

DIY Life-Size Phone Controlled BB8 Droid

by ASCAS on January 17, 2016

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Author: ASCAS [My FB Page](#)

Join me as I build fun and random weekend projects! I'm currently on hiatus.

Intro: DIY Life-Size Phone Controlled BB8 Droid

Today, I'm going to teach you how to build a **working, life-sized, phone-controlled** Starwars BB-8 droid! In this tutorial, we are only going to use household materials and a little Arduino circuitry.

Notice:

This is an ongoing project. The photos in this Instructable were taken from the video tutorial I made. The video below is just a teaser. The full-length tutorial and tutorial will be finished uploaded tomorrow (1/20/2015 - Wednesday PST). So keep eyes peeled and expect an update soon!

TEASER: Full-tutorial coming soon...



Step 1: Gather The Parts And Materials

Robotics & Electronics:

- Arduino Uno
- Pololu Dual VNH5019 Motor Shield
- Pololu 50:1 35D Metal Gearbox
- HC05 Bluetooth Module
- 4 Cell Lithium Battery Pack (2x)
- Switch, DC Jack, Wires, Solder

BB8's Body:

- Inflatable Beach Ball (Diameter: 50cm)
- Old Newspaper Strips
- Plain Canvas Strips
- 2 Bottles of PVA Glue (a.k.a Elmer's Glue)
- 1 Bottle of Woodglue

- White, Grey and Orange Spray Paint

- Roll-on Deodorants

BB8's Head:

- Styrofoam Ball (Diameter: 300cm)

- Christmas Ball (Size of BB8's Eye)

- WiFi Antenna (Prop Only)

- Cloths Hanger

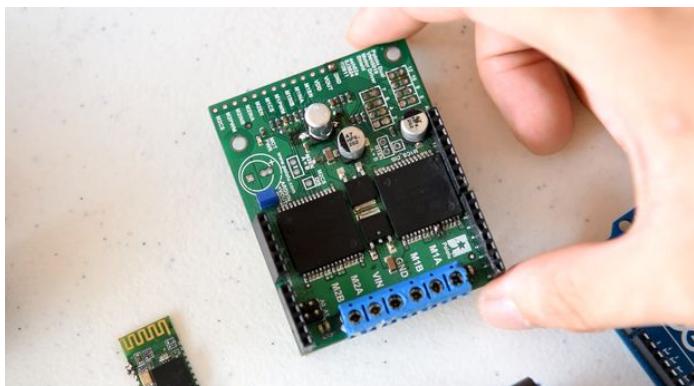
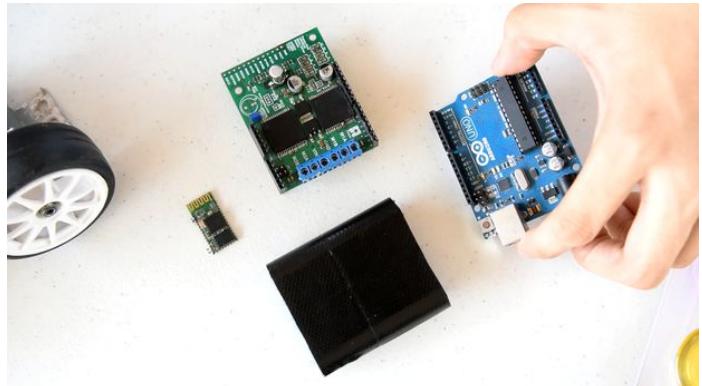
- Roll-on Deodorants

- White, Grey and Orange Spray Paint

MISC:

- Superglue

- Neodymium Magnets



Step 2: Inflate The Beach ball

Pump enough air until you reach the maximum diameter of your beach ball (50cm).



Step 3: Prepare The PVA Glue Mixture

We will use PVA glue (Elmer's glue) as our paper binder/ hardener. Mix 2 part water to 1 part PVA glue.



