INKJET PRINTING INSTRUCTIONS

Author: Andrik Lugnet

Supervisor: Dr. Alisyn Nedoma

Methodology

Ensure everything is plugged in. Turn on everything at the wall.

Check that lights on the right-most syringe pump are on (should be multiple green lights on top)

Check that Jet Drive III Controller is powered on (orange light is lit), if not, ensure switch at rear is turned to on position
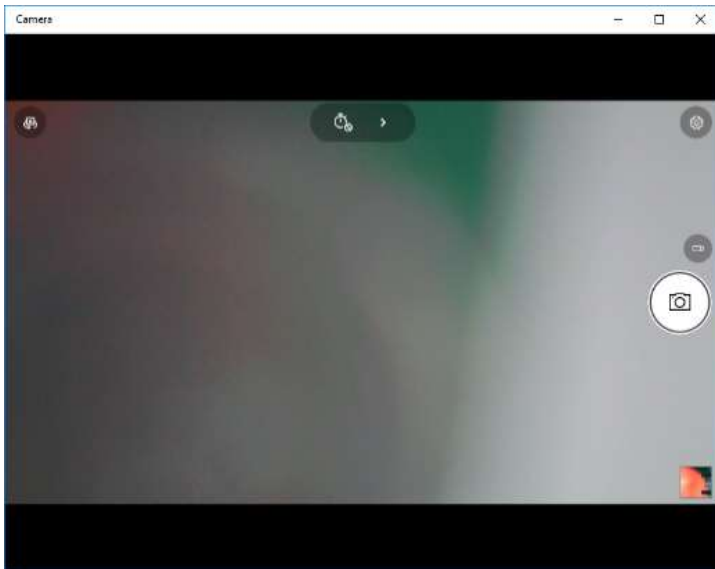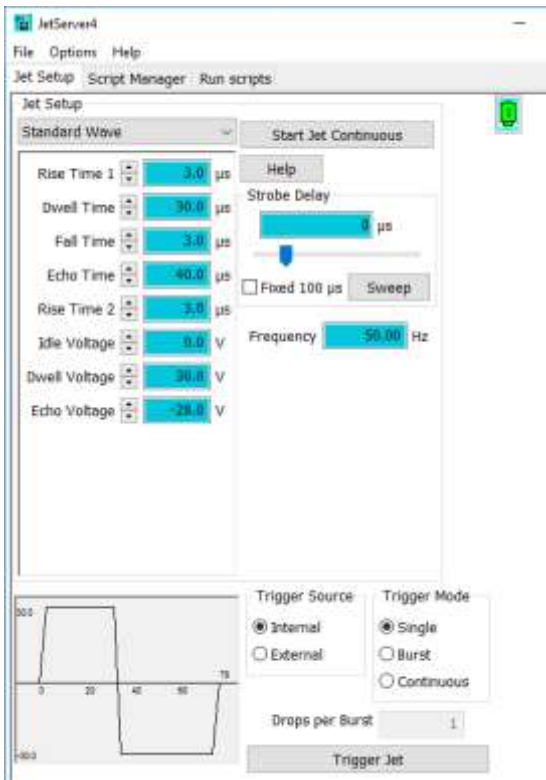
Turn on Laptop

Ctrl+Alt+Del

Log onto WiFi network (UoA-Wifi)

Sign into windows using your uni account

Start Camera App, ensure webcam is mounted correctly and in focus.

Make sure the lights on the camera are off/dim as possible as they hinder droplet viewing.

Start Jet Server application. Settings should be left at default to start with at least.

