

The Complete Guide to Implementing Mobile Robots in Your Lab

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Introduction

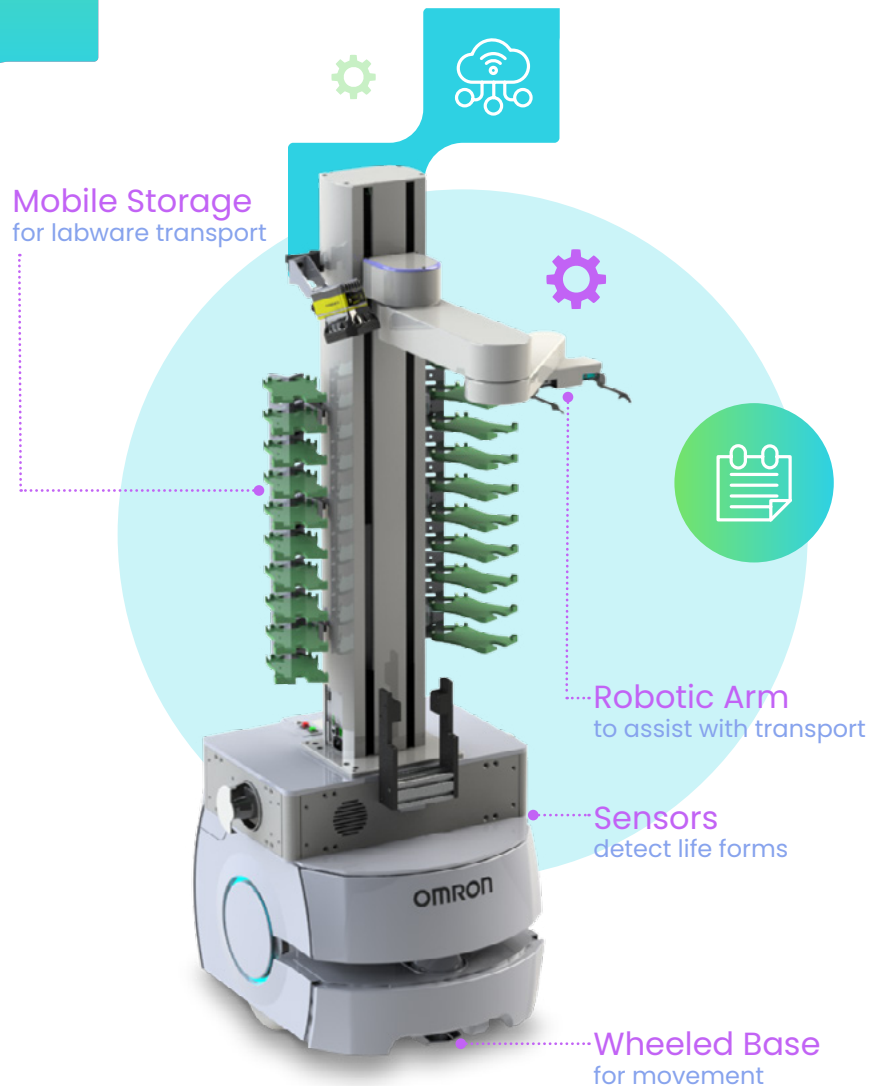
For the automation engineers at Biosero®, the idea of a mobile robot that's **collaborative**, **flexible**, and able to help bridge the gap between different parts of the lab is **revolutionary**. It makes you think about droids from Star Wars that beep around star cruisers while executing their tasks, in harmony with the humanoids around them.

While we aren't quite at the point of having sentient lab droids just yet, collaborative, flexible, and helpful robots are possible today through what we call "mobile robots." And these robots have the ability to accelerate research timelines in unique ways.

This ebook is all about the modern-day mobile robots: what you can expect from them, why you want them in your lab, and how you'd go about implementing them.



CHAPTER 1



What is a mobile robot?

A mobile robot these days generally includes a base to move the robot around the lab, a robotic arm to help with transportation of objects like plates and consumables, and a series of sensors that help the robot prevent collisions with lifeforms and inanimate objects.

Plus, at its heart, it has a computer that can connect with scheduling systems like Green Button Go® to allow for optimal path planning plus clear directions for when to pick up and drop off just about anything you can imagine in the lab.

Mobile robots: a visual guide

Click the button below if you want to see a mobile robot in action. It shows how the mobile robot interacts with other transportation systems to pick up plates and move them to new devices.