Step 4: Prepare The Newspaper Strips

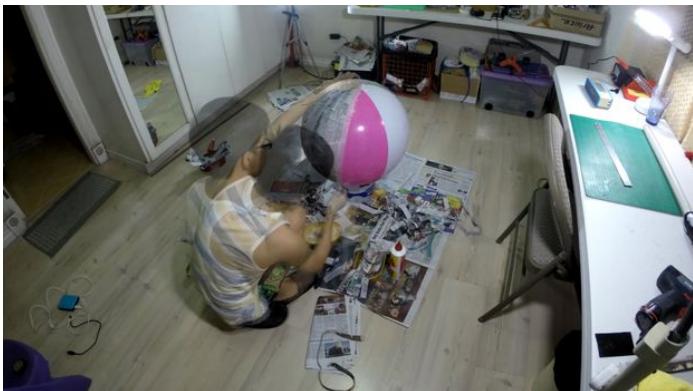
Gather a bunch of old newspapers. Align them carefully and cut them using a cutter knife and a ruler.



Step 5: Make The Paper Mache

We're basically making a huge piñata. We're going to use the beach ball as our mold for the paper mache.





Step 6: Tip* - For Faster Drying

If you're in a hurry, use a blow dryer to speed up the drying process. Or maybe point an electric fan to the paper mache and leave it to dry overnight.



Step 7: Add A Layer of Canvas

The store, where I buy fiber glass, ran out of supplies. I used plain canvas instead of the fiber glass. The canvas hardens really well and works as a good paper mache. (cloth mache)



Step 8: Let It Dry

It was raining cats and dogs when I reached this step. I took my paper mache indoors and used a fan to try it overnight.



Step 9: Smoothen The Surface

After the canvas mache dries, you may notice there are overlapping sheets of canvas. You can simply plane it off using a sharp cutter blade.



Step 10: Apply Wood Putty To BB8's Body

Get a can of wood putty and carefully apply it to your paper (cloth) mache ball. Use a metal applicator to do the job. The putty fills in the gaps. Any excess putty will be planed or removed after the sanding process.





Step 11: Sand BB8's Body

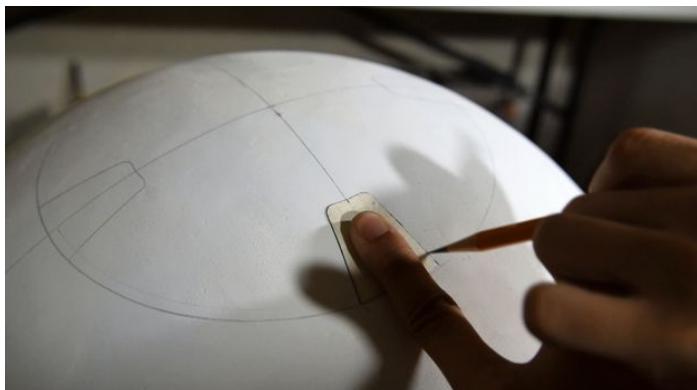
Once the putty dries. Sand the surface of BB8's body. Use a coarse grit (100-400 grit) of sand paper. I used my Makita electric sander to make the job easier.



Step 12: Draw Details and Outlines On BB8's Body

Download the file package below. I have included a template of BB8's detailed artwork. I had help from my dad to put this up. I'm very bad at drawing. We used videos and images from the net as our reference.

Circular shapes can be achieved by using a compass. While straight lines which falls on the curved surface of the body can be traced with a tailor's tape measure.



Step 13: Mask The Body

Use lots of masking tape to mask the areas that you don't want to get paint on. 'The art of masking'.



Step 14: Paint BB8's Body

We painted BB8's body with 3 different colors of spray paint: white, grey and orange.



Step 15: Peel The Mask

Once the paint dries, peel the masking tape.





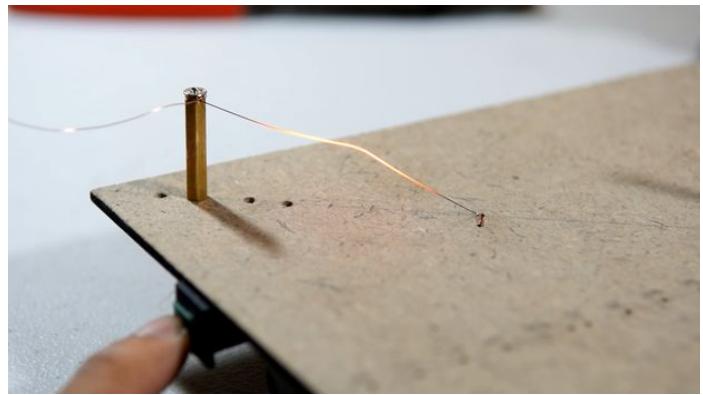
Step 16: Let's Make The BB8's Head

BB8's head measures 30cm in diameter. Basically it's a semi-circular head with a beveled edge, off-set from the median. Use a trash bin as a stencil, then use a marker to mark your cutout. Use a hacksaw to cut the Styrofoam ball in half (nearly half).