Start Hyperterminal application. Check the readme file if you need, otherwise don't start a new connection, instead open the Syringe Pump.ht connection
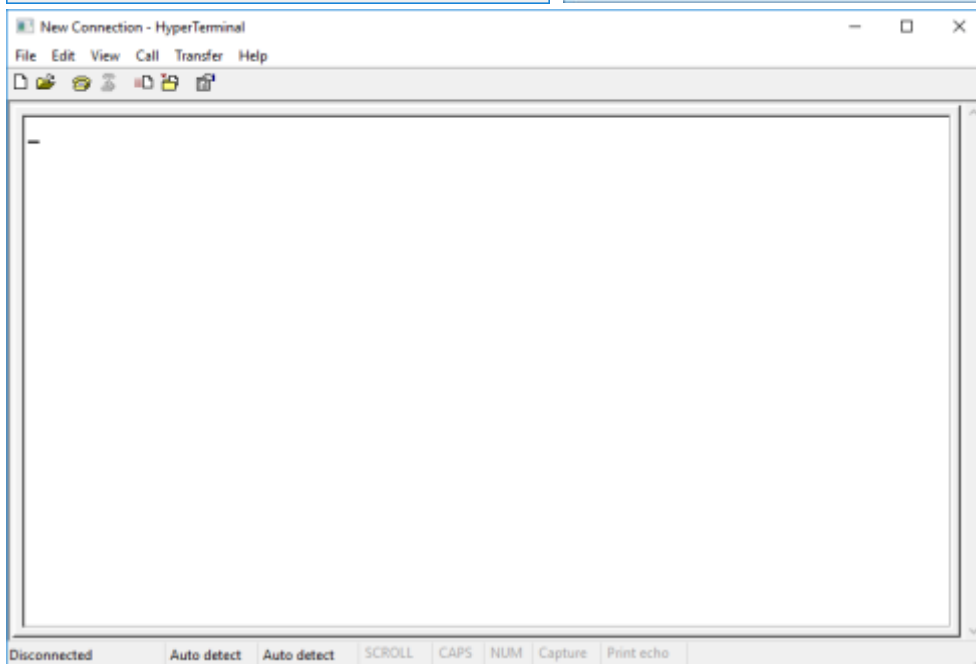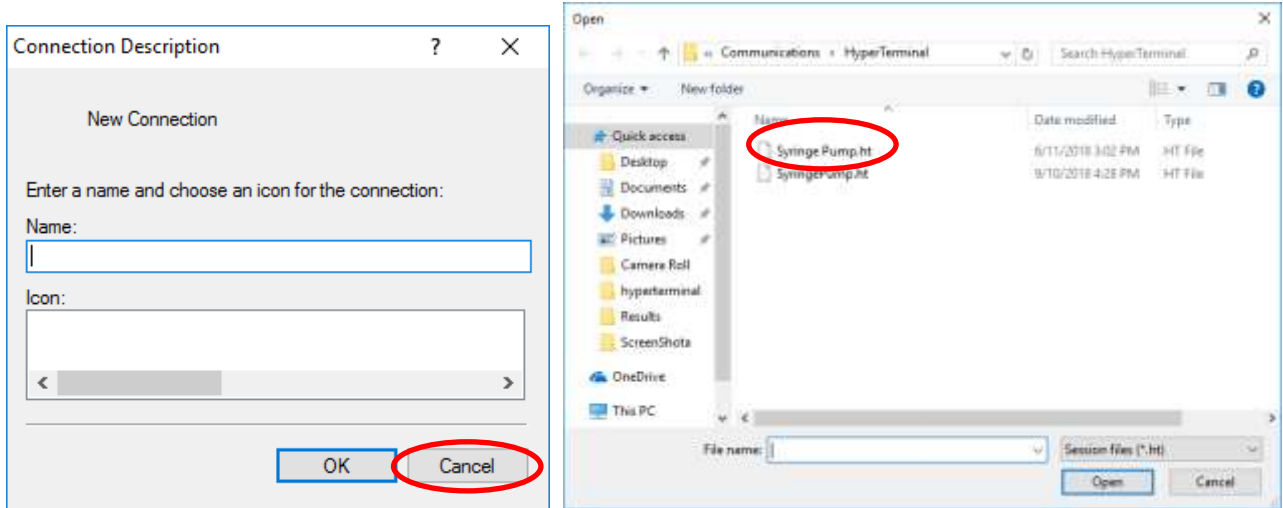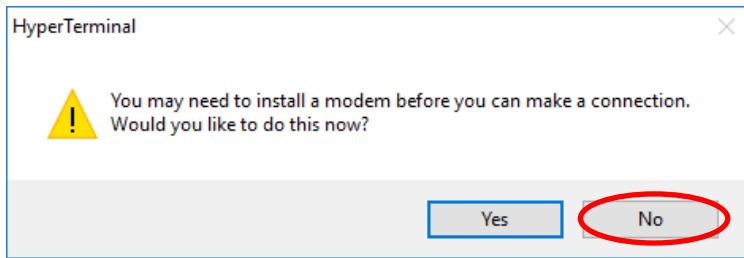
Ensure that no printhead is installed

