



Disruptive Innovation and Human-Centric Automation in the Lab

Not every lab needs a robotic liquid handling solution, but most cannot operate without a pipette. It is between these two scenarios where human-centric automation in the lab is helping overcome the [reproducibility crisis](#).





This begs the question, why would some labs choose not to automate specific steps in their workflow when robotic liquid handling is one of the most disruptive innovations driving clinical research around the world?

The answer isn't as simple as you may think. The real question is what portion of the workflow would benefit the most if the lab adopted automation. In clinical research, data collection, transformation, and storage remain a concern. Introducing a Laboratory Information Management System (LIMS) seems like the quickest way to improve consistency and repeatability. The problem is each manual step in your protocol may create a gap in your data collection that calls into question the rigor of your process or make it difficult for other researchers to reproduce the results after publishing your findings.

Reasons why many labs rely on manual pipetting steps include:

- It's cheaper or faster to use manual actions during the protocol
- Some of the steps in the protocol are prone to change frequently
- There are non-standard steps required to complete the protocol

Many researchers still believe the cost-benefit analysis between manual processes and fully automated protocols is a zero-sum game. This e-book discusses the benefits of a gradual digital transformation towards increased automation. We also cover the innovative technologies that enable you to digitize your protocols using a connected platform combined with manual pipetting solutions.

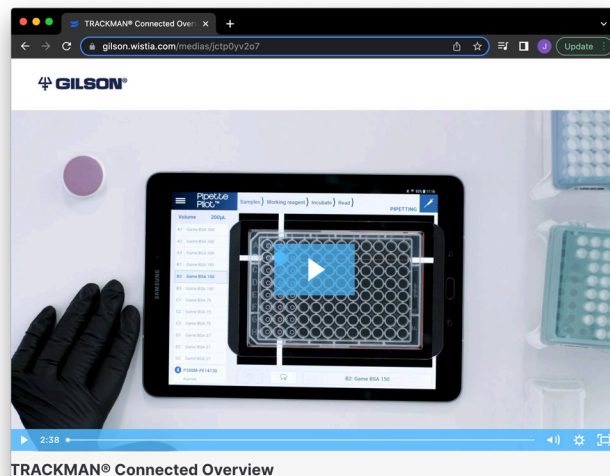
WHAT IS HUMAN-CENTRIC AUTOMATION IN THE LAB?

Human-centric automation focuses on the person doing the work and uses innovative technologies to aid, alert, or display vital information regarding the process. Manual pipetting is still common in most laboratories. While manual pipettes are excellent tools in the lab, they require extra work for record-keeping between the sample preparation and analysis steps.



The lack of digitalized records within each step in the protocol can impede your research, making reproducibility a challenge. The next generation of automation in the laboratory allows you to connect your manual pipetting instruments to a platform like [TRACKMAN® Connected](#).

Using this approach to digitalization, laboratories can create the necessary records to support the entire manual liquid handling procedure during each step. Each person can keep track of where they are in the protocol from the TRACKMAN Connected system, and you can export the results to your LIMS or an electronic lab notebook (ELN) like SciNote.



 This video provides an overview of this innovative system.

Human-Centric Automation and the TRACKMAN Connected System

Connected tools, like TRACKMAN Connected system, work to aid your lab's human resources instead of completely replacing them with automation. The system is comprised of a tablet with accessories and apps that makes pipetting faster with greater traceability and reproducibility. The TRACKMAN Connected system gives your team access to vital information as they progress through their workflow to help reduce preventable errors and optimize your pipetting tasks.

A TRACKMAN Connected system allows you to:

- Upload your pipetting protocols and execute them accurately using a guided interface
- Record and review all your pipetting operations and easily take notes
- Support best practices, like prewetting tips automatically within the protocol
- Track where to pipette and set the aspiration/dispensing speed/volume



TRACKMAN Connected and its associated apps also help track your PIPETMAN® M Connected's calibration schedule and control the execution of each pipetting activity according to pre-developed protocols, including ELISA. Additionally, the Bluetooth®-connected pipettes provide greater efficiency, speed, and reduce fatigue when compared to other pipettors.

WHAT ARE THE BENEFITS OF A CONNECTED PIPETTING SYSTEM?

The main benefit of the TRACKMAN Connected system is to support the human element in your daily protocol execution. The interface is easy-to-learn and provides a cost-effective solution to capture all the information in real-time from your pipettes to improve traceability and reproducibility by keeping accurate records during the entire workflow.

A connected pipetting ecosystem can help you solve many daily challenges researchers face during repetitive pipetting tasks. Mistakes can happen even in the most careful environments, and having a record in place to check exactly where you are in the protocol can help reduce human error.

Innovative Tools for the Modern Lab

TRACKMAN Connected uses a pre-configured tablet that allows for the digitalization of your laboratory workflows. A connection to an ELN (such as SciNote) or in-house LIMS gives you insight into every pipetting protocol and allows you to transfer data securely between researchers.

The tablet comes preloaded with the PipettePilot® app to record all pipetting actions. The PipetteScope® app is available to keep track of calibration schedules on

HOW DO I USE CONNECTED TOOLS AT THE BENCH?