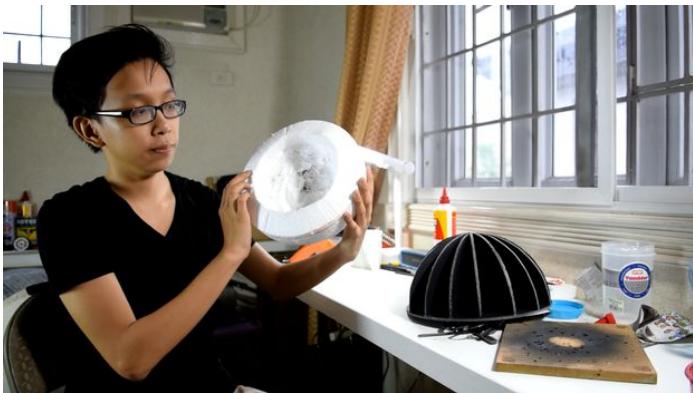
Step 17: Build A Styrofoam Bevel Cutter

The beveled edge can be achieved by building a makeshift styrofoam hot-wire cutter. I did that by recycling a piece of wood from an old picture frame, which I then used as the base of the styrofoam cutter. I mounted a metal stand-off at the middle as the pivot for the styrofoam. I mounted another metal stand-off for the hot-wire. The hot-wire can be stripped from a thick insulated wire. I then connected a switch and a 3.7v (18650) lithium-ion battery in series with the hot-wire. Whenever I press the push button switch, the wire heats up. Clean styro cuts for me!



Step 18: Hollow-out The Head Using Heat/ Fire

You can reduce weight by hollowing-out the inner portion of the styro ball. You can do that by melting/ burning the styrofoam using a blowtorch or a lighter.



Step 19: Apply Putty on BB8's Head

Then again, apply a layer of wood putty on BB8's head, then sand it with sandpaper.



Step 20: Draw The Details On BB8's Head



Step 21: Paint BB8's Head

We painted BB8's head with 3 different colors of spray paint: white, grey and orange.



Step 22: Make BB8's Eye

It was Christmas when I reached this step. I grabbed a frosted Christmas ball from our Christmas tree and used it as BB8's eye. I cleared the frosting by wiping it out with Acetone. I painted the inner portion of the ball with black spray paint, leaving the outer portion with a little luster.





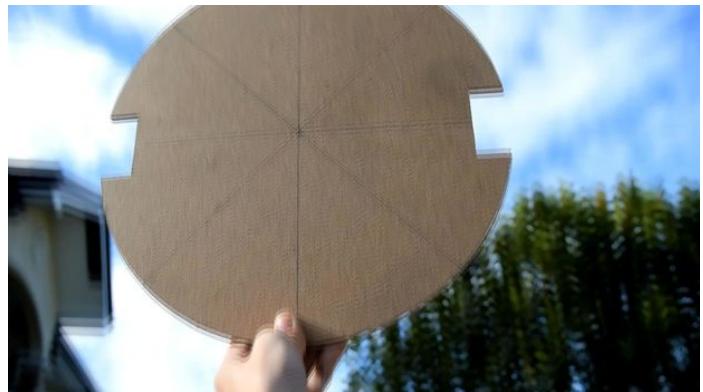
Step 23: More Parts And Details For BB8's Head

BB8's has two antennas. We took a WiFi antenna and hot glued it to the head. For the other antenna, we used a white solid wire. I added an MP3 module and a speaker on more Version 2.0.