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Place empty waste beaker underneath pressure regulator

Initialise the syringe pump by typing:

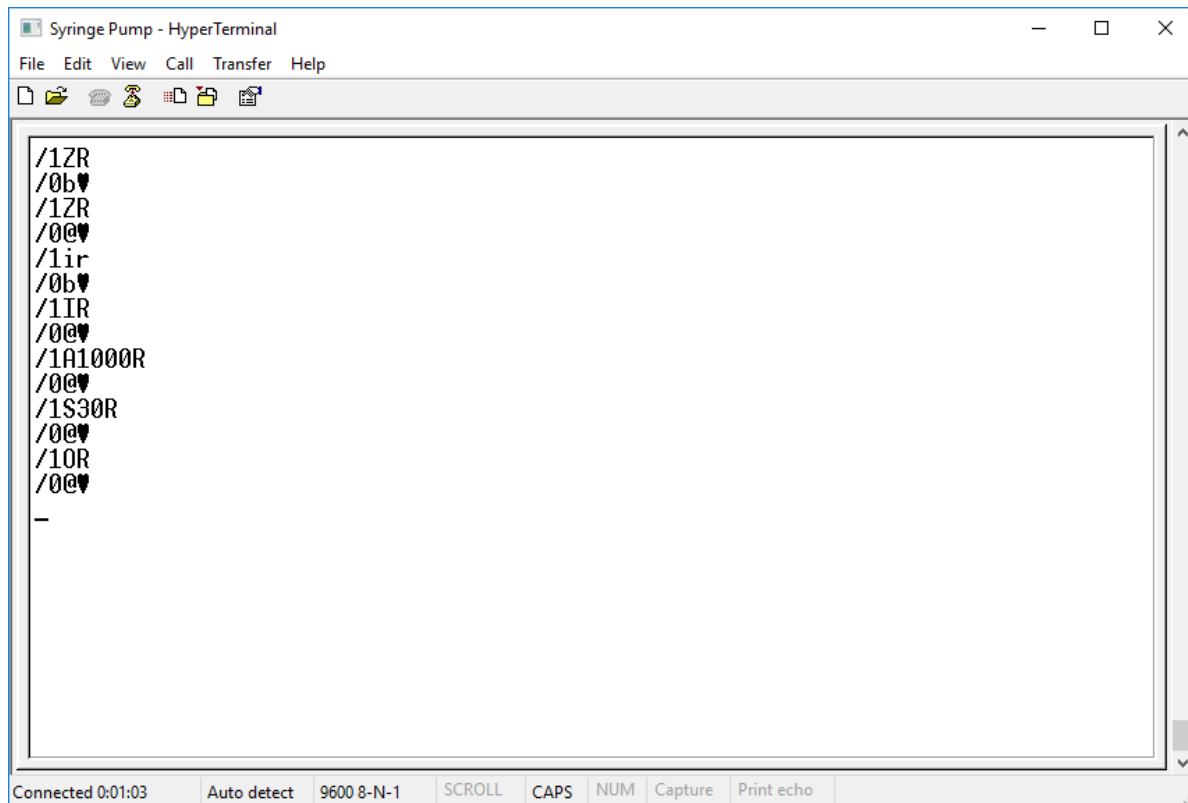/1ZR (powers on pump 1 and calibrates position, emptying the pump reservoir in the process)

/1OR (sets pump to outlet – should be open to air)

/1A1000R (moves pump to position 1000 to give you margin either way)

/1S30R (sets speed to very slow to avoid sudden pressure changes)

/1IR (sets pump to inlet – you connect this to reservoir)

Note that at any point you can type /1TR to stop the pump immediately, and /1?R to make it report its current position.

```
Syringe Pump - HyperTerminal                          —    □    ×
File   Edit   View   Call   Transfer   Help

/1ZR
/0b♥
/1ZR
/0@♥
/1ir
/0b♥
/1IR
/0@♥
/1A1000R
/0@♥
/1S30R
/0@♥
/1OR
/0@♥
_




Connected 0:01:03    Auto detect   9600 8-N-1    SCROLL   CAPS   NUM   Capture   Print echo
```

/0b ♥ means there was a problem registering the command. This often happens if you make a mistake, delete and then retype the command on the same line.

