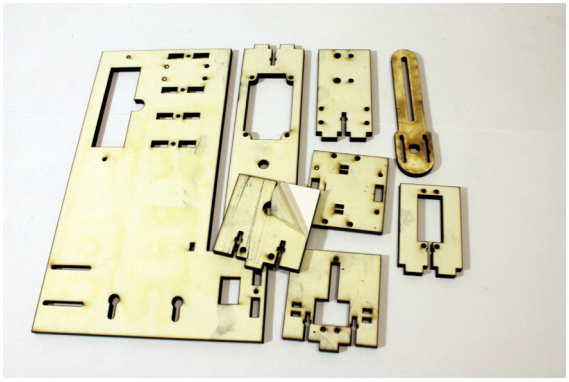
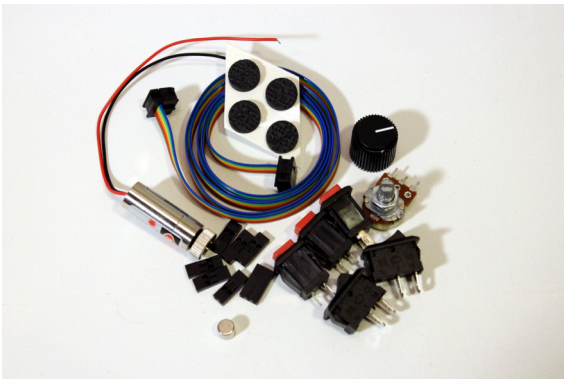
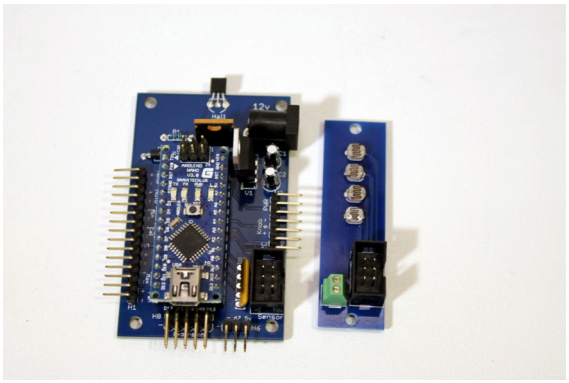
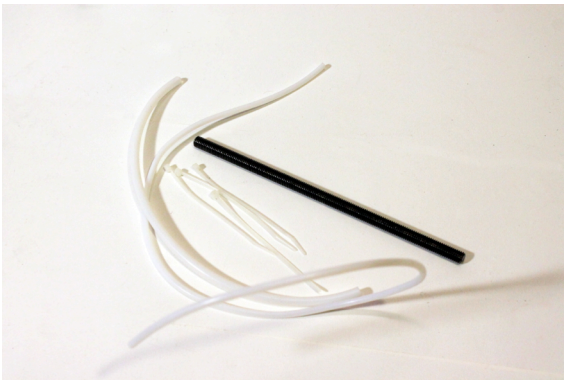
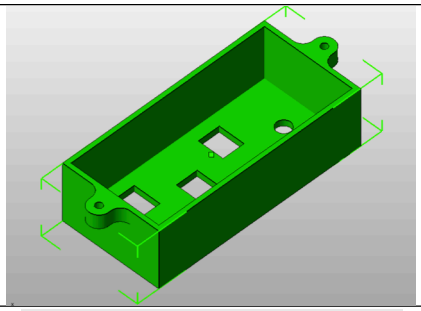
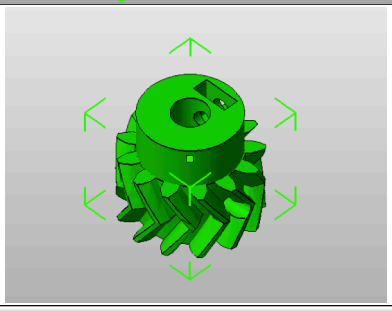
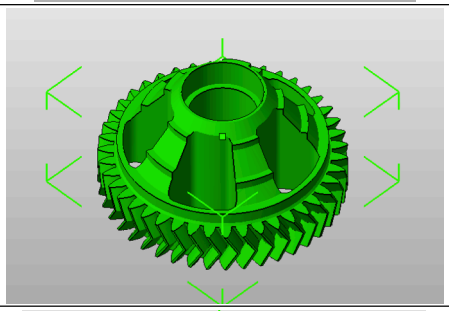