Step 24: Build The Mechanism - Cut Some Wood

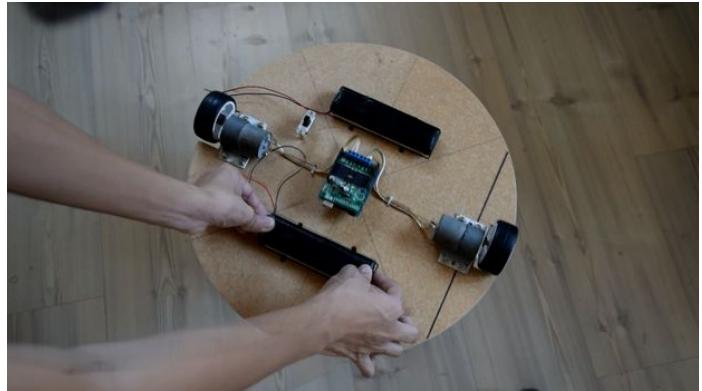
I used a 1/4" thick MDF wood as the base of the robotic mechanism inside BB8's body.





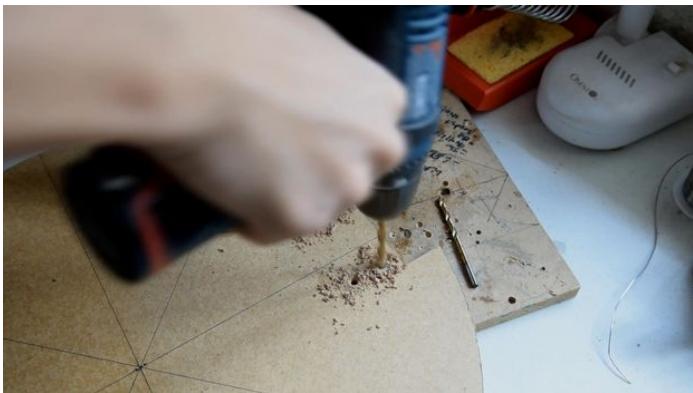
Step 25: Build A Makeshift Lithium Battery Pack

This is my new thing now. I save tons of money by assembling my own Lithium-ion battery pack. In this project I'm using a 4 cell battery pack. I simply just soldered four 18650 (3.7v 2000mAh) Lithium-ion batteries in series. 18650 rechargeable batteries are very cheap and common nowadays. I made two sets of these and connected them in parallel. I now have a total of 14.4v (4,000mAh)! It also costs less than my Turnigy bats!



Step 26: Mount The Metal Gearbox

Mount the metal gearbox together with the brackets on the MDF/ wooden platform. Use nuts & bolts, not glue.



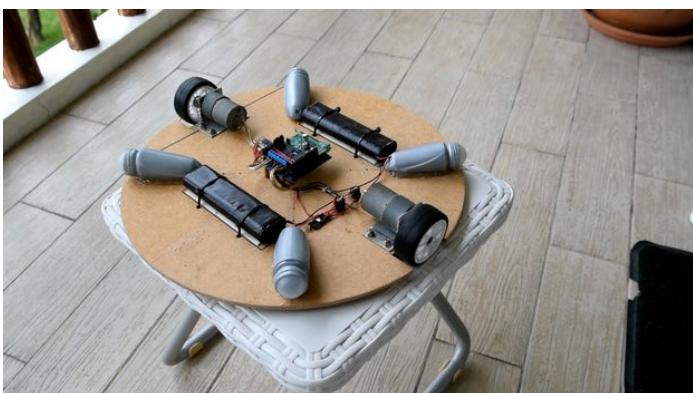
Step 27: Establish The Electronics (+How It Works)

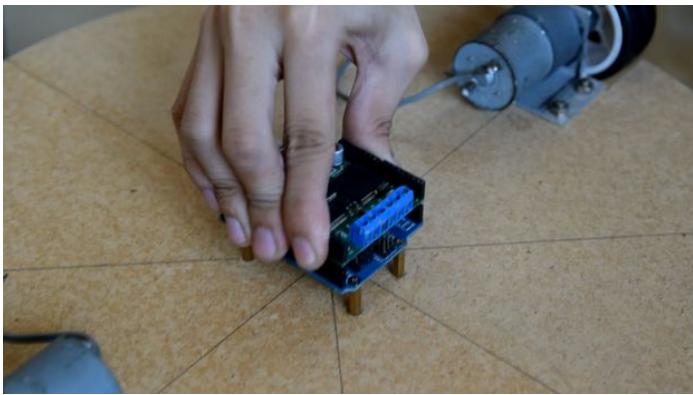
How It Works:

The phone app sends characters via Bluetooth every time you press a button. The Bluetooth module receives the data while the Arduino interprets and processes these data. The Arduino sends signals to the Motor Driver shield to give a go signal for the switching of the motors.