/0@ ♥ means the command was received and executed.

Fill the reservoir

Attaching the syringe pump pressure connection(?) to the reservoir, make sure to use 3Dprint clip
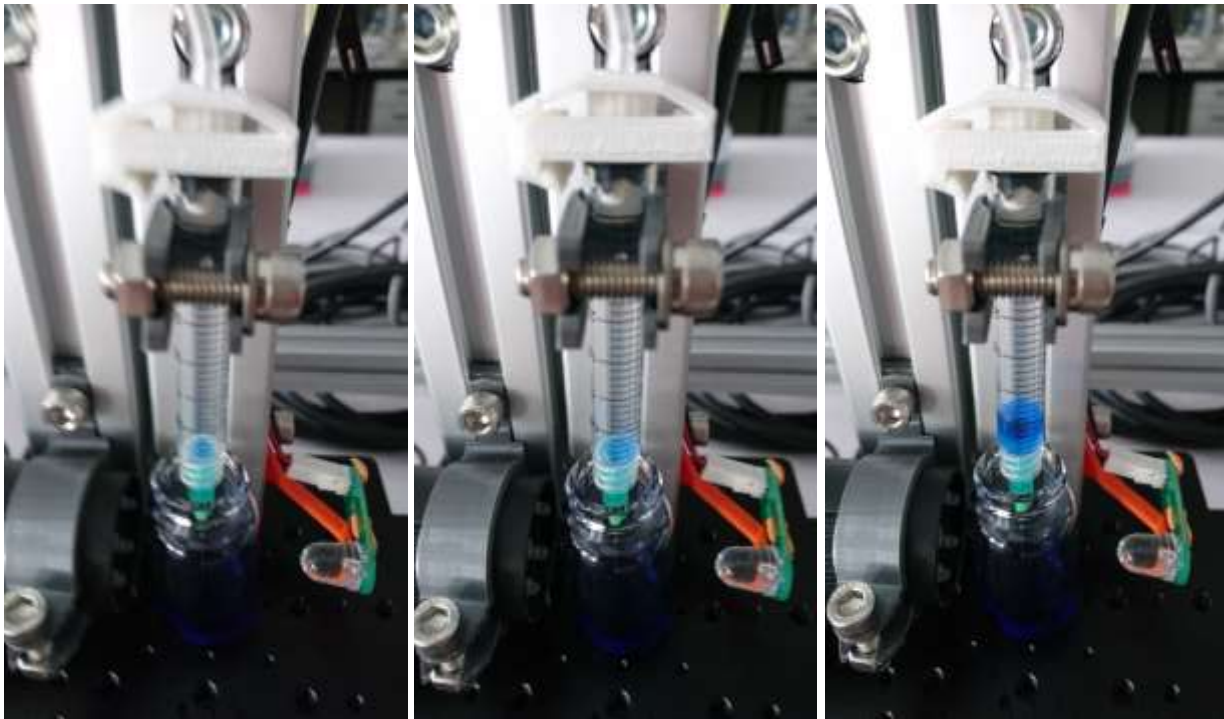

May need to attach a Luer Lock needle.

Placing the opening of the reservoir (needle tip in this case) in a beaker of your print solution.