What's so great about a mobile robot?

There are all kinds of useful transportation methods to move materials already deployed in labs around the world, including robotic arms, conveyor belts, and track-based systems. These are all good options if you want to transfer, for example, a microplate from one device to another for processing. But, all of these methods need to be bolted down and lose all their flexibility from there. Reconfiguring their path can require your automation engineers or consultants like Biosero to come in and redesign the entire system.

That's where the major benefits of the mobile robot really come in:

- Rapid deployment
- Scalability
- Safety
- Easy to repurpose
- Integrates with scheduling software



CHAPTER 2: WHAT'S SO GREAT ABOUT A MOBILE ROBOT?



Rapid deployment

Mobile robots are simple to implement since they don't have to be bolted in place or set up next to lab equipment like conveyor belts. As long as your lab has a good internet connection, mobile robots can be installed and put to work quickly.

Scalability

Mobile robots add next level flexibility to a lab. They are an easy way to connect stand-alone devices in the same lab or across labs. You can also seamlessly increase or decrease the number of mobile robots working in your labs at any given time. You can also assign robots to work exclusively on specific jobs or labs.

CHAPTER 2: WHAT'S SO GREAT ABOUT A MOBILE ROBOT?



Safety

Mobile robots use internal sensors and cameras to navigate and work in the lab environment. With some careful planning, you can work safely without worrying about robots bumping into you or your equipment.

Easy to repurpose

Priorities are constantly shifting, and scientific workflows frequently need to be adapted, but moving fixed lab equipment can be tedious and expensive, and the process can risk damage to the instruments or components. With mobile robots, reconfiguring your workflow and repurposing your instruments is easier than ever.

Integrates with scheduling software

Green Button Go software can work with smoothly to coordinate traffic on a schedule that meets your workflow needs. If you already use Green Button Go in your lab, you don't have to worry about purchasing separate software for new robots. We can easily incorporate mobile robots into new workflows.

Is a mobile robot a good fit for my lab?

Different labs demand different things from their automation. We've worked extensively with two sides of a familiar binary: production labs that are optimizing for efficiency and research labs that are optimizing for ever-changing experiments. Mobile robots can fit into either style but make a natural fit for labs that have specific needs around flexibility, connectivity, and productivity.

Here's where we think that mobile robots offer the quickest return on investment:

- Labs that need to maximize workflow flexibility
- Labs that want to reclaim time using automation without extensive track or conveyor-based systems
- Labs that want a new approach to keep up with the market



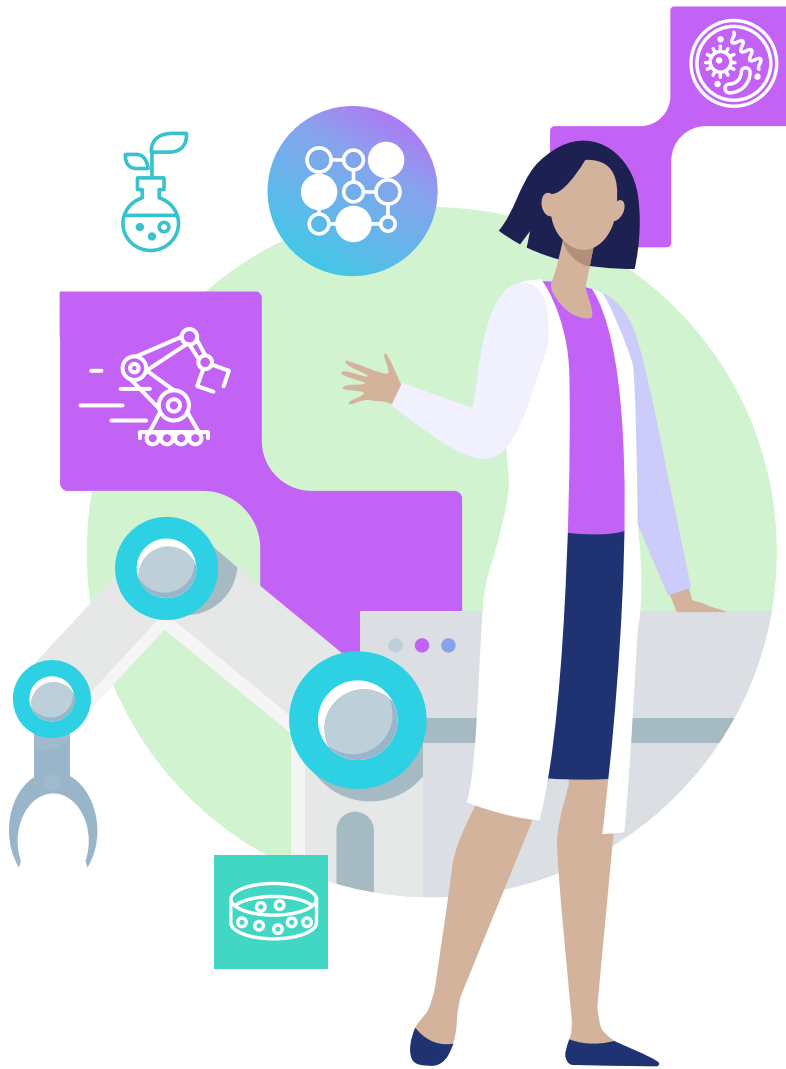
CHAPTER 3: IS A MOBILE ROBOT A GOOD FIT FOR MY LAB?



