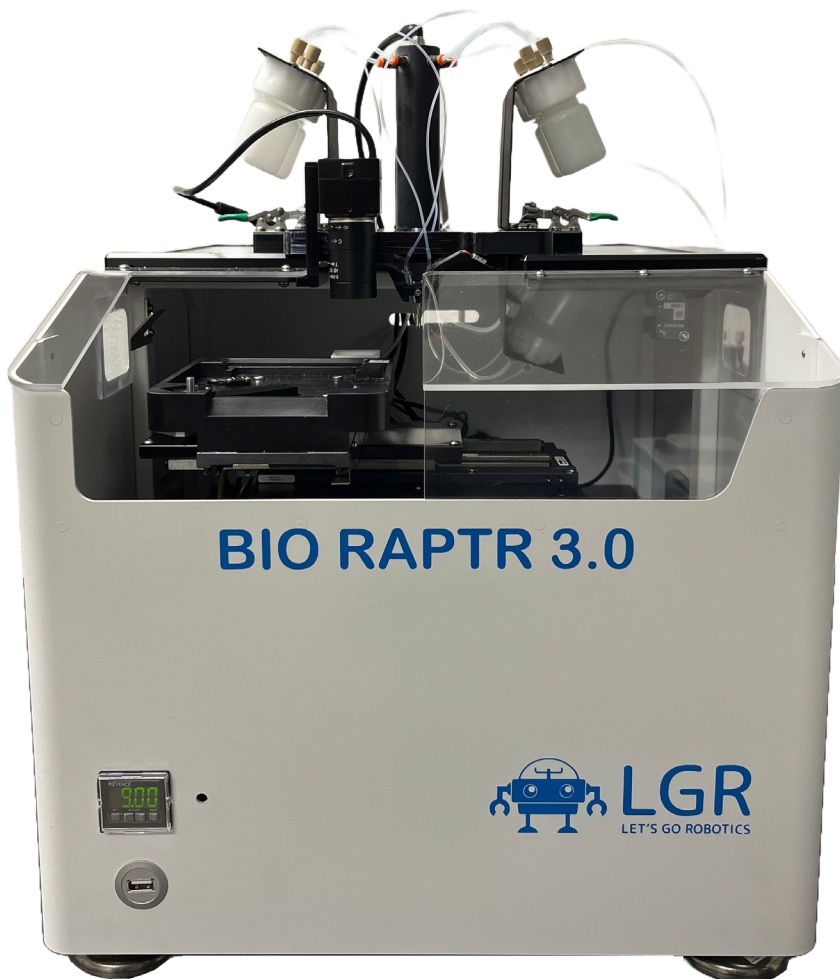


# BioRaptr™ 3.0 Dispenser

100 nL to 60 µL Precision Microfluid Dispensing



**NEW**

Sensor for determining valve dispense verification, located under the print head, this same sensor used for plate height checking.

**NEW**

USB camera to help with A1 dispense alignment.

**NEW**

Wifi direct to the system for display and programming, easy to connect a laptop or tablet.

**NEW**

BioRaptr 3.0 changes from the current BioRaptr 2.0: No plate de-lidding, and omitted the internal barcode reader, much smaller bench space then the BR2.

