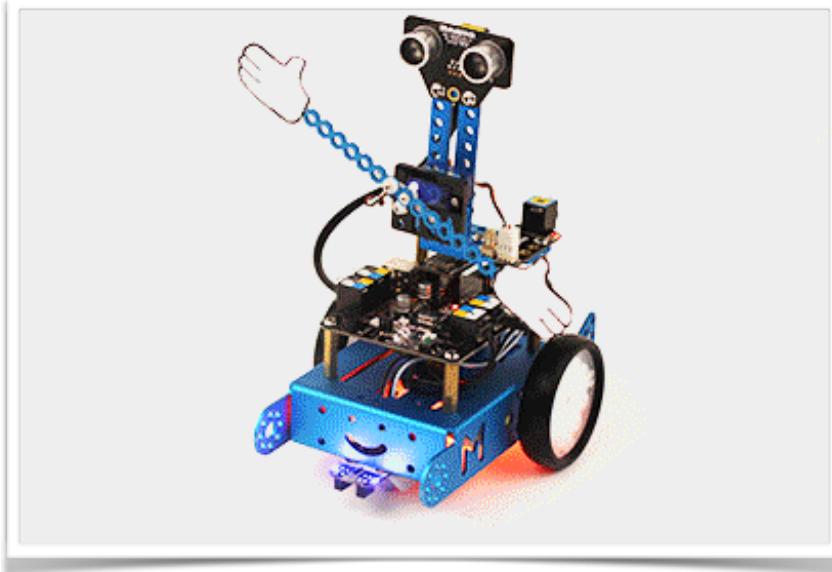


# BOTS FOR KIDS

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## Bot Customization

In the past five weeks we've gone over many things you can do with the base mBot kit. This week, we're going to discuss what you can do besides using the basic kit.

Modifications to the bot come in many flavors: new structures, decorations, sensors, ways to move, or even making your bot look just the way to you want.

In this newsletter we'll touch on structure, tools to create your own parts, and additional electrical modules you can add.

We'll also bring in some examples of robots that have been modified to give you some ideas. Over the next few weeks, your robots will start adopt more functionality and personality.

## Structure

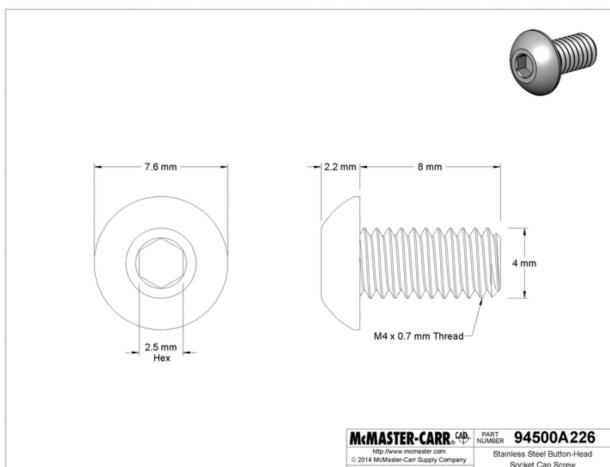
New structures can be made of almost anything: poster board, wood, plastic, or even your own 3D printed parts. Today we'll explore the possibilities.

You may notice the mBot has a lot of holes in it to screw things in. MakeBlock uses 4 millimeter wide holes in all parts, so any screw, nut, or bolt for any of the parts should work with any other. (The

[McMaster-Carr](#) description for the mBot screw, for example, is the "Type 316 Stainless Steel Button-Head Socket Cap Screw".)

MakeBlock also sells a bracketing kit for the mBot for those who want to get started quickly.

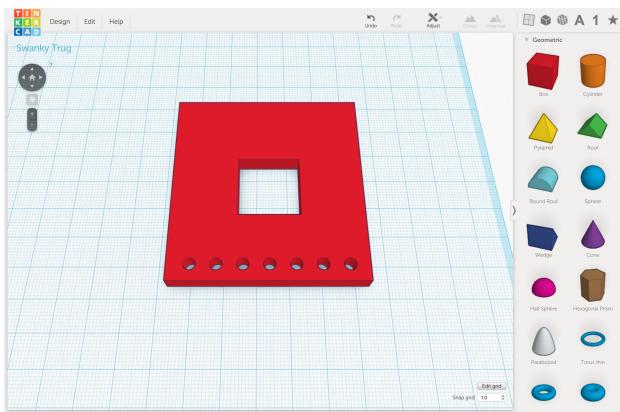
Longer structural pieces can be attached by drilling a hole with a 4mm bit, or just hot glue.



## TinkerCAD

If you need to create your own custom structural piece, you can 3D print it once you have it designed. One easy way to design it is with a program called TinkerCAD. It is an online program that runs in your browser at [www.tinkercad.com](http://www.tinkercad.com).

Once you create an account with your parents, click “Create a New Design”. You will then have a small grid on which you can drag shapes. The shapes are on the right-hand side, and as you place them TinkerCAD will show their size and position. To cut a hole in a shape, use the box or cylinder hole and drag it where you want. When you’re happy with the position, group the hole and the solid object to combine them.



You can build up any object by combining smaller shapes into larger ones, and TinkerCAD automatically saves it to your account as you work. For a good 3D print, you want to make something that lies as flat as possible on the grid and there are as few “bridges” as possible.

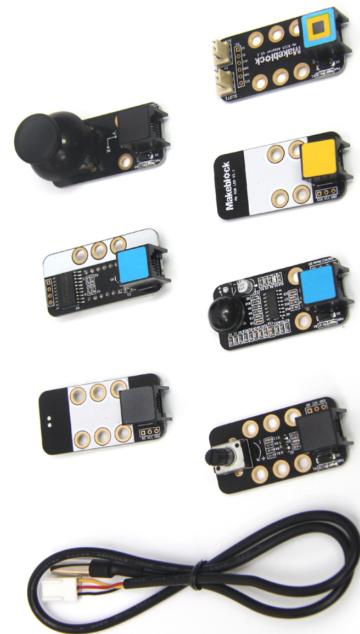
We'll give you additional tips in the class.

When your design is ready to be 3D printed, click the “Design” menu and select “Download for 3D Printing”. We'll collect the files and try printing them for next week.

## More Modules

The mBot comes with a lot of stuff built-in, but it is possible to add additional modules in the two empty slots. You can buy them on the web, but we'll have a collection of them for you to experiment with in class.

For example, you can add a second ultra-sonic sensor and point them at angles so you can steer towards the largest opening to avoid obstacles.



Or add a “servo”, which is a motor that can point in a specific direction. Servos are the motors that let you steer a remote control car or plane.

There are also sensors that detect light, movement, touch, sound, temperature, humidity, smoke, fire, or even your own robots angle and motion.

Maybe your robot can stand guard in your bedroom and detect sneaky siblings. Or monitor your fish's water temperature. For a more complex project, maybe you can try to build some way for the mBot to pick things up or grab things and create a sport out of it.

We'll keep a small number of various additional modules around during class each week, so bring your ideas.