Labs that need to maximize workflow flexibility

At times, you may need to run a single experiment repeatedly with lots of samples. At other times, you may need to run different assays with fewer samples. Some labs must be able to pivot depending on the research need, and trying to build a single platform that meets all your needs may not be the most effective solution. A mobile robot paired with Green Button Go, for example, can easily switch gears as needed. You can even task mobile robots to keep samples moving from one workstation to the next around the clock, whether you are running the same experiments as usual or different ones.

CHAPTER 3: IS A MOBILE ROBOT A GOOD FIT FOR MY LAB?



Labs that want to reclaim time using automation without extensive track or conveyor-based systems

The lab can be a busy place! There's little value in having scientists spend their time transporting samples from storage to the bench or between instruments when that task can be delegated to a mobile robot. Think of mobile robots as collaborators who handle the repetitive tasks so that scientists can spend their time on more important things, like thinking about the next steps for research and designing new experiments. And mobile robots can do all that without being tied to a transportation system that behaves like a railroad, requiring traffic only on fixed and prepared pathways. A mobile robot is more like a semi-truck hauling loads on regular roads and working well with other drivers (people!).

CHAPTER 3: IS A MOBILE ROBOT A GOOD FIT FOR MY LAB?



Labs that want a new approach to keep up with the market

Scientists are under pressure to incorporate the latest advances into their processes. Modern systems that are more flexible and easier to use help meet the research demands. Investing in newer, innovative systems with better usability is a good way to meet these goals. Mobile robots are easy to deploy and incorporate into lab workflows, connecting workcells, stand-alone equipment, and manual lab bench tasks. With the addition of Green Button Go, you can orchestrate your larger laboratory workflow schedule and visualize everything at once. You don't even have to launch an entirely new infrastructure in your lab to see the benefits.

CHAPTER 3: IS A MOBILE ROBOT A GOOD FIT FOR MY LAB?

Mobile robot advantages

- Complete data capture and tracking
- Eliminates human error and variability
- Allows for transport within a lab or between rooms
- Operates harmoniously with lab staff
- Extends capabilities of workstations with on-demand assembly
- Adapts to lab layout changes with the click of a button
- Reduces spatial constraints in the lab since there are no bulky, built-in components
- Allows for increased productivity beyond working hours

Mobile robot considerations

- Long-term investment
- Can only interact with one area of the lab at a time
- Maintains low speed across workstations



What do I need to know to implement a mobile robot in my lab?

If you're thinking that mobile robots might be a good fit for your lab, here's what you need to know to implement them. We've put these tips together after launching mobile robots for a broad range of customers, and the principles apply to everyone.

1. Review suppliers
2. Set a budget
3. Create a planning team
4. Consider the constraints of the lab environment
5. Plan for time to deploy the system
6. Don't forget maintenance needs



CHAPTER 4: WHAT DO I NEED TO KNOW TO IMPLEMENT A MOBILE ROBOT IN MY LAB?



1. Review suppliers

Create a list of suppliers offering autonomous mobile robots that align with your needs. Evaluate each supplier's history and the success of their robots in the field by reading reviews or publications and talking to existing customers if possible. Doing due diligence ahead of time will save resources and prevent problems down the road.



2. Set a budget

Calculate the actual costs of implementing mobile robots, not just the cost of the mobile robot itself. Think about how many robots you need, as well as any associated costs with running and maintaining the fleet. Consider the costs of software, consulting, and services needed to deploy and operate the robots.

