

# Replicating Renowned Droids

Solutions in this chapter:

- Building an R2-D2-Style Droid
- Building a Johnny Five-Style Droid



## Introduction

If you're a fan of science fiction novels and movies like we are, it's quite natural to try and reproduce some of their leading robotic characters. Obviously, you cannot hope to get even close to the complex behavior they show in films. That would be an impossible task even with resources well beyond those of the MINDSTORMS system, but even with a much more modest goal in mind, you will discover this is not an easy task. The difficulties come from trying to model a small scale robot after a large-sized one with a complex shape; something not easy to reproduce using LEGO parts.

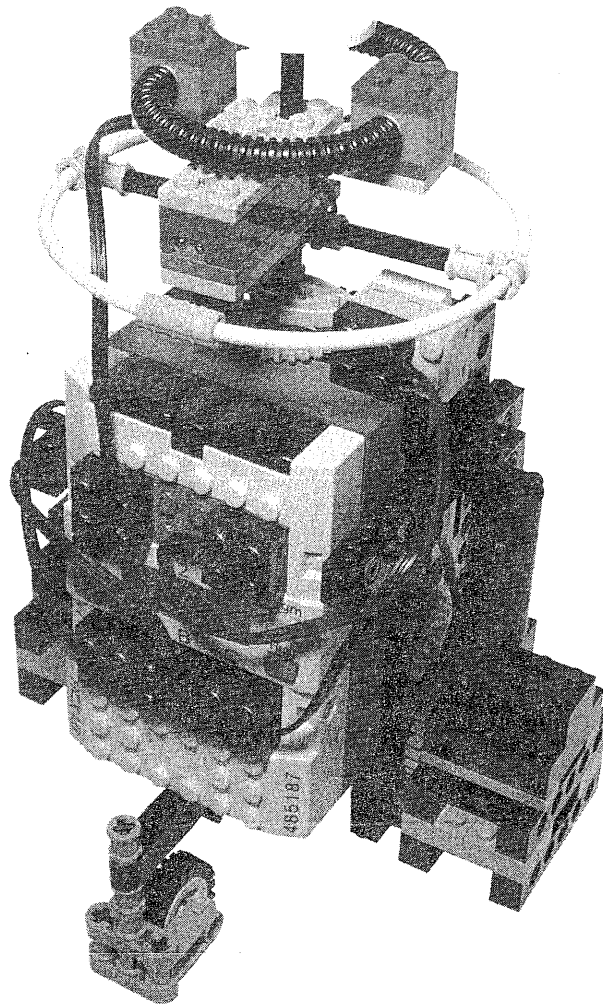
In this chapter, we describe the clones of two very famous robots: R2-D2 from George Lucas' *Star Wars* saga, probably the most beloved android of all time, and Johnny Five/Number Five from John Badham's film *Short Circuit*. We challenged ourselves to build both of them using only MINDSTORMS parts, plus an optional third motor, with both of them designed for light following, a matter not yet explored in the book. As always, you're invited to use our models as starting points for your own variations either in shape or functionality.

## Building an R2-D2-Style Droid

The "real" R2-D2 is essentially made of a cylindrical body culminating in a hemispherical head. Two rigid legs come out from its sides, ending with the wheels that provide motion to the robot. R2-D2 is a differential drive. The original character also features a front retractable wheel used only under certain conditions; in our model this is the third supporting point necessary for balance.

Figure 18.1 shows our R2-D2. You'll notice it's more of a symbolic representation than a realistic model! The RCX, mounted vertically, constitutes the main part of the body, while the head is mimicked by a compound structure of tubes.

