

Celera Genomics Uses LabVIEW in Human Genome Sequencing

National Instruments Article

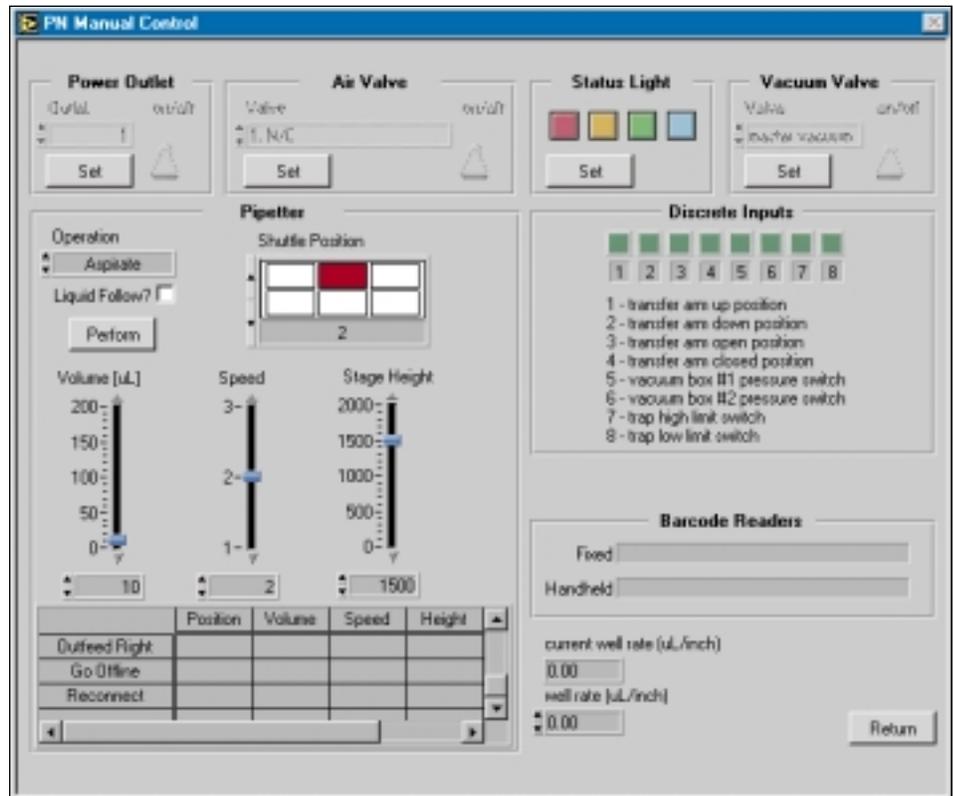
Celera Genomics Uses LabVIEW in Human Genome Sequencing

The Challenge: Automating pipetting robots to transfer samples and dispense reagents.

The Solution: Saving time and money by using a LabVIEW program to develop an automated testing process.

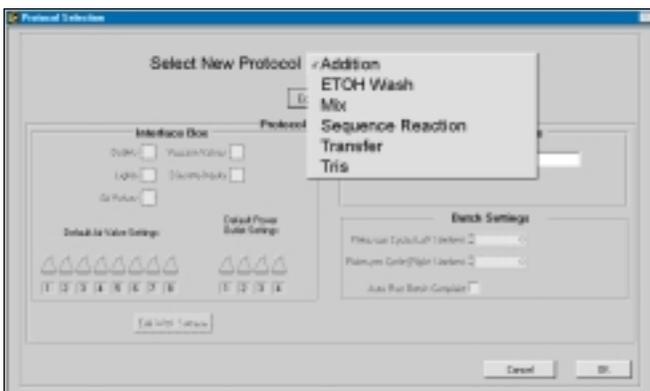
Introduction

Data Science Automation in conjunction with Applied Biosystems assisted Celera Genomics, one of the leading sources of genomic information, with its goal to sequence the entire human genome and other organisms. Celera Genomics accomplished sequencing by automating pipetting robots using National Instruments LabVIEW. The pipetting robots transfer samples and dispense reagents while processing initial E. coli clones, generating resultant templates, and performing sequence chemistry in preparation for final base calling. Pipetting tasks involve various loading and unloading steps, as well as ensuring correct volumes are aspirated and dispensed from appropriate sources. Each pipetting task needs to process a large number of plates.