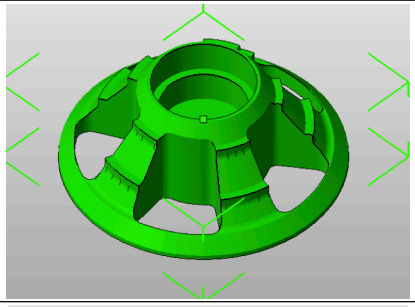
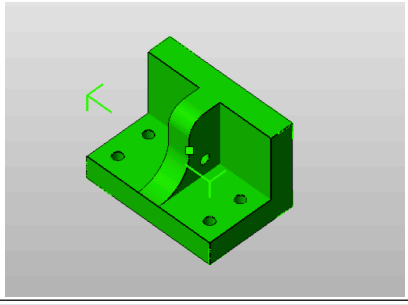
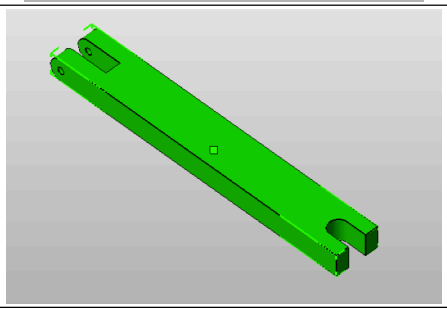
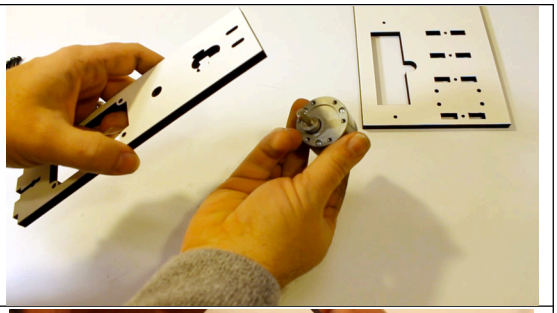
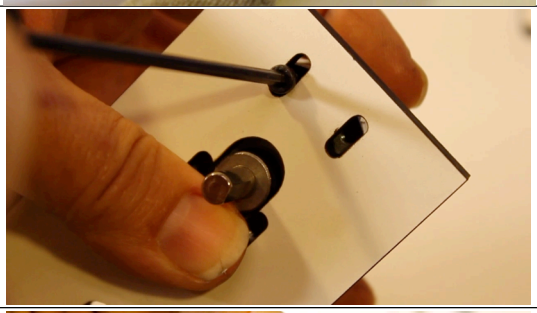
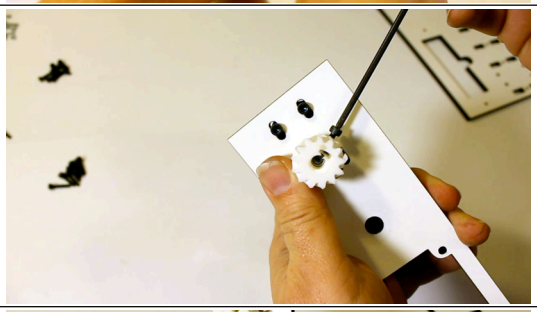
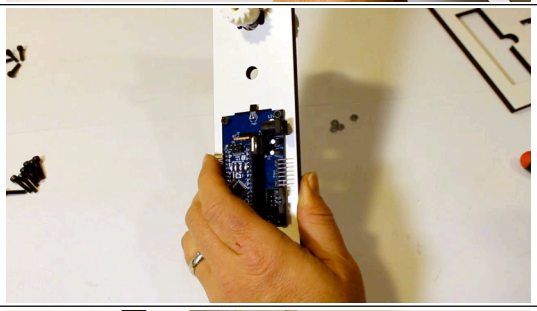
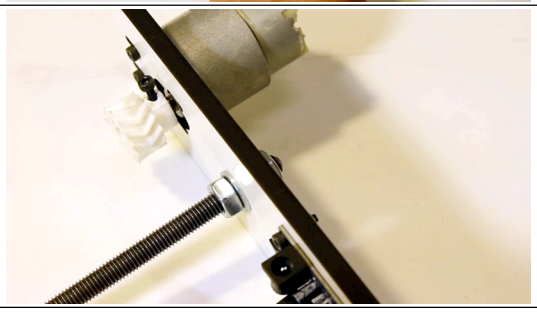