1 ✓ CHECK the activity and calibration status of your device in PipetteScope™	2 📄 REQUEST a pipette calibration/service if needed	3 🔗 OPEN the PipettePilot® app	4 📄 LOAD your protocol from SciNote or your tablet	5 ✍️ EDIT and save changes to your protocol
6 🔗 CONNECT your PIPETMAN® M Connected and environment sensor to the app	7 👉 PLACE your plate support and microplate on the screen	8 💡 FOLLOW the light on the app that shows where, when and how to pipette	9 💬 REVIEW your automatically generated report and add comments	10 📄 SAVE the report locally or send it to your ELN

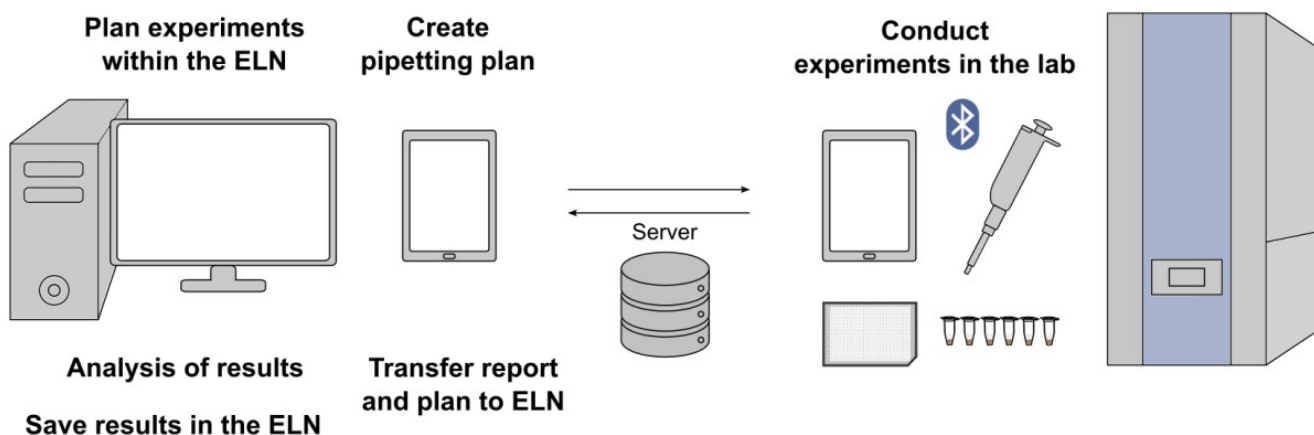
Infographic shows the different ways a connected tool at the bench can help pipettors improve their protocol execution



your mobile device. You can also import your protocols or design them directly on the TRACKMAN Connected tablet.

Once you have your protocols, you can place your wells on the tablet, and the PipettePilot app will track your progress and guide your manual pipetting actions through each step of the workflow. You can modify the reagents required and set the volumes for each liquid handling step to aspirate and dispense accurate volumes at the required speed.

You can digitalize your entire pool of protocols and keep track of each planned experiment from start to finish.



A digitalized experiment execution plan using connected tools in the lab

USING HUMAN-CENTRIC AUTOMATION FOR IMPROVED REPRODUCIBILITY

TRACKMAN Connected falls into the human-centric automation category and perfectly fits the gap between full robotic automation and traditional, manual tracking. With an adaptable solution that increases oversight and control over your manual liquid handling tasks, you can improve your sampling efficiency and maximize reproducibility. Below are two examples where TRACKMAN Connected helped our customers.

Improving Efficiency for In Vitro Diagnostics

At Admera Health, a molecular diagnostic company, the TRACKMAN Connected system enabled greater pipetting efficiency and helped Dr. Yun Zhao to keep track of each step of their pipetting protocols during their personalized medicine research.



He noted that the biggest benefit was having access to the records and being able to investigate any errors to see exactly where they went wrong. Using a .CSV file, the team could easily upload protocols to the TRACKMAN Connected system and quickly execute the steps. TRACKMAN Connected even controls the volumes during each dispensing and aspiration stage for them.

Diagnosing COVID-19 with SHIELD T3 and I-COVID

SHIELD T3 (an organization founded by the University of Illinois) aims to promote the use of a rapid saliva-based COVID-19 diagnostic testing protocol called I-COVID. They target, test, and report to health agencies quickly about the results of a specific population's positivity rates to help in the fight against COVID-19.

The team decided to use TRACKMAN Connected in combination with a PIPETMAX® liquid handling robot and a PLATEMASTER® for high-throughput pipetting. The connected ecosystem enables them to automate the steps required, track the manual steps, and report on results confidently for each RT-qPCR test they process.

HUMAN-CENTRIC INNOVATION IN THE LAB WITH GILSON

Gilson remains committed to helping scientists with a full suite of services, from data management to process automation, and the digitalization of protocols. Our technologies give you the ability to automate protocols for liquid handling, purification, and extraction workflows.

With connected liquid handling tools, you can create accurate protocols for all your experiments and guide your pipettors through every step, reducing human errors and increasing throughput as necessary.

FOR RESEARCHERS THAT NEED A HUMAN-CENTRIC AUTOMATED SOLUTION, CONTACT A GILSON REPRESENTATIVE TODAY.