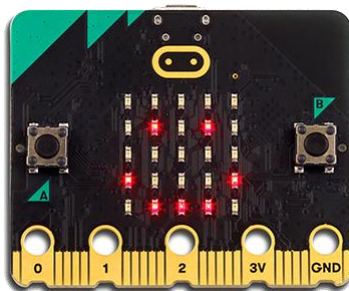


Part Image

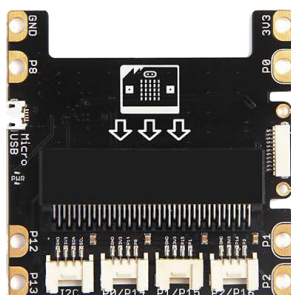
Description

Reference Link



BBC micro:bit

Reference [here](#). These are available from many different retail stores.



Grove micro:bit expansion shield

Reference [here](#). These are available from many different retail stores.



Grove Sweep Servo. **Do not purchase a continuous 360° Servo for this project.**

Reference [here](#). These are available from many different retail stores.

TI-Nspire CX II



USB mini OTG to micro cable. This cable is the same as the one supplied with the TI Bluetooth Adapter.

You can request a TI cable [here](#) by filling out the request form. These cables are also available from many different retail stores. However, there are different types of this cable. It must be **mini OTG** to work with micro:bit.



Rechargeable external USB battery with USB A to micro power cable. This cable typically comes with a battery.

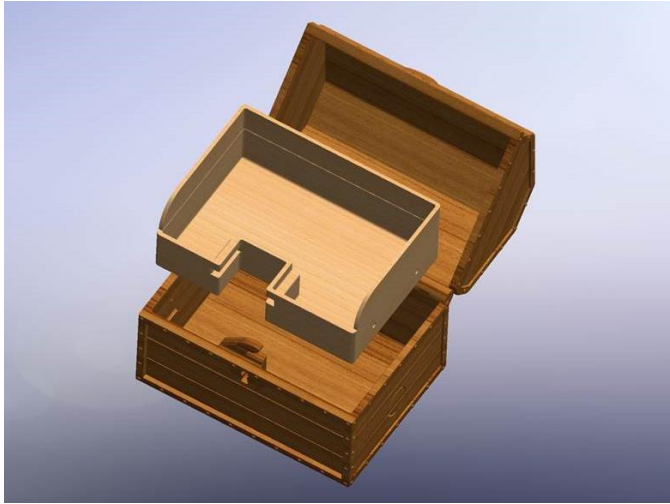
Reference [here](#). These are available from many different retail stores.



Treasure Chest 3D Printing Instructions

1. **Chest.stl** is the bottom and top of the chest that print as one part. With a successful print, the top and bottom of the chest should have a freely moving hinge right off the printer.
2. **Tray.stl** is the drop-in tray that holds the sweep servo
3. Print settings
 - a) 0.2mm layer lines
 - b) 3 to 4 shells
 - c) 10 to 20% infill
 - d) Material PLA
 - e) TIP: Ensure your printer is well-calibrated and has minimal hairs and zits. These issues could cause the "print in place" hinge on the chest to fuse.

Assembly Instructions:



1. Insert micro:bit card face-up in the Grove expansion shield.
2. Insert Grove servo cable in P1/P15 receptacle on the Grove expansion shield.
3. Place the assembly into the bottom of the treasure chest. Mind the routing of the cable.
4. Insert the micro:bit calculator cable through the hole on the right side of the chest. You will need to pop out the plastic disk on the first assembly. Insert the micro end into the top of the micro:bit. Attach the other mini end to the USB port at the top of the CX II calculator. Turn on the calculator, and the board should power up and display the Texas logo on the card's 5x5 LED display.
5. Insert the USB power cable through the hole on the back side of the chest. You will need to pop out the plastic disk on the first assembly. Insert the USB micro end of the power cable into the micro USB connector on the left side of the Grove expansion shield. Attach the other end, USB A, into the external battery and turn it on.
6. Open the document "7 – Cybersecurity – Pick the Lock" on your calculator and advance to page 2.2, "servo_test.py". On page 2.1, you will find the "servo_configure.py" file used to tune the servo.
7. Run the servo_test program and press the [enter] key on the calculator to rotate the servo shaft counterclockwise, the open position, and display "unlocked, press [enter] to lock" on the calculator.
8. Press the single tab horn onto the servo shaft parallel to the chest latch, as shown in the picture above. This position does not engage the lid latch and is unlocked. The calculator will display "[enter] to lock".
9. Press the [enter] key to lock the latch. The servo will rotate clockwise into the latch; this is the locked position. The calculator will display "locked, press[enter] to unlock".
10. Repeatedly lock/unlock your chest to ensure the servo horn travels properly into and out of the latch. If you hear a humming from the servo when locked, you will want to adjust the servo setting in the lock() function on page 2.1, "servo_configure.py", and add a few steps to the value in "grove.set_servo(pin1,10)". If the horn does not engage the latch sufficiently to lock, try subtracting a few steps. You must **save the file, [ctrl] + [B]**, before changes will take effect. Test the lock again.
11. Optionally, place a small binder clip on the back of the tray, as shown in the image on the "Pick the Lock" activity. This serves as a spring to pop open the lid when unlocked. Have fun picking the lock!

12. If your chest becomes locked and you need to open it by picking the lock the old-fashioned way, remove the external battery and disconnect the calculator. Insert a paperclip into one of the two small holes in the lid above the keyhole, and push the servo horn into the unlocked position to release the lid.