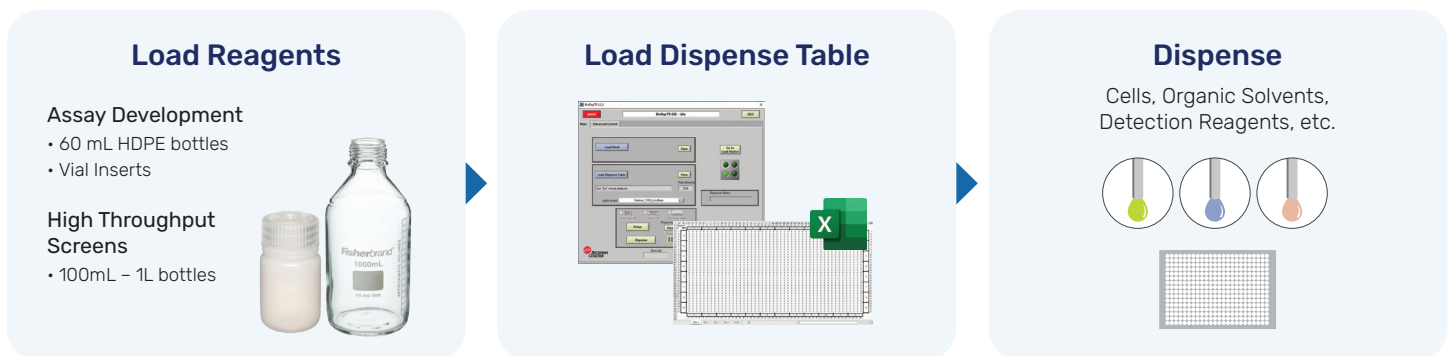
**NEW**

Simple electronics packaging located under the main base plate, and with much smaller packaging and improvements.

## BioRaptr 3.0 Features

- Category non-contact micro dispenser for Microwell plates
- Dispense volume range: 100 nL to 60 µL
- Dispense mechanism: Pressurized micro-solenoid valve
- Number of tips: 4 or 8
- Destination: 96-, 384-, 1536- and 3456-well microplates
- XYZ- Stage Travel X&Y 150mm Z stage 25mm with 1µm resolution

## BioRaptr 3.0 Basic Workflow



## BioRaptr 3.0 Software Design Approach

### Allow Stand-alone AND Remote Access

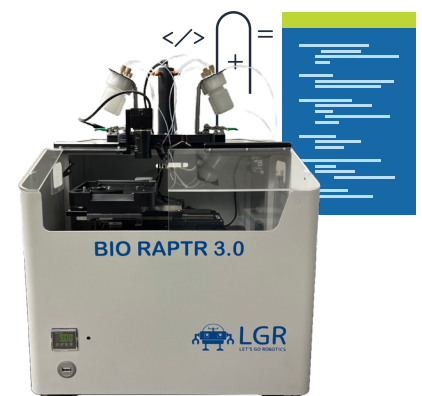
Software allows for local control with keyboard/mouse connected to single board computer or from anywhere via a web browser if connected over the network

### Leverage existing software libraries

-Developed using Python and uses several open-source projects

### Hardware agnostic

-The same software is used to control both the BioRaptr 2.0 and Precise Drop II



# Take a Detailed Look at the BioRaptr 3.0 Features

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- New software developed in Python and runs on a Linux computer within the system, no stand-alone computer is required. The calibration scale connects directly to the BioRaptr 3.0 for calibration, and improved features for valve calibration. One does not have to run a complete calibration for all eight CH's. You can select the valve and volume range to calibrate within minutes, and not have to wait for 12 hour or more for calibration. The new system removes air pressure on the source bottle when not dispensing to eliminate "splash downs" and leaky valves containing the XY stages. LGR developed the new valve controller computer and PCB. This design is faster than the original system at 1 micro sec clock timing, and includes all new components.
- New software features to enable on-the-fly dispense gradient adjustment, along with row or column pattern dispensing. The new systems run all the current FRD BioRaptr "Excel" dispense files.
- The new system uses a Galil motion controller that will be supported for 10 years or more. This is using 1 micro meter linear encoders, and the current linear motors for accurate XYZ locations. This accuracy allows for 3456 plate types if needed.
- New calibrations can be added easily on the system to dispense at different air bottle pressure or for different reagent densities.
- The new system allows for control of the system over a network, this also allows for easy automation interfacing with current robotics.
- Log files are stored for traceability, along with backup and restore capabilities of all the software settings. Long run could be 21 CFR Part 11 compliant for record-keeping.
- Email notification for errors can be setup, provide the system has a network connection.
- Walk up USB flash stick file loading for dispense files. One can work at a remote desk computer and then go to the system to setup a custom dispense. Alternatively, if on a network, then just transfer the file over. Naturally, one can use the easy to use built-in software tools on the system to setup dispenses.
- Current Lee Valves for the BioRaptr can be purchased new from the The Lee Company directly. These are 40 VDC valves to lower the current and keep the cells from getting hot. They work well and took years to develop by Aurora.
- Applicable to a plethora of scientific applications where precision dispensing is essential including: sample preparation for PCR, sequencing, genotyping, and gene expression. Essential for cellular analysis including cell dispensing, cell viability assays, cell proliferation assays and serial dilutions, to name a few.