CHAPTER 4: WHAT DO I NEED TO KNOW TO IMPLEMENT A MOBILE ROBOT IN MY LAB?



3. Create a planning team

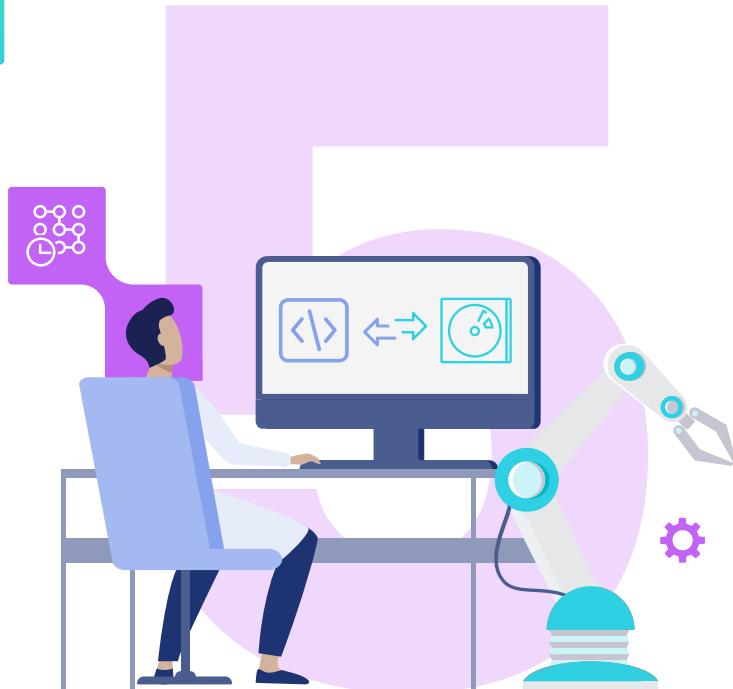
Set up a team of people who will be responsible for thinking through the logistics of implementation. The team will need to think about things like which labs the robots will need to travel to and how those labs are set up. They'll also need to think about the paths where the robots will travel and will they need to open doors, activate elevators, or interact with their human lab partners.



4. Consider the constraints of the lab environment

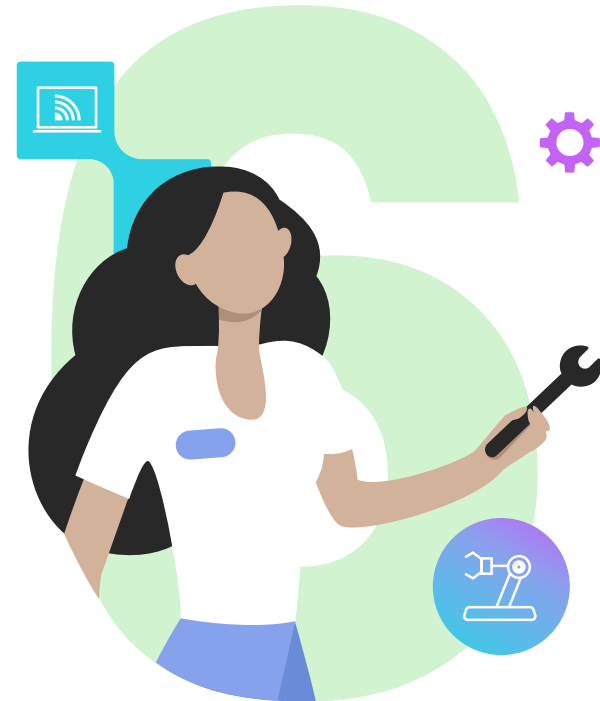
You may need to change some things about the way your labs are set up. This might include rearranging equipment to limit potential obstacles or designating certain routes for robots only. Also, make sure that your Wi-Fi connection is strong enough to handle the extra load.

CHAPTER 4: WHAT DO I NEED TO KNOW TO IMPLEMENT A MOBILE ROBOT IN MY LAB?



5. Plan for time to deploy the system

As with any robot, some teaching will be required. The first step is to map the laboratory. This is a simple operation that takes just a few minutes. This will be followed by teaching each of the pick and place nest locations. If you are using Green Button Go, you're guided through the entire process. When teaching is complete, sample transport requests become as simple as issuing a single command called "Transport."



6. Don't forget maintenance needs

Like all equipment in the lab, mobile robots need regular maintenance and upkeep, as does any associated software. Lab staff should be aware of any scheduled maintenance work or software upgrades so they can avoid planning experiments at those times.

