

91T Reverse Engineering Roomba

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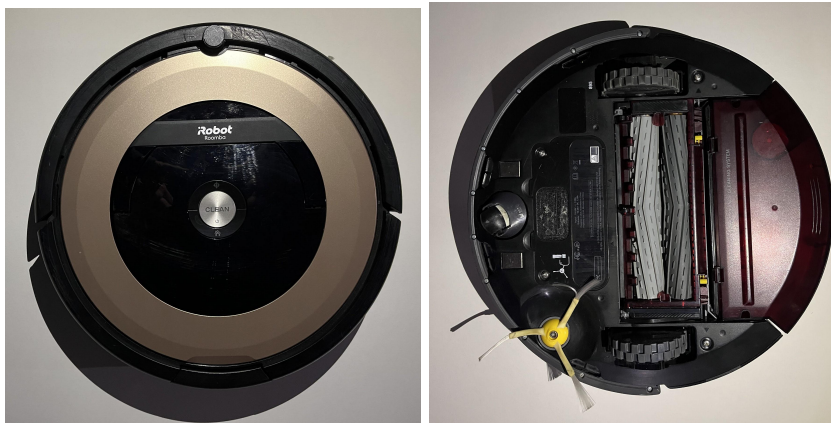


The item we chose to deconstruct was the Roomba 890. Its basic function is to vacuum and it uses We chose this item because it is a common household item that is often used all over the world as a substitute for a full vacuum cleaner. We also figured that due to how it functions, it must have a complex interior that would be interesting to deconstruct. Finally, with the knowledge we would gain from deconstructing a roomba, we could learn to fix our own roombas if they were to ever break and save ourselves from repair costs.

Basic analysis

The Roomba has 5 motors. The majority of the robot is made with plastic pieces. The Roomba consists of sensors, wheels, brushes, an air filter, and many screws.

Picture of Roomba before deconstruction



Parts in the Robot



Vacuum (Caption)

This is a picture of the vacuum mechanism. This part of the robot uses one motor. The brush that spins inward pushes dirt towards the vacuum and then it collects in the dirt bin. This part plays a major role in the system because it picks up the dirt.

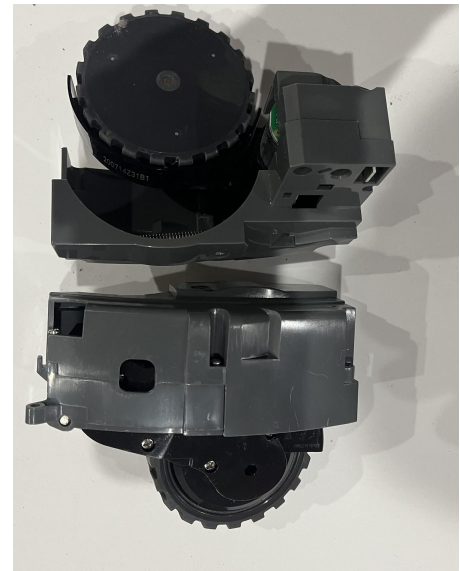


Dirt Bin (Caption)

This is a picture of the dirt bin. When we took the dirt bin apart we discovered a filter. With further research we discovered that the filter is designed to trap dust particles inside the bin as air flows through the vacuum. This part uses up one motor.

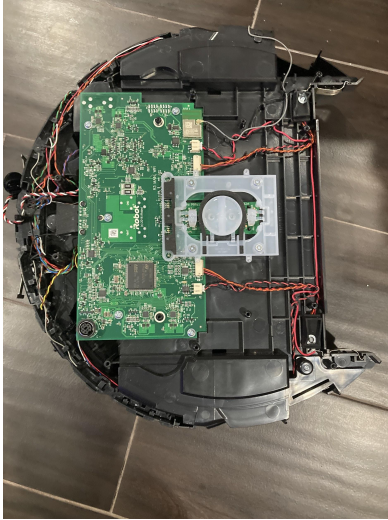
Wheels (Caption)

This is a picture of the wheels The Roomba has two wheels. They each have their own motor. With research we discovered that the wheels contain optical encoders which use light sensors to determine how far the Roomba traveled. They play a major role in the system because they help the robot move.



Motors (Caption)

This is a picture of the motors in the robot. The robot has five motors and consumes about 30 watts during operation. The motors are 1-inch-diameter dc motors. They play a major role in the system because they help run all the parts.



Motherboard (Caption)

This is a picture of the motherboard. It is towards the top in the center. The motherboard is the main circuit board and it brings many important components of the Roomba together. This is a crucial part of the system because without it, the robots' other components would not be able to work together or interact.

Sensors

When we researched the sensors and what they do, we found out that the robot uses infrared sensors and photocell sensors. They work in combination to clean a room. The infrared sensor is at the very front of the robot and uses light to detect objects. By doing this, the robot can lightly bounce off the object to ensure that no damage is done to the object. The roomba contains various sensors. It uses a light sensor to determine how far it traveled. The robot also uses its piezoelectric sensor as a dirt detector. When dirt hits the sensor, the Roomba receives a tiny electric impulse. This will prompt the robot to clean the area. The Roomba also has cliff sensors in order to navigate near stairs. They have bump sensors to detect objects nearby and wall sensors too.

Processors

During our research we found that the robot uses Qualcomm processors which have smartphone-level processing. It has more memory and imprint link. When the robot is done with a vacuum job it lets the Braava know when to start and they compare maps of the home and you can control where they clean using the iRobot app.

Lessons Learned

We learned how the Roomba works while taking it apart. We found out what parts are needed for it to function and through research, what role each of them have. We became aware of the importance of staying organized while deconstructing something because it can get messy and parts can go missing. Another lesson we learned is having the right tools to complete a project. We also learned that this complicated machine was basically a bunch of smaller parts working together to accomplish a goal. This project has given us lots of valuable knowledge because we have learned many important lessons and have gained a few important skills.