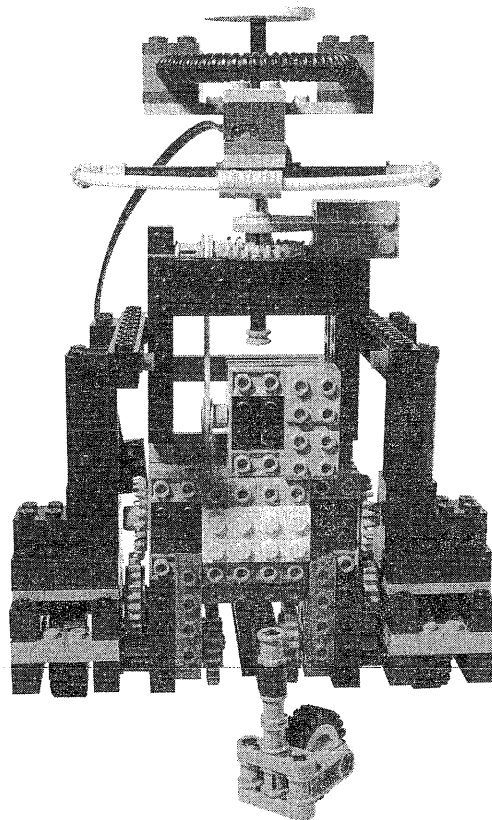
Figure 18.1 Our R2-D2-Style Droid



The three motors are behind the RCX (Figures 18.2 and 18.3). Two of them, at the bottom, connect to the wheels with a 1:3 ratio, while the third rotates the head. As we explained at the beginning of the chapter, if you don't have the third motor, you can build a fixed-head version of the robot. It, too, will be able to follow light.

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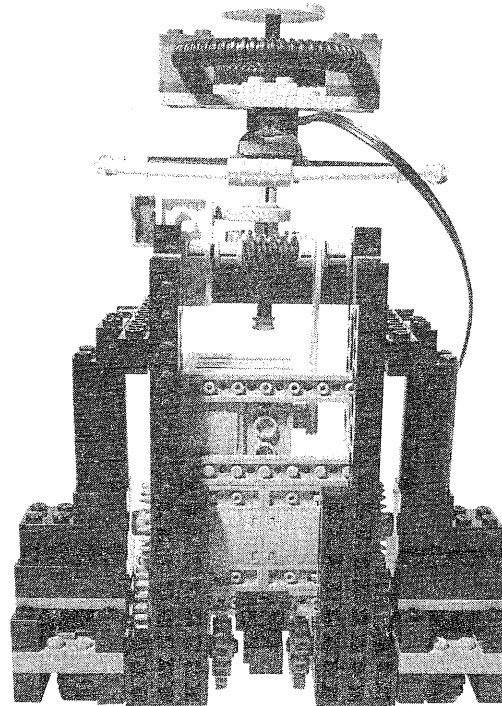


**Figure 18.2** Front View (with RCX Removed)

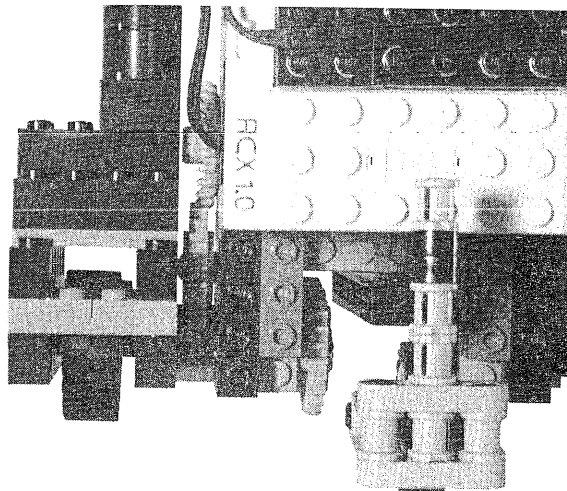
Each of the drive motors mounts a 24t crown gear, which engages another (plain) 24t whose axle ends with an 8t gear. The latter engages a third 24t gear connected to the wheel (Figure 18.4).

The legs are built mainly with plain bricks and 2 x 2 round bricks. They end in a 1 x 2 TECHNIC brick attached to the horizontal beam that locks the upper part of the chassis and carries the RCX (see Figure 18.5). The front wheel is a simple caster, which is very important for the proper balance of the model. When a robot has a vertical shape, like R2-D2 has, the position of its mass is critical for its stability during changes of direction and speed. It's not just a matter of keeping the COG inside the supporting base, but mainly of opposing the effect of inertia, which could make your robot flip over (see Chapter 5).

**Figure 18.3** Rear View (with RCX Removed)



**Figure 18.4** Detail of the Gearing



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