CHAPTER 4: WHAT DO I NEED TO KNOW TO IMPLEMENT A MOBILE ROBOT IN MY LAB?



FINISH

7. Your lab is ready for a mobile robot!

Want to learn more?

Mobile robots are still relatively new to the laboratory space, so we've put together some helpful suggestions for how to get more familiar with the possibilities.

- Manufacturer sites
- More on mobile robots from Biosero
- Virtual or live tours with mobile robots integrated into Green Button Go systems
- Get Biosero's help launching a mobile robot in your lab



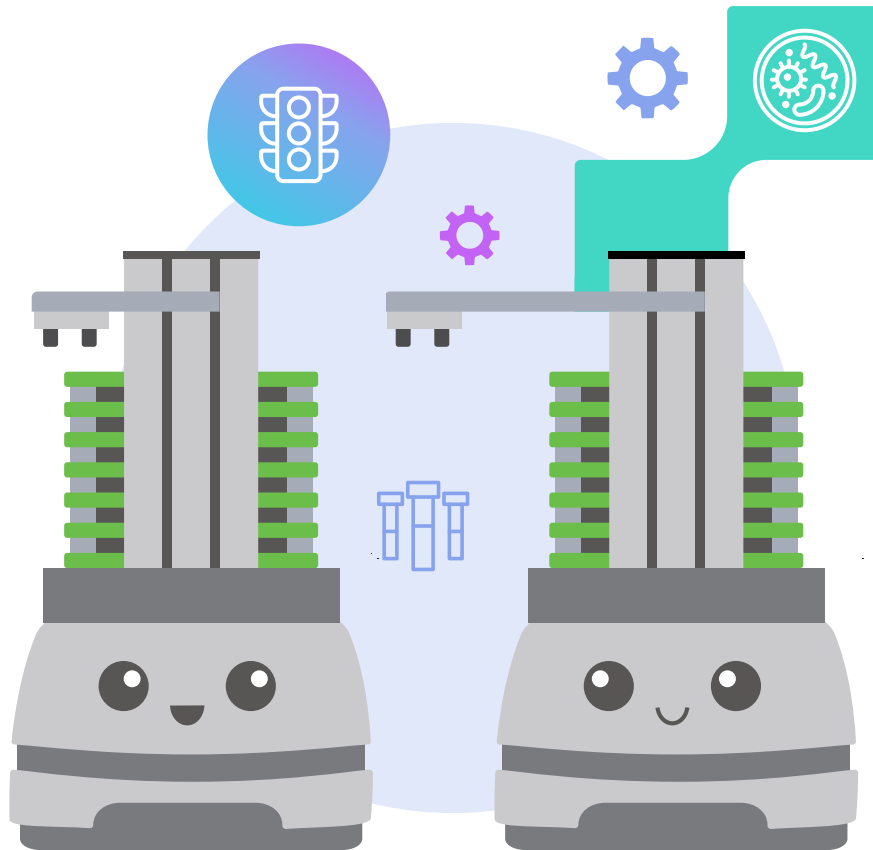
CHAPTER 5: WANT TO LEARN MORE?



Manufacturer sites

We recommend researching mobile robot manufacturers as an important starting point. Biosero offers custom mobile robots with a variety of autonomous mobile robot and autonomous guided vehicle providers like **Omron**, but as a hardware-agnostic software provider, we also work with mobile robot providers like **Kevin Robot** and **Astech Projects** to integrate their technology with Green Button Go.

CHAPTER 5: WANT TO LEARN MORE?



More on mobile robots from Biosero

If you'd like to do more reading on mobile robots from the Biosero team, check out these links:

CHAPTER 5: WANT TO LEARN MORE?



Virtual or live tours with mobile robots integrated into Green Button Go systems

We love mobile robots here at Biosero, and that's why we made our team mobile robot, Mobi, the concierge to the Biosero Acceleration Lab. You can visit San Diego, CA to get a live Acceleration Lab Tour to see Mobi in action, or we can set up a virtual tour. Either way, you can see for yourself just how a mobile robot fits into the laboratory environment and how you'd program it for action.

CHAPTER 5: WANT TO LEARN MORE?



Get Biosero's help launching a mobile robot in your lab

If you want help implementing a mobile robot or a fleet of them in your lab, consider contacting an automation partner like Biosero. We provide software and integration solutions to help labs achieve their workflow goals in lab automation, and mobile robots are just one very important part of the transportation picture.

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