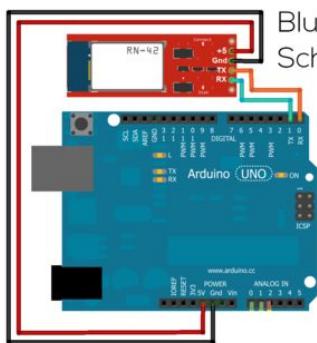
Steps:

- 1st.) Mount the Arduino to the platform
- 2nd.) Stack the Motor Driver Shield
- 3rd.) Connect the left motor's wires to M1A & M1B
- 4th.) Connect the right motor's wires to M2A & M2B
- 5th.) Mount The Lithium-Ion Batteries





Step 28: Add The Bluetooth Module



Bluetooth Module to Arduino Schematic Diagram (HC-05)

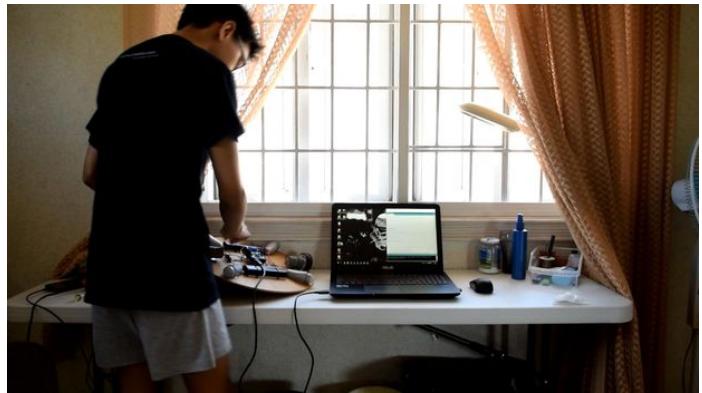
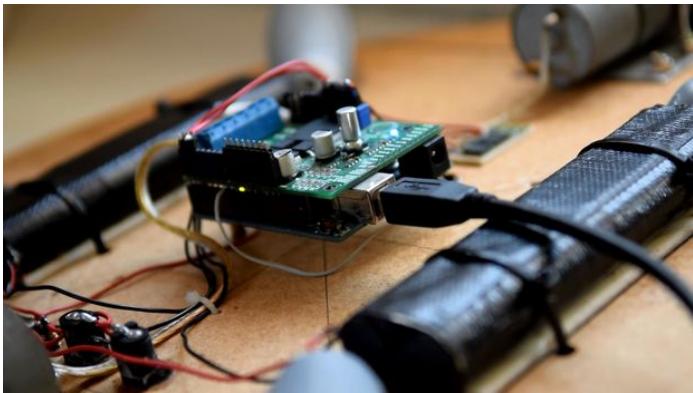
Connect:

- 1) Arduino's TX to Bluetooth Module's RX.
- 2) Arduino's RX to Bluetooth Module's TX.
- 3) Supply 5v to the Bluetooth Module.
- 4.) Connect both grounds together.

Step 29: Program The Robotic Mechanism

Here's the Arduino Code. Before you upload the code/ program to your Arduino Uno board, be sure to install the Pololu Motor Driver Library. Also, please do not forget to disconnect the TX-RX lines of the Bluetooth module from the Arduino. This is done to prevent the Bluetooth module from interfering with the Arduino during the programming process.