Type /1A1500R to suck some print solution into the reservoir (may need to change this value) (note that 800 steps is ~1.3mL)
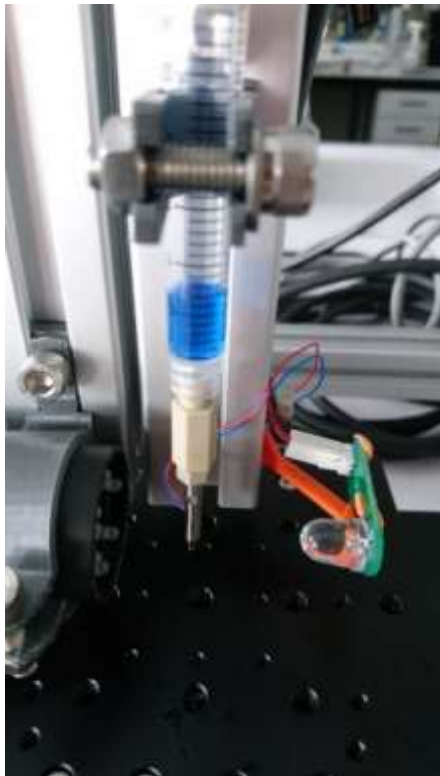
Type /1A1550R to bring some air in and prevent drips

Remove needle and dispose of carefully.

Attach an inkjet printhead from the pink box in the top drawer. You may need a luer-lock adaptor depending on what you're using as a printing reservoir.

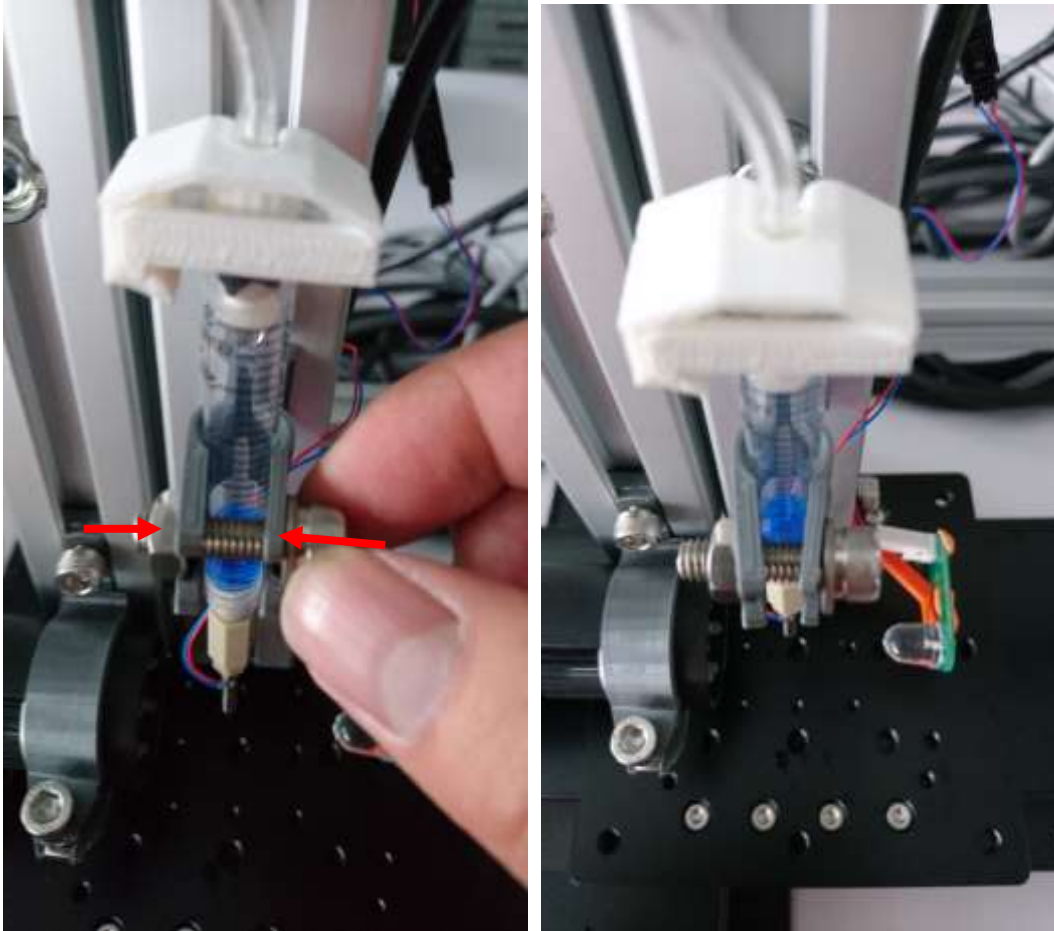Plug in printhead to Jet Drive III Controller.

