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MAKE: PROJECTS

Make This Mini Star Wars BB-8 Ball Droid with a Hacked Sphero

By **Christian Poulsen** Difficulty: Moderate

458

407

100

70

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As an industrial designer, I've been particularly fascinated by products that have personality and emotion. And I think the droids in Star Wars have always been really great at capturing a character without facial expression and drawing you in. And BB-8 was no different when they **brought it out onstage** for the first time.

As I watched it roll around my only thought was “need!” ...So **I made one**.

Part of what I really enjoyed about the process of making it was the timeline. Most projects I work on end up taking weeks, if not months to finish. With BB-8, I pushed myself to make it in a day. As a result, the surfacing and paint is less than perfect, which I'm serendipitously calling “weathered”. But I was able to stick to my goal, and was able to make the whole thing in a matter of hours. I wanted to capture the character and personality of the real robot as simply as possible, and I'm really happy with how it turned out.

To make it I used a Sphero 1.0 for the body (I've never split open the **Sphero 2.0**, so I'm not sure if it will work on that model), polyurethane foam surfaced with spackle for the head, and neodymium magnets to connect the two. My file for the head design can be **downloaded from Thingiverse**.

Star Wars BB-8 Droid Made from a Sphero and Magnets





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Sphero 1.0 (1)
Gunmetal Plastidip spraypaint
Orange paint
White paint
3/4" Neodymium ring magnet Placed in the Sphero.
3/8" neodymium magnet disc Placed in the head.
3/8" adhesive-backed felt pad
Polyurethane foam
Wood spackle
Clear Enamel spray paint
Sharpie marker For adding fine detail before the clear coat.

TOOLS

Hacksaw
Bench vise
3D modeling software I used Rhino 3d.
CNC Mill
Laser cutter For cutting shapes into tape for paint masking.
Drill press Used to drill out area to embed magnet in BB-8's head.
Sandpaper
Glue gun

STEPS

PROJECT STEPS

1. Splitting Sphero 1.0
 2. Embedding the magnet
 3. Design and fabricate the head
 4. Masking and Painting
 5. Finishing coats
 6. Add magnets and felt
-



Step #1: Splitting Sphero 1.0



he first step was to split open the Sphero along the part line using a hack saw, being careful not to saw through the internal chassis.



CHRISTIAN POULSEN

Christian Poulsen is currently in the process of finishing his degree in Industrial Design at Brigham Young University, trying to find time between fixing his perma-plagued 70's Porsche named Sebastian and any number of other personal or work projects.

Website

9 Comments

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aphi • 9 months ago

Hi Christian. Give us a ring at tlcsecure.com ! We're working on something similar with Sphero 2.0 but instead of a wooden head we will have a plastic one housing a camera. We are looking at the SDK to see if we can stabilize the head and control direction :-) Phil

2 ^ | ▾ • Reply • Share ›

Louis M Johnson Jr • 9 months ago

Nice Job! If you can make the sphero in the base a bit larger (which makes the base larger) using the same internal Magnet arrangement. Then use a second Sphero outside its ball as the head unit. Program the head unit to sense the base unit's magnet as its Target location and to stay right on that point. Then the head would stay right where it's supposed to be. You might even be able to use a remote to turn and offset the head from it's target point as we see in the movie's droid. :^)

1 ^ | ▾ • Reply • Share ›

Scott Christensen • 2 months ago

I have my Sphero opened up and was wondering if I could just use some squared buckyballs as the magnets with just a little hotglue keeping them in place.

^ | ▾ • Reply • Share ›

Jacob Lahue • 6 months ago

I am so happy you made this because I bought the sphero 1.0 a few years ago and I quickly lost interest with playing with it, because it was slow, and a bunch of other reasons. But when I got my make magazine, I saw you could build one of these, I was like " I need dis!". So I turned the pages to find it and then realized its using the Sphero 1.0! The 3 year old toy collecting dust in my closet! I was so happy! Thank you!

^ | v • Reply • Share ›

Everseeker • 9 months ago

In some screenshots you can barely see what look like wheels peeking out from the bottom of the head. I think there's a set of omniwheels under there, to allow the head to rotate.

Taking that further, If you use balancing software & positioning hardware, I am not at all sure you need the mag link at all.

In fact, Could the top be the ONLY active part? (It always leans over to initiate movement... Could that be because it NEEDS to do that... moving the center of mass past the centroid to cause motion?)

I have seen several algorithms that could handle all of the above nicely. Beginning with an IEEE article a couple years back, there are now a ton of unicycle bots & ball balance bots on youtube...

the bottom could simply be a hollow, but relatively high mass, sphere. Inertia is your friend in this case... and higher mass helps. Not toooooo high though, or the "lean" will never initiate movement. Someone with a higher math pedigree than I possess might be able to deduce the relative masses of the 2 bodies given the angle needed to initiate movement (and to stop it too)

^ | v • Reply • Share ›

Derek • 9 months ago

This is kinda funny to me because the company behind Sphero made BB8 and are releasing a toy version anyway. You basically did their exact job. Good work.

^ | v • Reply • Share ›

cheinzmann • 9 months ago

Anyone remember the Sphero Peacekeeper edition?

<https://www.indiegogo.com/proj...>

^ | v • Reply • Share ›

mrklingon • 9 months ago

Looks like the *real* BB-8 is a sphero at heart -

<http://www.denverpost.com/news...>

^ | v • Reply • Share ›

Ras Pi • 9 months ago

As predicted by Make: a few days ago, somebody has made their own bb8.

^ | v • Reply • Share ›



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