



TIME REQUIRED:

1-3 Hours

DIFFICULTY:

Easy

COST:

\$80-\$150

MATERIALS

- » Corrugated cardboard
 - » Heavy duty plastic trash bag Transparent bags are easier to work with.
 - » Servomotor, 9g micro size
 - » Electronic speed controller (ESC), approx. 10A
 - » Brushless motor, 1,000KV-2,000KV
 - » Propeller, size 5x4.5
 - » R/C transmitter and receiver, 2 channel minimum
 - » Double-sided tape, strong
 - » Kids' toy beach tennis rackets (2) or similar. I find these at the dollar store.
 - » Strawbees connectors (34) Find a local retailer at strawbees.com/resellers.
 - » Drinking straws (3) Reuse old straws, or get Strawbees recyclable straws.
 - » Rubber bands or zip ties
 - » Scotch tape
 - » 3D-printed parts (optional) for the motor pod. Download the 3D files from makezine.com/go/cardboard-hovercraft. Or make your own from cardboard or 1mm-2mm plastic.
- OR PICK UP A KIT** like those pictured above at strawbees.com/store

TOOLS

- » Paper templates Download them from makezine.com/go/cardboard-hovercraft.
- » Pencil
- » Box cutter
- » Scissors
- » Phillips screwdriver
- » Metal ruler
- » Saw
- » Hot glue gun or epoxy (optional) if you're making the DIY cardboard motor pod

DIY R/C Hovercraft

Made from cardboard and trash bags, these things rip! Make a bunch and race your friends

Written by Erik Thorstenson



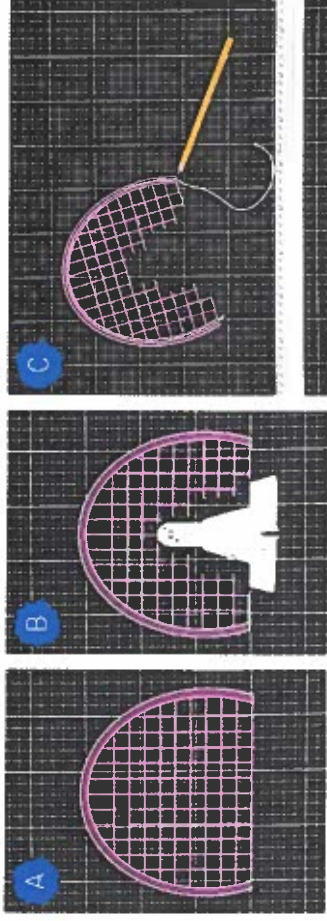
ERIK THORSTENSON is an engineer, entrepreneur, and co-founder of Strawbees, an award-winning prototyping toy for all ages.

having lots of fun building hovercraft as big as 1 meter square. I've also had help from some awesome Norwegian makers from Makeadrome (makeadrome.net), who immediately started holding workshops building some of my early designs and nudged my company, Strawbees, in the right direction with improvements. Finally, we released it to the market as an educational experiment kit.

The entire idea of our cardboard hovercraft construction is having an easy platform for experimentation. We use a snap-on, snap-off motor system and low-cost materials so you can easily make fast, iterative design changes to the base, skirt, and steering fin. It's a ton of fun, and

It all started when I crashed a DIY quadcopter and wanted to reuse the parts for something fun. This was on a weekend when I had a slight fever, so I had some spare time on my hands ... and I had an old dream of building a hovercraft ... as makers, you know how it goes!

So I put together some cardboard, trash bags, and electronics, and it just worked. Since then I've been refining the design, trying out different things and



hopefully it will help you learn some great product development skills.

And these babies are fast! They hover across land and sea at over 25mph (~40km/h). Create your own spectacular designs, and race them with your friends.

1. MAKE THE PROPELLER GUARD

You'll start by building the items that will mount on top of the base, so you'll know where to put your holes in the base. First, the propeller guard.

Find cheap toy "beach tennis" rackets made in durable plastic. Many of these are molded with a slot that's perfect for cardboard; if not, you can just tape or glue the cardboard to the edge. A cardboard guard, in combination with the plastic grid, will stop things from hitting your propeller land the other way around (too of course).

Make sure there's room for your propeller to spin freely, then mark your cut and saw off the rackets at this point [Figure A].

On one of the rackets, you need to make room for the motor pod. Align the pod and mark around it with a pencil, then cut on your line [Figure B].

Place a length of string in the slot in the edge of the racket, and mark it to measure how long the cardboard for the guard should be [Figure C]. You can also use a flexible measuring tape.

Cut out the end template and place it on a piece of corrugated cardboard, parallel to the fluting in the cardboard [Figure D]. This makes it easy to slot it into the racket later. Mark the first end's contour and holes using the template. Then measure the distance (that you marked on the string) to the other side and mark the opposite end using the same template.

Finish the contour by cutting the ends along your marks and then cut the long edges between them [Figure E]. Round the corners if you want it cleaner looking; we chose not to in this tutorial.

Punch the four holes out with a pencil [Figure F].

Slot the cardboard in between the two rackets [Figure G]. Secure with rubber bands or zip ties. Your propeller guard is now done.

2. PREPARE THE BASE

Use the base template or measure a 25cm x 34cm square. For strength, make sure the fluting in the cardboard runs front-to-back on your hovercraft; otherwise it folds too easily in a crash. Cut the square out using the metal ruler.

Cut the 5cm x 5cm hole for the motor pod according to the template. Take note of the offset from the center; this position is important for the balance of the hovercraft. Depending on the weight of your electronics and propeller guard, you can try out different offsets to perfect your design. If your hovercraft is tail-heavy, move the assembly forward on the next base you make, and if it's front-heavy, move it backward. You can also tape weights to your hovercraft to balance it before your build your next one.

Place your motor mount (see Steps 3 and 4) on top of the hole and mark the 4 holes for the motor pod. Do the same for the propeller guard. Make sure the propeller guard leaves enough room for the motor and propeller. Punch the holes with a pencil [Figure H].

Choose which side is going to be up, then thread single-legged Strawbees connectors up through all the holes [Figure I]. Fold the round head of the Strawbees flat against the base bottom and secure with tape. You need 8 Strawbees per base; you can reuse them after this one is trashed.

3. 3D-PRINTED MOTOR POD

If you have access to a 3D printer, follow this step; if not, go to Step 4. The 3D-printed motor pod comes in two