Mount reservoir securely

    Insert into holder
    Adjust so printhead is correct height over printing surface (often a receiving liquid or microwell)
    Tighten screw to hold in place

Adjust the camera if necessary. There is an Allen (hex) driver kit in the second drawer to loosen the bolts if necessary

Ensure strobe functions by triggering the jet and checking for pink/red light in the camera.

If you have literature /suggested parameters for your waveform (material dependant) input them into the Jet Server software now, otherwise leave it as default

Replace waste beaker/container underneath printhead if you have removed it.

Start printing. May need to adjust strobe delay to see droplets properly (330ms?)
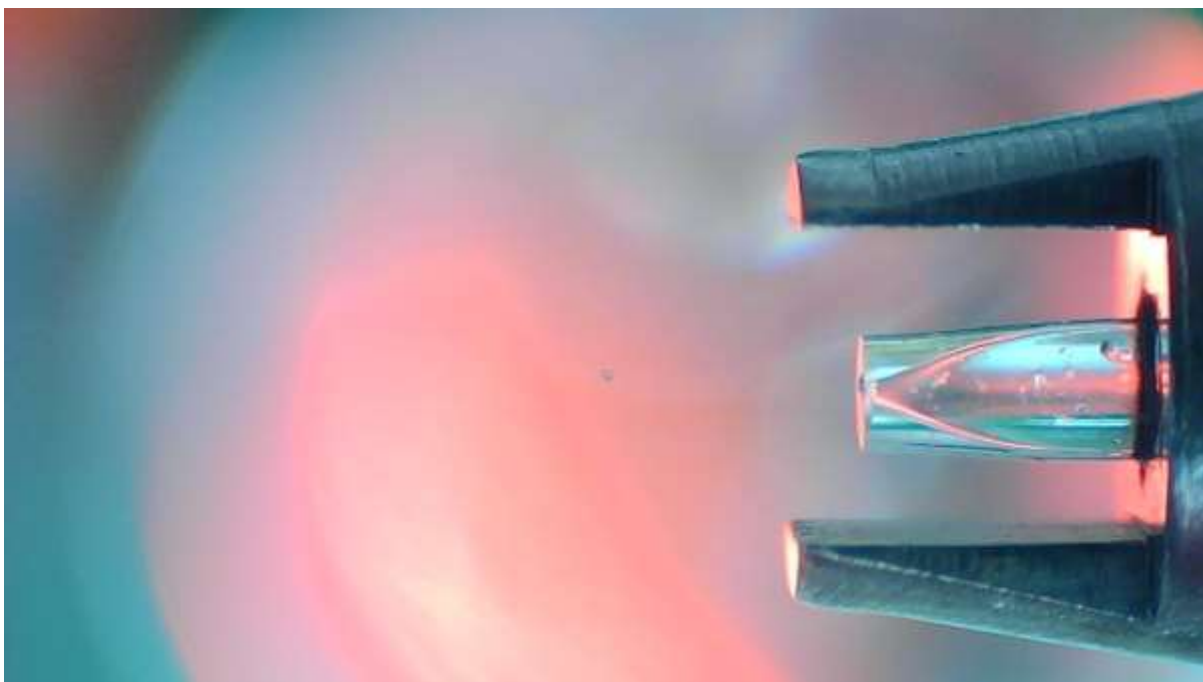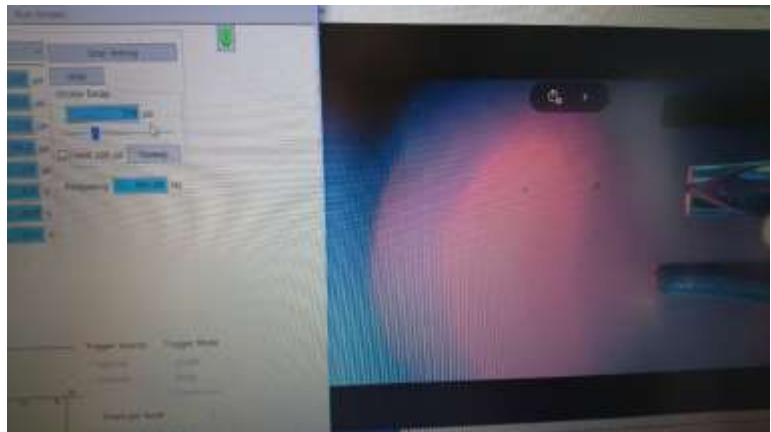
Once droplets have been confirmed and stable, replace waste beaker with receiving solution and being printing/experiment