National Instruments LabVIEW screens display manual processing of plates through pipetting robots.

Using the multithreading and various synchronization tools of LabVIEW, the application can handle complex simultaneous tasks, while the SQL toolkit can seamlessly integrate with the databases.



Protocol Selection Screen.

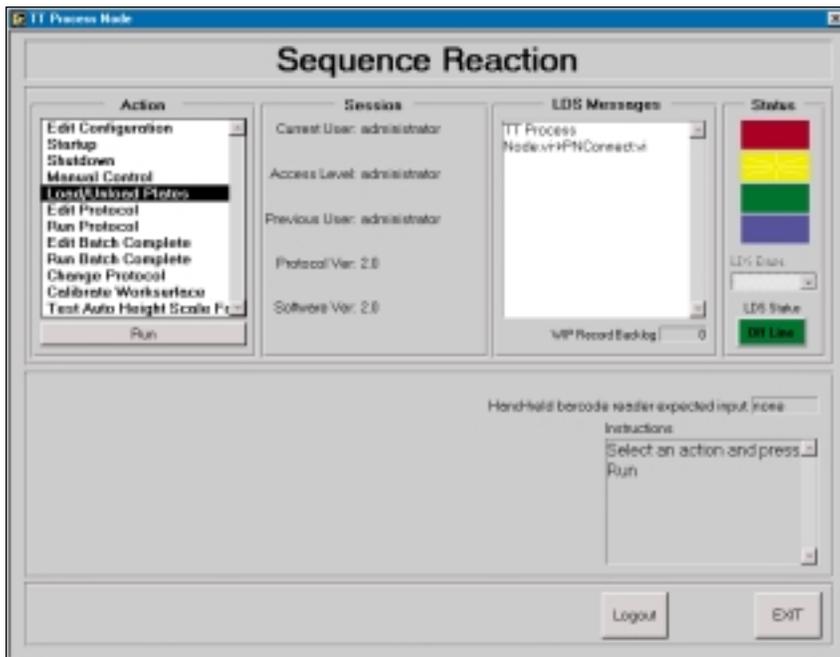
Developing an Automated Pipetting System

Manual processing of these plates through the pipetting robots, despite the programmable sequences built into the robots, is very costly in terms of time and labor. To speed up the process, Celera Genomics decided to automate the pipetting system using NI LabVIEW as the development tool. With LabVIEW, Data Science Automation and Applied Biosystems engineers quickly developed a relatively

large-scale application. Using the multithreading and various synchronization tools of LabVIEW, the application can handle complex simultaneous tasks, while the SQL toolkit can seamlessly integrate with the databases. In addition, we designed the application to add motion and vision functionalities if necessary. With LabVIEW vision and motion compatibility, we can extend this application easily.

Achieving Successful Results with LabVIEW

The automated pipetting system developed by Celera Genomics ensures the consistency of sequencing chemistry, reduces human error, and lowers the production time and cost of development. In addition, the login process further lowers the wasted plates and samples by making sure that only the authorized and properly trained operators can perform pipetting tasks. The plate information is



Sequence Reaction Screen Shot – TT Process Node.

now verified against the Celera laboratory database for type and process sequence verifications, which reduces accidental processing of incorrect plates and prevents another source of costly waste. We can also track sample and reagent volumes for more efficient use of reagents. For expensive reagents, tracking reduces wasted volumes and results in tremendous cost savings.

Currently, Celera Genomics uses the pipetting control system on most of their production pipetting systems. In addition, we are constantly improving the system as the role of pipetting robots expands and as Celera R&D and production efforts diversify.■

For information on NI motion control, visit ni.com/info and enter exchg.

We designed the application to add motion and vision functionalities if necessary. With LabVIEW vision and motion compatibility, we can extend this application easily.



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