**Electrochemical detection of oxacillin resistance with SimpleStat: a low cost integrated potentiostat and sensor platform**

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**Supplementary Material – Assembly and Use Instructions**

This supplementary material includes all of the information required to build the SimpleStat and is organised into the following folders:

**SS\_PCB\_V1\_3**

* Contains the KiCAD 5.0.1 design files required to manufacture the PCB. These can be edited in KiCAD to tailor the PCB. Alternatively, the SimpleStat can be built as documented in this paper by using the production files in the subfolder: production files.
* A Bill of Material with suggested supplier numbers for all the parts used in the device is also included in this folder.
* KiCAD software can be downloaded from: http://kicad-pcb.org/

**SS\_firmware\_V1\_0**

* Contains the Atmel Studio 7 source files needed to compile and produce the firmware for the ATtiny412 microcontroller used in the design. A precompiled version of the firmware is also included in this folder. To use this, see the subfolder: ***SimpleStat\_V1\_0\_Hex\_ELF***.
* Atmel Studio can be downloaded from: https://www.microchip.com/

**simpleStat Calibration Procedure**

* This file describes the recommended procedure that should be followed to calibrate the SimpleStat. In order to complete the calibration, we used a Fluke 115 digital multimeter, but there are several lower cost alternative available.

**Assembly**

* The SimpleStat can be assembled using a fine tipped soldering iron, or with the use of solder paste in conjunction with the hotplate method described Dryden and Wheeler (1), which can be found at the following URL:

http://microfluidics.utoronto.ca/gitlab/dstat/dstat-hardware

**Programming the ATtiny412 Microcontroller**

* We programmed the microcontroller using an Atmel ICE programmer, which can easily be used through Atmel Studio 7.
* An alternative method of programming was also explored using an Ardunio as a UPDI programmer. The procedure and Arduino files required for this approach is described here:

https://github.com/ElTangas/jtag2updi

**PC Communication over UART**

* By default, the firmware used for the SimpleStat is designed to supply data to a computer. We achieved this using an inexpensive UART connected to J5 Pin 1 and J4 Pin 4.
* A number of devices are available to achieve this, such as the FTDI UMFT234XF Development Module (Digikey order number: UMFT234XF)
* A terminal program such as Putty (https://www.putty.org/) can be used to interface to the UART controller and record data from the SimpleStat

**Downstream Data Analysis**

We performed downstream data analysis using a Matlab script file, located in the root folder called: ***simpleStatDPV\_analysis.m***.

This file can be opened in a text editor for those who do not want to use Matlab, so that the operations required to plot and present the data can be understood.