When finished, increase syringe pump by 100 steps (suck air through printhead)

Unplug printhead from Jet Controller III

Detach luer lock and printhead for cleaning in accordance with best operating procedures.

For something relatively non-hazardous like a salt solution, simple flushing with DI water and drying should be sufficient. More hazardous or non-polar materials may require solvents or detergent.

(Draw DI water through it using spare syringe with luer lock, dry with kimwipe and put away)

TROUBLESHOOTING
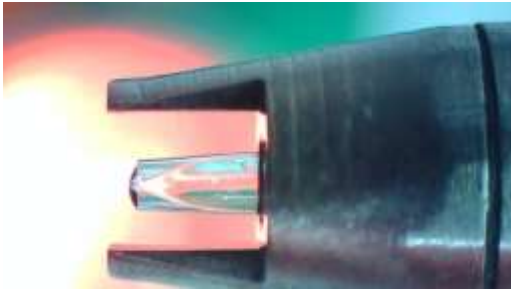
If you are having trouble printing (e.g there is a bead of fluid on the aperture of the printhead) you may need to adjust the backpressure of the system by moving the syringe pump via Hyperterminal

Use /1?R to get the plungers current position and then adjust it by steps of 5 as necessary.

If you're still struggling to get droplet formation, consider trying one of the other printheads in the pink box. The one you're using might be clogged.

Be aware that droplets don't show up well on the laptop screen if you print at less than 100Hz because of the lack of light from a strobe/cheap camera.

If the Microscope camera isn't showing in the Camera App, ensure it is connected to the USB port on the side of the laptop, not at the back.

Then press the "switch camera input" button to swap from the laptop webcam to the microscope camera
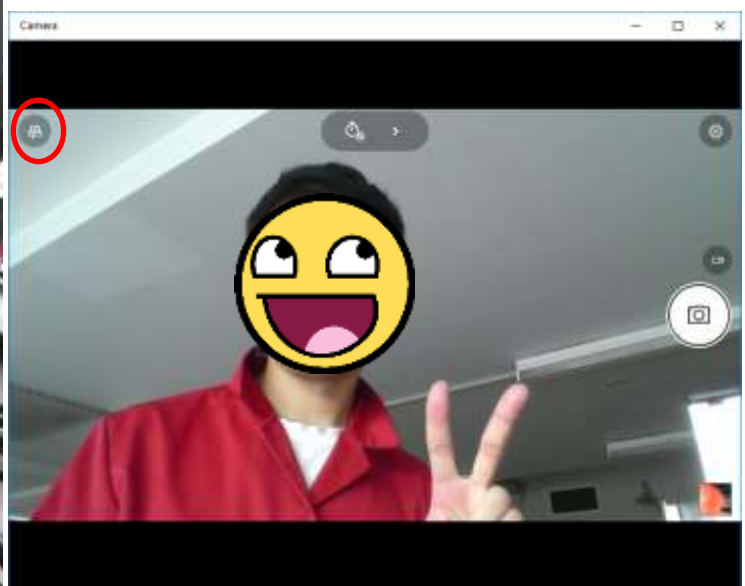
Any other questions/queries (like if you need 3D printing files to fit a larger reservoir), feel free to email me at alug460@aucklanduni.ac.nz

Jonathan Stringer is also very knowledgeable about inkjet printing
j.stringer@auckland.ac.nz