**Thanks for using this code for automating microfluidics.**

**Here’s a readme file on how to open the “actuation” program.**

**Step 1:** Please place .actuation folder in your Documents folder and then open the “actuation.conf” file and set the different paths.

Debug = 1 means to show debug statements when you execute actuation.exe (or 0 to hide).

The four directories can be set to your desired path. For example, C:\Steve\Devices\ where this directory would contain my devices.

**Step 2:** Download the following software and install –

Arduino (I use version 1.05)

NI-VISA (from national instruments)

gtk2-runtime environment (<http://gtk-win.sourceforge.net/home/index.php/Main/Downloads>)

Inkscape

Cygwin setup (<http://cygwin.com/install.html>)

Codeblocks (to compile and to change C++ code)

**Step 3:** Open the Arduino folder and run “dmf\_driver.ino”. Compile and run. It should display “Done uploading” if everything is OK. I sometimes get the following error

“avrdude: stk500\_getsync(): not in sync: resp=0x00”

As long as it says done uploading, you can ignore this error code. If not, you can check Arduino forums to fix this problem.

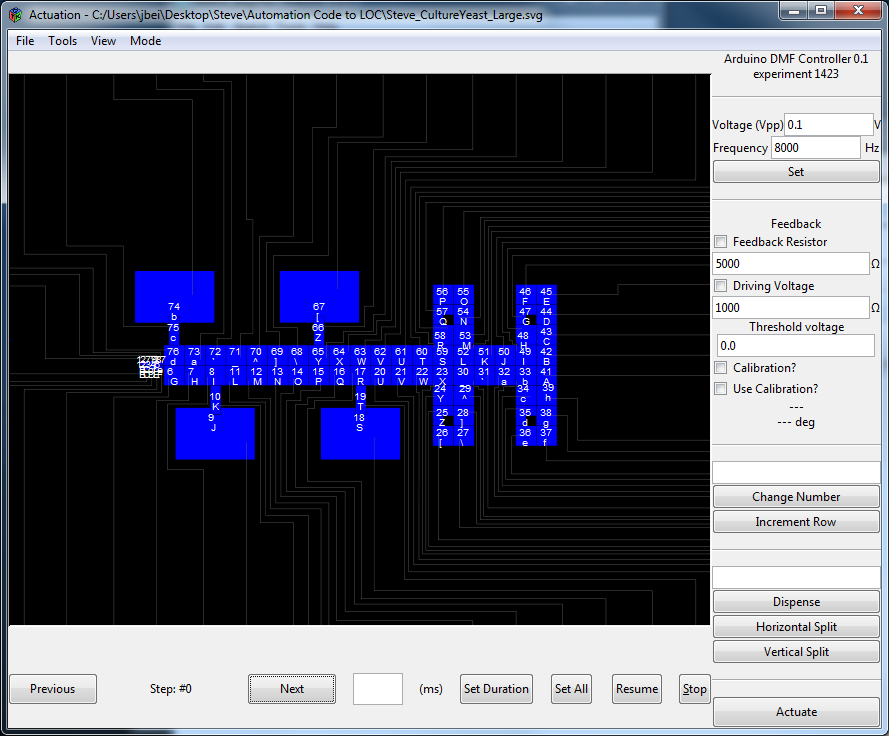
**Step 4:** Turn on your function generator – if you don’t use agilent 33210A, you need to download the drivers for your function generator and modify the main.cpp code to control your generator autonomously. If you do use Agilent 33210A you need to find the logical address for the machine (check instruction manual) and insert it in the main.cpp code. Build and it will place the actuation.exe code in your \bin\Release folder.

Need to modify this line (change the bold part)

#define DEFAULT\_LOGICAL\_ADDRESS "**usb0::0x0957::0x1507::MY48012079::INSTR**"

**Step 5:** Run actuation.exe and load my “D2D Microfluidic.svg” file to run D2D microfluidics. You can also load your own microfluidics design in svg format.

If everything is correct, you should see something similar to this screen.



You can click electrodes to turn them on and off, set your own programs, change the voltage and frequency, add feedback to your automation.

If you do set your own programs, ensure you set your pulse time and set duration (or you can ‘set all’ to maintain the same time for all pulses). After you enter the last step, press next, then enter “-1” into the pulse time and set duration. This tells the program this is your last step.

If you have any questions, please email Steve ([ccshih@lbl.gov](mailto:ccshih@lbl.gov)). Please do cite this in your own research paper.