

Arduino Micro Breadboard Laboratory
Interface Processor
(Micro BLIP)

MicroBLIP
circuit board v1.2
Operating System v1.2.0

1/21/2018

User Manual

1 Setup and Operation

1.1 Introduction

For the past ten years, students in the instrumentation course in the Bioengineering Department at the University of Pittsburgh have each constructed, used, and taken home a system called the Breadboard Lab Interface Processor (BLIP). The BLIP functions as a number of basic laboratory instruments. These include an analog data logger, signal generator, frequency counter, duration timer, and event logger. The BLIP is powered by USB from a computer and appears to that computer as a human typing on a standard keyboard. Thus, the BLIP can interface to any text editor or spreadsheet software on any standard platform (Macintosh, Linux, or Windows).

The new version of the BLIP introduced here, the MicroBLIP, is based on the popular Arduino “Micro” microcontroller board. This document describes how to use the MicroBLIP. A separate construction manual, “Building the Micro-BLIP,” is provided under Lab 2 on the class schedule at

http://www.vialab.org/Bioe_1310/schedule.html

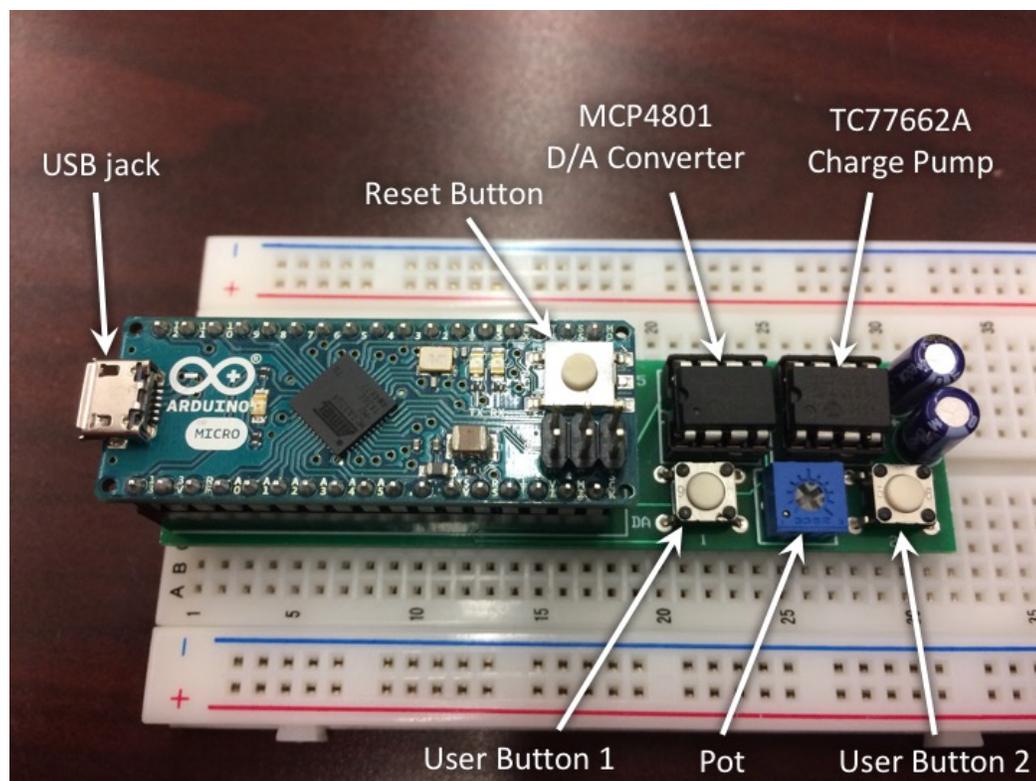


Fig. 1 MicroBLIP, showing locations of Reset Button, Pot, USB jack, user Buttons 1 and 2.

The figure above shows the completed MicroBLIP inserted into a breadboard. Note that the left most pins of the male header are inserted into Column 1 of the breadboard. Since the pins of the Arduino pass through the custom printed circuit board (PCB) of the MicroBLIP, the Arduino

pins have a fixed correspondence to the column numbers of the breadboard. Also note that at this time no other connections are present on the breadboard. These will be added as the MicroBLIP is used in Lab 3 and subsequent labs. **It is important that no other power sources, including batteries, ever be used on the breadboard along with the MicroBLIP, to avoid damage to the MicroBLIP.**

1.2 Loading the Software onto the MicroBLIP

In order to upload the MicroBLIP software onto the Arduino, we will be using the Arduino Integrated Development Environment (IDE). If you are using one of the Windows machines in the B10 Lab, open the Arduino IDE, which is installed on those computers (there should be a link to the IDE on the desktop). If you are using your own computer, download the IDE from the Arduino website:

<https://www.arduino.cc/en/Main/Software>

Next, connect your Arduino board to the computer using the USB cable provided with your MicroBlip. Once connected, you will see a blue LED glow, located under the MICRO board, indicating that it is getting power from the computer.

In the Arduino IDE, go to Tools -> Boards and select Arduino/Genuino Micro. Next, go to Tools -> Port, and select the port that the Arduino is connected to. Now the IDE knows which type of Arduino board is being used, and which serial port it is connected to.

Download the program (also called a “sketch” in the Arduino community) by clicking on “MicroBLIP program” under Lab 2 on the class schedule at

http://www.vialab.org/Bioe_1310/schedule.html

Double-click on this file and it will be loaded into the Arduino IDE’s edit screen. You will be asked if you want to create a new “sketch folder” to contain this program, and you should click “OK.”

Next, in the upper left corner of this screen, find the icon that looks like a check-mark. Click on this icon to verify that the code has no errors. There should be no errors, provided the program was copied correctly.

Just to the right of the check-mark icon is the upload icon, which looks like an arrow pointing to the right. Click on this icon, and wait until the upload is completed, watching the green and yellow LEDs blink on your Arduino. Once it is done, you should be able to test the MicroBLIP software as described in the next section.

1.3 Testing the MicrBLIP

Open a text editor on your computer. Whenever you have the MicroBLIP plugged into a USB port of your computer, you should have a text editor open. Since the MicroBLIP will appear to the computer like a human typing on a keyboard, it can disrupt other programs if they are currently selected when the MicroBLIP is typing.

To start the program, push the hardware Reset Button on the Arduino Micro (see Fig. 1). The green LED should flash for about 7 seconds, and then the yellow LED should flash once. Then press User Button 1 and the welcome message will be typed. You may then cycle through the

MicroBLIP modes by repeatedly pressing User Button 1, or you may first display the mode descriptions by pressing User Button 2.

Once programmed, the MicroBLIP can be removed, and it will automatically restart any time it is plugged back into a USB port, at which time you can again open a text editor and press User Button 1 to get the welcome message.

Using the MicroBLIP in each of its modes will be described in subsequent sections of this manual.