Maureen Schrader lay on the operating table at Saint Barnabas Medical Center in Livingston, New Jersey. Four mechanical arms moved with precision around her abdomen. One arm held a high-definition camera. The other three arms used small surgical instruments to make a five-centimeter incision just below her ribcage. It was a tiny opening, but it was big enough to put a new kidney into Maureen’s body.

At no point in the operation did the surgeon touch Maureen. In fact, he sat several feet away peering into a monitor and holding what looked like video game controls. The movements of surgeon’s hands were digitally captured and sent to the robotic arms, which mimicked his every movement. The robot became an extension of the surgeon, and together they transplanted the kidney.

Robots in the operating room are now a reality, and the next operation you or a family member undergoes may well involve a robot. But surgery is just one area in which robots are changing modern medicine. As a pre-med student interested in becoming a surgeon, I have long been fascinated by medical robots. After researching the topic for this speech, I’d like to introduce you to the world of medical robots.

We’ll look at three kinds of robots in particular—orderly robots, remote-presence robots, and surgical robots. Let’s begin with orderly robots.

Orderly robots help hospital staff accomplish routine tasks. Their primary job is to transport medicine, food, and lab supplies—and to do so without a human by their side. Here’s one of the most popular orderly robots—the TUG, or tug robot—which, according to its manufacturer, is used in more than 100 hospitals in the United States alone.

A September 2010 story in *Discovery News* explains how the robot works. Relying on a digital map of the hospital, the robot moves from room to room to pick up and drop off supplies. It senses people and obstacles by what are called “light whiskers”—invisible beams of sonar, infrared, and laser. These light whiskers are represented by the different colored lines you see in this drawing. They constantly scan the environment to avoid collisions.

TUG robots can also communicate with one another about the best route to a location given current hallway conditions. They are highly efficient and make fewer delivery errors than people. Mark Weigel, director of food services at Bethesda Memorial Hospital in Maryland, notes that the TUG robot “never argues with patients, takes no breaks, is always polite and always on time.”

But orderly robots are not the only robots transforming modern medicine. Remote-presence robots help doctors visit their patients even when they are not in the same room. “Remote presence” means that the doctor is able to be “present” with the patient even when the doctor is in a “remote” location.
Imagine sitting in a hospital room when in comes this—the RP-7. A 2009 story in *US News and World Report* explains that physicians can pilot these robots from a laptop anywhere in the hospital—or in the world. A screen, camera, microphone and speaker system, like the ones shown in this photograph, allow the doctor to interview the patient. Hospital staff can attach medical devices like electronic stethoscopes to the robot so the doctor can review a patient’s vital signs.

According to a 2010 article in *Hospital Management*, the RP-7 is used in more than 250 U.S. hospitals and has performed more than 100,000 clinic sessions. They are particularly important in hospitals with a high patient-to-doctor ratio.

In addition to orderly robots and remote-presence robots, a third kind of robot is changing modern medicine. Surgical robots, like the kind I mentioned at the start of my speech, are increasingly being used in operating rooms around the world. Most popular is the one you see here—the daVinci. According to a 2010 article in the *Miami Herald*, there are more than 1,400 daVinci robots in hospitals worldwide, and they are used in 200,000 operations every year.

How does daVinci work? Intuitive Surgical, maker of daVinci, explains that the surgeon controls the robot from a remote terminal. You can see the terminal in this photograph. Usually, the terminal is a few feet away, as in the photograph. But it can be thousands of miles away, allowing a surgeon in San Francisco to operate on a patient in Miami. The doctor moves the robot’s arms utilizing an interactive 3-D imaging system. But make no mistake: Even though the robot is touching the patient, the surgeon is in control.

Doctors love daVinci because it dramatically improves the quality of surgical procedures. Dr. Jeffrey Wolf, a head-and-neck surgeon at the University of Maryland medical center, states that daVinci “gives us unprecedented access . . . with really good 3-D visualization. . . . We’re now able to perform intricate surgeries in a very small space with great dexterity.” DaVinci also reduces the risk of post-surgery complications, allows for faster healing, and helps patients leave the hospital sooner.

In conclusion, we’ve seen that medical robots are playing an increasingly important role in modern medicine. Whether they’re running errands for hospital employees, helping physicians stay in touch with their patients, or acting as a surgeon’s eyes and hands, medical robots have brought the future into the present.

So the next time you find yourself at the hospital, keep your eyes peeled for the kind of technological marvels that used to exist only in science fiction. Medical robots are now a matter of science fact.