Don't know how to install an Arduino library? Find the instructions here! ([click me](#)).





```
BB8 | Arduino 1.6.5
File Edit Sketch Tools Help
800x
#include "DualVNH5019MotorShield.h"
DualVNH5019MotorShield md;
/*
#include <Servo.h>
Servo myservo;
*/
char dataIn='S';
char determinant;
char det;
int vel = 200; //Bluetooth Stuff

int overdrive = 13; //Press Toggle Switch #1, the pin13 LED will light up

void setup(){
Serial.begin(9600);md.init();

/*
myservo.attach(6);delay(100);
myservo.write(90);delay(100);
*/
}

void loop(){ det = check(); // You'll need to reconstruct this if your not using the Pololu

while (det == 'F') // F, move forward
{md.setSpeeds(vel,vel);det = check();}

while (det == 'B') // B, move back
{md.setSpeeds(-vel,-vel);det = check();}

while (det == 'L') // L, move wheels left
```

File Downloads



BB8's_Arduino_Code.zip (1 KB)



[Pololu Library \(Dual VNH5019 Motor Shield\).zip](#) (6 KB)

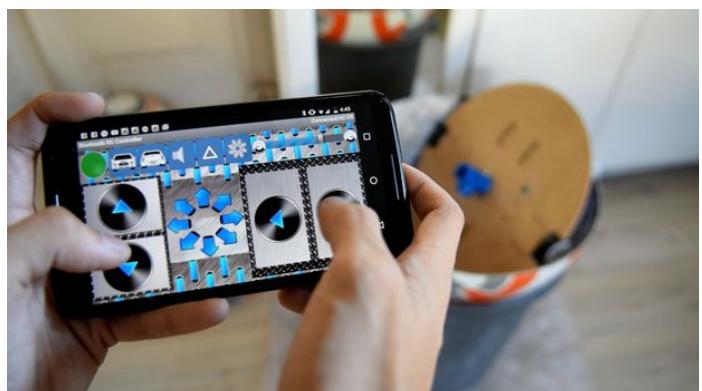
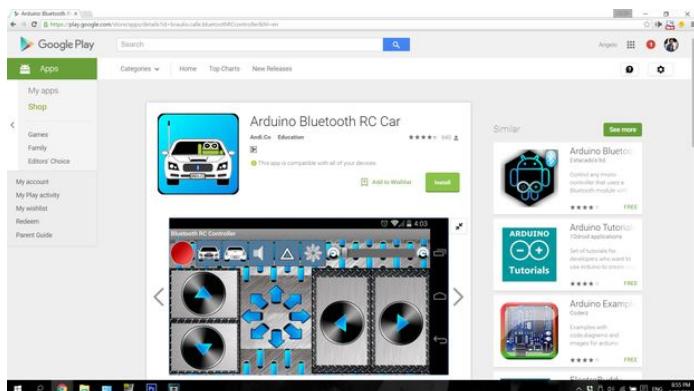
[NOTE: When saving, if you see .tmp as the file ext, rename it to "Pololu_Library (Dual_VNH5019_Motor_Shield).zip"]

Step 30: Download The Phone App

Here's a link to the phone app that I've used. It's named as 'Arduino Bluetooth RC Car'. It's a very simple app to use.

How To Use It:

- 1.) Download the app form the play store/ itunes.
 - 2.) Launch the app
 - 3.) Open the configure window (wrench icon)
 - 4.) Tap; connect.
 - 5.) Select HC-05 (The name of the Bluetooth module)
 - 6.) The red light should turn green once it establishes BT communication.



Step 31: Cut BB8's Body In Half

Use a hacksaw to cut BB8's body in half.



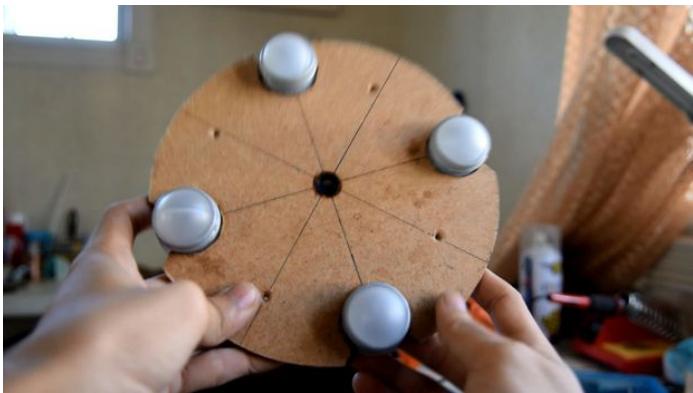
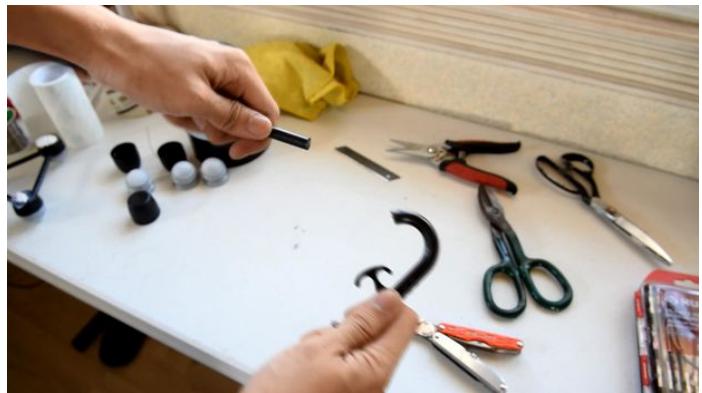
Step 32: Build Makeshift Rollers!

