Five Questions about the Future of IoT in the Laboratory with Steve DeCabooter

Since Gilson invented the continuously adjustable variable volume pipette 45 years ago, we have been an industry leader in liquid handling innovation, helping scientists by making lab life easier and being more productive. Gilson sees the next big advances in lab tools as being smart devices containing technologies referred to as the Internet of Things (IoT). We sat down with Steve DeCabooter, Director of Product Information Platforms at Gilson, to discuss the growing role of the IoT in the laboratory, and how Gilson's connected pipettes will contribute to this trend and infuse research with greater traceability and verifiability.

WHAT IS DRIVING THE GROWTH OF THE IoT IN THE LABORATORY?

Most life scientists know by now that the industry is facing a reproducibility crisis. IoT is, at its core, about economical sensing, connectivity and data aggregation. When taken together, these capabilities give all industries the opportunity to record, report, and analyze all sorts of new parts of our world that used to be invisible. The life sciences industry is no different. Here at Gilson, we are combatting the reproducibility crisis by using IoT to improve the traceability and verifiability within researchers' experiments.

WHAT ROLE DO PIPETTES PLAY IN THE LAB OF THE FUTURE?

Currently, manual pipetting data is difficult to verify because it often cannot be traced. This is an

Figure 1: TRACKMAN Connected System

opportunity for improvement. Often, researchers try to keep paper logs of their pipetting activities, but it's difficult to keep up, and they end up summarizing their activities and miss details. If there is a mistake such as pipetting the wrong well without noticing, for instance, and then results are published, other researchers who try to build on those results risk carrying that mistake forward. As each step builds on to the next, the accidental errors will compound, leading to greater losses caused by inaccurate data.

Gilson's PIPETMAN® M Connected pipettes, when paired with TRACKMAN® Connected, apply IoT technologies that provide clarity to scientists' pipetting activities. With our connected platform, researchers can enhance existing pipetting workflows and be guided through their protocol, helping them with their more mundane steps. In the background, the software automatically documents liquid handling activities, providing researchers with a report of each action they've taken. This enables them to not only review past

efforts as they plan for the future, but it also facilitates collaboration. When paired with a larger connected ecosystem, like the Electronic Lab Notebook, SciNote, they can share their plans and results with colleagues, who can then be confident that they're following the exact same steps when they try to reproduce an experiment's results.

WHO WILL BENEFIT MOST FROM A CONNECTED PIPETTE?

It will be most beneficial to two groups: scientists whose workflows involve a lot of repetitive work, where they design standardized procedures that they use repeatedly, and scientists who are performing complex protocols where it's easy to make mistakes. A scientist can create a protocol or load a previously-run protocol, and our app can guide them along, configuring their pipette and showing them the next well to pipette, one step at a time. This can help scientists keep track of their progress, relieving the pressure to follow a complex protocol without making a mistake.

WHAT CONCERNS DO SCIENTISTS HAVE ABOUT BRINGING THE IoT INTO LABORATORIES?

Despite its benefits, the IoT introduces new concerns to laboratories they haven't dealt with before. For example, the ability to automatically transfer and store data electronically makes security a shared commitment. Cloud-based systems have a different set of benefits and tradeoffs from standard on-premises solutions, and this is a concern that scientists and their organizations must weigh as they select their partners. Another concern of scientists is figuring out how IoT can fit in their lab. Most scientists see value in IoT, but they aren't sure how to integrate it smoothly into their pre-existing workflows. Scientists want to know "How is this going to help me every day? Is this really going to solve any problems for me?" We at Gilson take these concerns seriously. Our team has worked hard to ensure that a researcher gets the benefits with very few additional steps from their standard pipetting workflow, all while applying the same commitment to reliability and trust we've earned in our pipettes to our digital systems.

I believe we are at an inflection point in our industry with respect to digitization and the adoption of IoT. Our industry has seen the benefits of automation, traceability and verifiability for years, but the economics have only benefited the biggest, most repetitive workflows. IoT technologies bring the costs down to a point where quality control is economical at a much smaller scale—the research lab where every experiment is different; the "first steps," where higher volume users need to load their systems.

As scientists continuously improve the quality of their own research, we have the solutions that will help them get there.

WHAT'S NEXT FOR GILSON AND THE IoT?

We're just scratching the surface. Our connected pipettes are just the first step; in the future, our Gilson Connect initiative will extend to other tools. Our dream is to see the entire laboratory integrated, similar to connected homes today. Many people have smart home systems that can control their lights, purchase items, provide weather and calendar updates, control their thermostat, and so on. Right now, we're just making the light switch.

As we connect more tools, we'll start to see laboratories become fully integrated. Our goal is to build tools that allow scientists to perform their normal activities without worrying about committing errors, all with ubiquitous connectivity that makes their lab life easier.

To learn more about Gilson Connect, click here.