## Restoring a Classic

“A key component of High-Throughput Screening (HTS) at NCATS, and in general, is accurate, reliable, and fast low-volume liquid dispensing into microtiter plates. Options for flexible and high-quality dispensers that are both user and automation friendly have historically been limited, and we have relied heavily on the BioRaptr dispensers that were initially supported through Aurora Discovery followed by Beckman Coulter, until their eventual removal from the market.

Given our heavy investment in these dispensers and their ubiquitous adoption across multiple laboratories, the NCATS automation team has maintained over 20 BioRaptr dispensers in-house down to the component level for the majority of the last decade. These dispensers are integrated onto multiple robotic platforms and used for bench-top assay optimization and validation by our biologists daily. The ability to calibrate the 4-valve/tip dispense heads quickly and create custom multi-tip protocols on a well-level as well as dispense a 1536-well microtiter plate in less than a few minutes is essential to our HTS operations. We have also integrated custom features such as droplet detection, designed and built in-house to add further dependability. Due to limited options for dispenser replacements that are equivalent to the BioRaptr, NCATS invested time into upgrading the existing dispensers from Windows XP to Windows 10 to improve security as well as improve functionality by moving away from an unsupported operating system.

We also formed a collaboration with Let’s Go Robotics (LGR) to update and refurbish the existing BioRaptr models, ensuring that we maintain the features that have made them our primary dispensers for over a decade, while also adding new capabilities to enhance their already outstanding performance. This work will help to ensure that the daily bench and automated system operations using these dispensers will continue uninterrupted while also making improvements for future integrations.”



***SLAS 2022 Presentation Abstract***  
**Sam G. Michael**  
**NIH/NCATS**

## BioRaptr 3.0 Technical Specifications

<b>Dimensions</b>	425mm W x 490mm D x 555mm H
<b>Weight</b>	41kg
<b>Dispense Volume Range</b>	100 nL - 60 $\mu$ L
<b>Dead Volume</b>	70 $\mu$ L
<b>Cross Contamination</b>	None
<b>Reagent Capacity</b>	Up to 8
<b>Compatible Plate Types</b>	96-well, 384-well, 1536-well, and 3456-well
<b>Speed</b>	1536 4 channel fill time at 1 $\mu$ L is 43 Seconds (includes plate height check)
<b>Precision (%CV)</b>	<2%
<b>DMSO Compatibility</b>	Yes, for low concentrations provided valves are rinsed after use
<b>Robotic Integration</b>	Top loading with articulated robots
<b>Power</b>	AC Voltage / Current 100-240 VAC, 5A, 50/60 Hz, NEMA 5-15 plug
<b>Compressed Air</b>	80-100 PSIG (5.5-6.9 bar) , 2 cfm @80 psi (0.084 m <sup>3</sup> /min @ 5.5 bar) Oil-free
<b>Air Connection</b>	One 6-mm diameter compression fitting
<b>Computer/Software</b>	Same software as the Precise Drop II. Computer included within the system. Complete with automation interface, Enet connection



Learn more about BioRaptr 3.0 at

[letsgorobotics.com](http://letsgorobotics.com)