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Bissell vacuum suction not working

When you sip soda through a straw, you are utilizing the simplest of all suction mechanisms. Sucking the soda up causes a pressure drop between the bottom of the straw and the top of the straw. With greater fluid pressure at the bottom than the top, the soda is pushed up to your mouth. This is the same basic mechanism at work in a vacuum cleaner, though the execution is a bit more complicated. In this article, we'll look inside a vacuum cleaner to find out how it puts suction to work when cleaning up the dust and debris in your house. As we'll see, the standard vacuum cleaner design is exceedingly simple, but it relies on a host of physical principles to clean effectively.It may look like a complicated machine, but the conventional vacuum cleaner is actually made up of only six essential components:An intake port, which may include a variety of cleaning accessoriesAn exhaust portAn electric motorA fanA porous bagA housing that contains all the other componentsWhen you plug the vacuum cleaner in and turn it on, this is what happens:The electric current operates the motor. The motor is attached to the fan, which has angled blades (like an airplane propeller).As the fan blades turn, they force air forward, toward the exhaust port (check out How Airplanes Work to find out what causes this).When air particles are driven forward, the density of particles (and therefore the air pressure) increases in front of the fan and decreases behind the fan.This pressure drop behind the fan is just like the pressure drop in the straw when you sip from your drink. The pressure level in the area behind the fan drops below the pressure level outside the vacuum cleaner (the ambient air pressure). This creates suction, a partial vacuum, inside the vacuum cleaner. The ambient air pushes itself into the vacuum cleaner through the intake port because the air pressure inside the vacuum cleaner is lower than the pressure outside.As long as the fan is running and the passageway through the vacuum cleaner remains open, there is a constant stream of air moving through the intake port and out the exhaust port. But how does a flowing stream of air collect the dirt and debris from your carpet? The key principle is friction. When people ask “How does a robot vacuum work?” it’s typically the device’s robotic element, more than its vacuum, they’re curious about. How does this computerized cleaner know where it’s been and where it hasn’t yet? How does it know when it’s finished? Why do some seem to clean in an orderly way, while others follow a meandering and perplexing path? It turns out that the answers aren’t all that complicated: There are basically just two ways a robot vacuum finds its way around your home. ’Seeing’ through sensors To effectively clean a room, a robot needs to move freely through the space while staying out of trouble. But they don’t see the world the way we do, even when there is a camera onboard. Instead, they use various sensors to detect obstacles and other hazards, measure how far they’ve travelled, and discover new areas to cover. These sensors trigger programmed behaviors that determine how the robot responds. Just which sensors a robot vacuum uses and how they work can vary by manufacturer and model, but these are common to all: Obstacle sensors: From a robot vacuum’s point of view, our homes are an obstacle course of chair legs, coffee tables, sofas, and stray toys. Sensors located on or near the vacuum’s shock-absorbing bumpers allow it to steer through these obstructions without getting slowed down. When the bumper impacts an object, the sensor is triggered and the robot vacuum knows to turn and move away until it finds a clear path. Which direction it takes is determined by where the bumper makes contact. If a vacuum hits an object with the left side of its bumper, for example, it will generally turn right because it has determined the object to be to its left. Eufy Many robot vacuums, such as the Eufy RobotVac 11, navigate by responding to sensory input. But maneuvering around objects can often leave swaths of floor uncleaned. To minimize this, some manufacturers take—literally—different approaches to obstacles. An iRobot Roomba, for example, will slow down as its approaches an obstacle. “The advantage of Roomba is that we gently touch objects, because what we find is that you can push through soft objects like curtains and bed skirts,” said iRobot’s director of product management Ken Bazydola. “That gives you better coverage.” Cliff sensors: Stairs are perhaps the biggest peril for robot vacuums; a tumble could damage the vacuum and anyone in its path. Because of this, cliff sensors are a safety requirement on all robot vacuums. They measure the distance to the floor by constantly sending infrared signals to its surface. If the signals don’t immediately bounce back, the robot surmises it has reached a stair or some other “cliff” and will change direction. Neato Robotics Neato Robotics’ Botvac D7 Connected robotic vacuum uses a radar range finder to map your home’s floor plan. Wall sensors: From their name, you might think wall sensors help robot vacuums avoid collisions. Not so. They actually help them detect walls, again using infrared light, so they can follow along them. This allows them to clean along the edges where the wall meets the floor. Best of all, it allows them to do it without bumping and scuffing the wall as we often do with standup vacuums. In models with mapping capabilities, wall sensors can also help the vacuum follow around open doorways and discover new areas to clean. Wheel sensors: A robot vacuum uses light sensors to measure wheel rotation. With this number and the wheel circumference, it can calculate how far it has traveled. At one time, sensor navigation was the way all robot vacuums worked. Today it’s mostly limited to manufacturer’s lower-end models, because though it’s effective, it’s not particularly efficient. Because these robot vacuums react to sensory input, they tend to grope their way through a room, vacuuming in haphazard paths. In order to get complete coverage and clean every area at least once they’ll take multiple passes over a room in whatever time their battery life allows. In our tests, this usually meant longer vacuuming times and, in the case of larger rooms, uneven cleaning as some areas got more attention than others. Michael Brown / IDG This is the home’s floor plan as drawn by its architect. Compare it to the map the Neato Botvac D7 Connected drew after cleaning (below). The magic of mapping Newer, higher-end robot vacuums include self-navigation systems that use mapping technology. Each manufacturer implements its own particular spin on mapping, but each of them is currently built around two slightly different methods. One uses an onboard digital camera to take pictures of walls, ceilings, doorways, furniture and other landmarks. A version of this type of mapping is used in Roomba’s 900 series vacuums and Samsung’s Powerbots. The other method, employed in vacuums like Neato’s Botvac series, uses a laser range finder (also called LIDAR for Light Detection and Ranging) that measures the distance to objects in the vacuum’s path. In either case, the robot vacuum uses the data it collects in combination with information from its other sensors to gradually build a map of the room during its initial cleaning. Michael Brown / IDG The Neato Botvac D7 Connected’s map is remarkably close to the home’s actual floor plan. The dark areas are locations the vacuum couldn’t reach, such as closets, cabinets, and low furniture. The orange dot shows the vacuum’s current location, at its docking station. Mapping delivers significant advantages. Armed with a floor plan, the robot vacuum can plot the most efficient route through the room, which is why mapping models seem to move in more orderly straight lines than their non-mapping counterparts. Mapping also allows the robot vac to localize itself within the map, which informs it where it’s been and where it yet needs to go. And if the vacuum’s battery runs low part way through the job, it can return to its dock to recharge, and then pick up where it left off. The result of all this is a quicker, more thorough and even cleaning. Mapping navigation isn’t without its peccadilloes. Camera-mapping vacuums can struggle and lose their way in low-light environments. Dark walls can interfere with LIDAR models’ laser signals and floor-length mirrors can fool them into thinking a room is bigger than it is. But these are minor issues compared to the benefits mapping offers. No robot vacuum will navigate flawlessly all the time. You’ll sometimes have to detangle them from cords or extract them from a low couch they never should have gone under to begin with. Ultimately, which navigation method your robot vacuum uses doesn’t matter as much its ability to clean your floors to your satisfaction with a minimum of help from you. But the next time your vacuums navigation has you scratching your head, remember that there’s probably a method to its madness.

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