

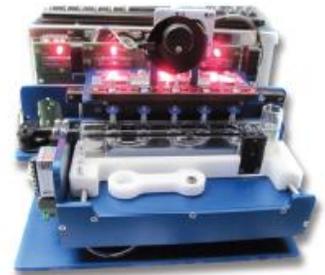


Breadboard Instrumentation

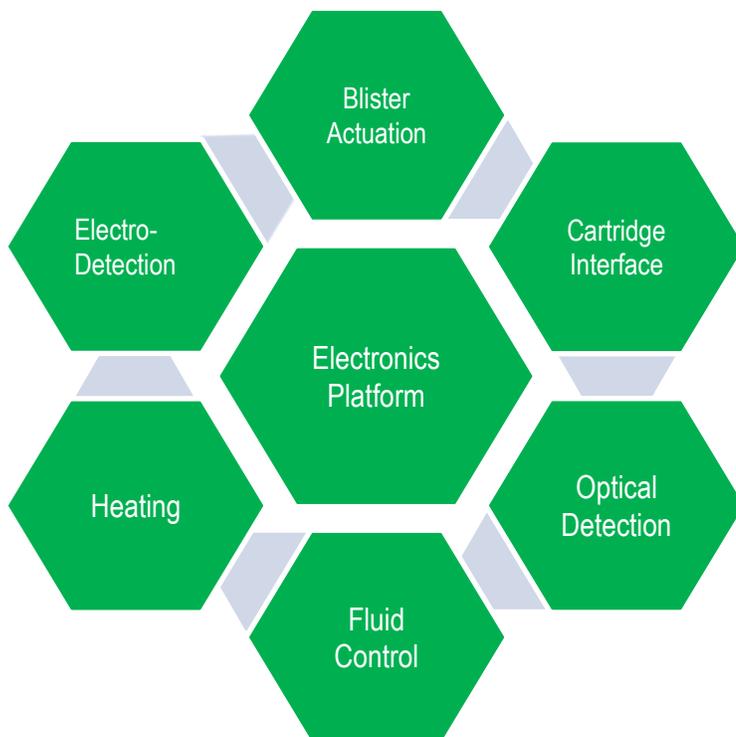
One of the more complex challenges in developing a Lab on a Chip product is integrating the instrument with the microfluidic chip.

Along with our ability to rapidly prototyping devices, and move quickly through the design, build-test-cycle for a microfluidic device, we offer mechanical, electrical, and software engineering to integrate the chip with a small standalone instrument.

Using a modular approach to instrument development, we have created a set of engineering solutions to integrate each of the sub-systems shown below. In the center is an Electronics Platform that is powerful, low cost, and easy to program, with a choice of user interface; keyboard & monitor or wirelessly with a tablet.



BENCHTOP WHOLE BLOOD ANALYZER



The result is a robust, low cost instrument system that is customized to your application requirements.

An instrument breadboard could include:

- Pneumatics, Pumps
- Heaters & Thermistors
- Stepper Motors, Linear Actuators
- Potentiostats & Electrometers,
- LEDs & Diode Detectors

To enable:

- Fluid Movement
- Thermocycling or Constant Temp.
- Blister Pack Actuation, and
- Electro-active Detection,
- Optical Detection.

The Electronics Platform, or the brains of the instrument, ties all the sub-systems together with a user interface using a keyboard & monitor, or wirelessly with a tablet.

We specify components for each sub-system that are compact, have low power requirements, and suitable for a handheld system.

Components for each sub-system are tested and verified with its control electronics, then integrated with the Electronics Platform.

The electronic controls for the sub-systems are initially developed in through-hole circuit boards. An example of an OEM through-hole, electronic controller is this Model 1420 potentiostat by Custom Sensor Solutions shown at right. This compact design is great for developing biosensor control electronics.

When the control electronics for the sub-systems are validated, they are integrated together onto a single control board using a surface mount design which is compact and cost effective.



Cartridge Instrument Interface

Instrument Components	Microfluidic Cartridge
<p><u>Blister Actuation</u></p> <ul style="list-style-type: none"> • Blister Pack Liquid Reagent Storage • Mechanical Actuation • Actuator Control Electronics <p><u>Cartridge Interface</u></p> <ul style="list-style-type: none"> • Microfluidic Cartridge Insert • Electrical Connections • Pneumatic Connections • Liquid Interface  <p><u>Temperature Control</u></p> <ul style="list-style-type: none"> • Heater & Controller • Sensor: Thermistor or Thermocouple and Electronics  <p><u>Liquid Control</u></p> <ul style="list-style-type: none"> • Manifold/Tubing Assembly • Precision pumps and controls • Solenoid Valves and controller • Regulated pressure/vacuum • Pressure sensors <p><u>Electrochemical Detection</u></p> <ul style="list-style-type: none"> • Printed Electrodes • Membranes/Chemistry • Potentiostat/Electrometer • Electrical connectors  <p><u>Optical Detection</u></p> <ul style="list-style-type: none"> • Internal Optical system • External Interface 	<p><u>Blister Pack</u></p> <p>Foil Blister Pouch with Frangible Seal</p> <ul style="list-style-type: none"> • Pillow, no tooling required • Dome blister (500 uL std tool) • Volumes 50 uL to 500 uL <p><u>Microfluidic Cartridge</u></p> <ul style="list-style-type: none"> • Rapid Prototyping, CNC, Inj. Molding • On-Board Valves, Vents, Pumps • Capillary fill • Biosensors  <p><u>Thermal Interface</u></p> <ul style="list-style-type: none"> • Constant Temp. or PCR Thermocycling • Evaluate design and optimize <p><u>Cartridge Connections and Ports</u></p> <ul style="list-style-type: none"> • Bondable leuers/barbs for prototyping • Injection Molded Ports/caps • Manifold ports for pneumatics • On-Board Valves, Vents, Pumps with pneumatic ports for control <p><u>Biosensor Design</u></p> <ul style="list-style-type: none"> • Electrode design • ISE Membrane Deposition • Interface to Cartridge <p><u>Optical Interface</u></p> <ul style="list-style-type: none"> • Materials, Pathlength