Roll-on deodorants!



Step 33: Build BB8's Internal Magnetic Head Mechanism

BB8 has a magnetic mechanism that keeps the head upright. He has a Internal and External one. In my design, I hot glued four Roll-on deodorants (as my makeshift rollers) on a round wooden plate. I then attached a servo with two large magnets attached to it. The plate is mounted to the base with four elongated wooden shafts.



Step 34: Where Can I Find Magnets?

Speaker drivers are good sources of strong magnets. I recycled two blown out speakers and extracted the magnets from it.





Step 35: External Magnetic Mechanism - Add Magnets To The Head

Make A Delta Roller:

Again, I made a roller set, this time for the outside (BB8's head). I made a delta/ triangular roller set. Then again, I used roll-on deodorants for the makeshift rollers and then I used a light weight plastic shaft to connect three rollers together. The shaft was taken from a plastic segment of a clothes hanger.

Position The Magnets:

Install the half of BB8's body (above the internal mechanism) then throw your magnets where the magnet is located from the other side. Let them attract each. Ta-daaa! You don't have to take measurements in order to find the exact position of the other the magnets from the other end. Finally hot glue the magnets to the Delta Roller and then hot glue the Delta Roller to the Stryfoam head of BB8.

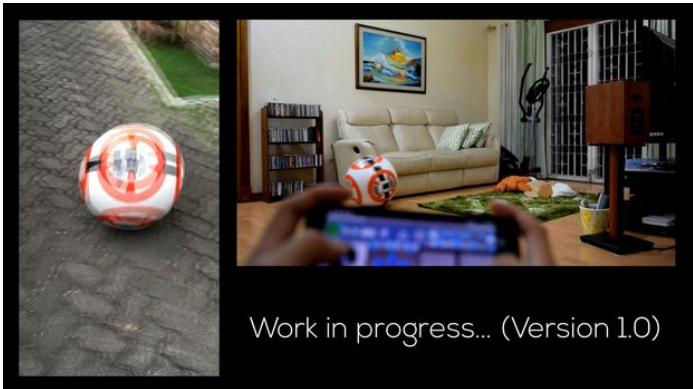




Step 36: Seal The Robot

Encapsulate the robotic mechanism and use superglue or wood glue to seal BB8's body together.

Step 37: Moment of Truth - Test It!



Step 38: Findings

Step 39: Future Upgrades

Step 40: Version # 2 - Coming Soon!

Related Instructables



Lifesize
Stargate for Sci-
Fi Valley Con by
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Build a life-
sized active
volcano by
damianzuch



How to Make a
Batmobile by
VerendusVir



make a life-size
3D cardboard
motorbike by
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CARD
BOARD
MOTORBIKE
make a life-size
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MaKey Makey
and Scratch
Operation Game
by jedininja89



DIY Lifesize
Witch Legs by
cnortonart

Comments

3 comments [Add Comment](#)



yonatan24 says:

Wow! That looks like so much work!

Jan 19, 2016. 5:44 AM [REPLY](#)



Imetomi says:

Very nice! I became jaelous... :D

Jan 19, 2016. 2:31 AM [REPLY](#)



ASCAS says:

Thank you! :)

Jan 19, 2016. 3:19 AM [REPLY](#)