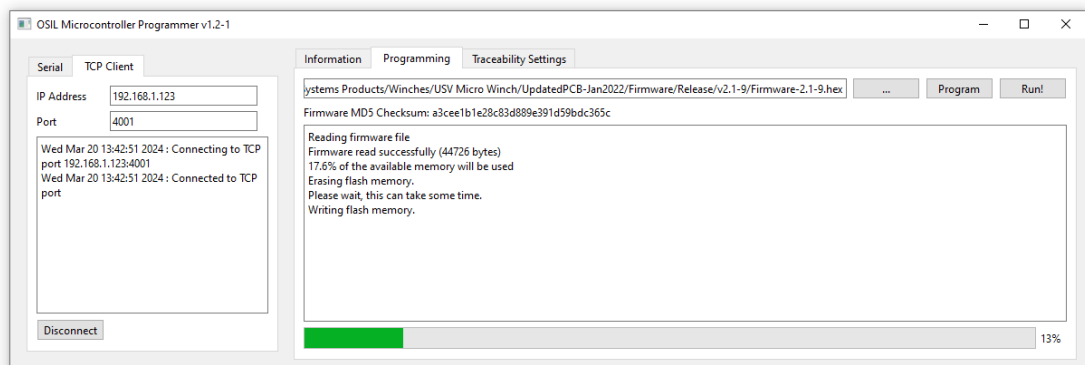
To connect to the device click “Scan”. The drop-down box next to the scan button will be populated with all serial ports available on the system. Information about the port is given in the panel below. Select the appropriate COM port, select 9600 BAUD, then click “Connect”. The program then queries the device and displays information about the chip to be programmed. It is important that this information is present, otherwise the device cannot be programmed.



Next, select “Program” tab and pick the firmware file by clicking the “...” button next to “<Select Firmware File>”. The tool only supports firmware in Intel HEX format. Once selected, click “Program”. Which will start the programming process. This consists of four stages:

1. Load and verify the provided firmware file.
2. Erase the microcontroller memory
3. Program the device
4. Verify the programmed data.

During programming, the user is updated at each stage, as below:



The final step is to configure the device to run the new firmware by clicking “Run!”. The device should then be power cycled, and will reboot into the new firmware.

3.1 Traceability Settings

The traceability settings are for use by OSIL personnel. This allows the hardware version, serial number and bootloader BAUD rate to be set. It should not be necessary to change these settings after initial programming.