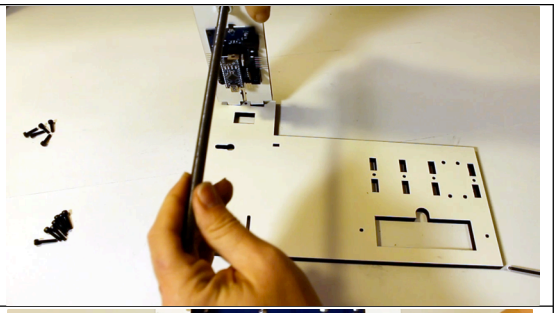
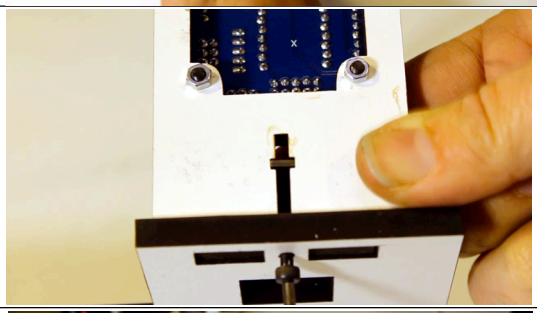
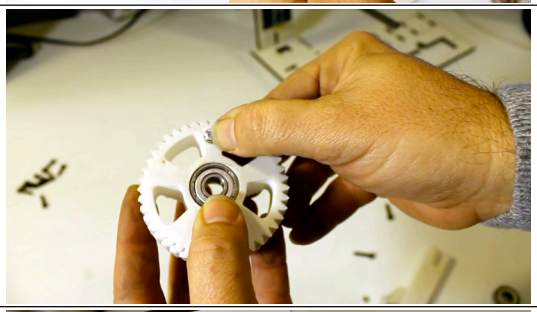
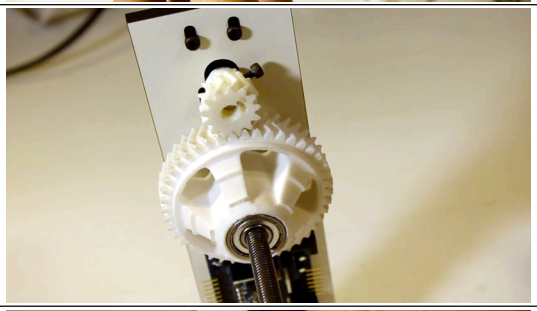
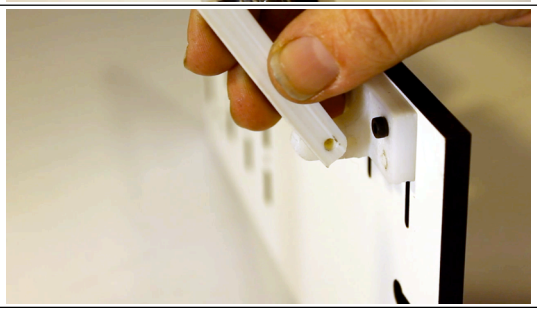
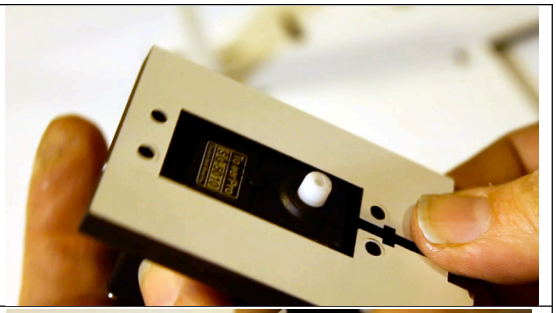
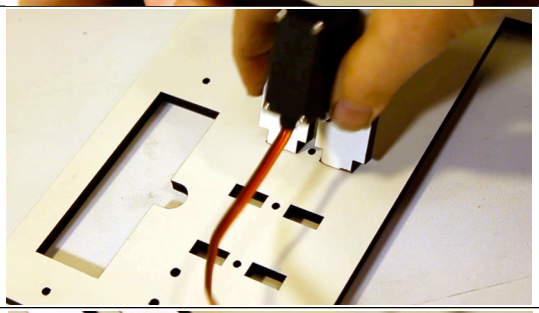
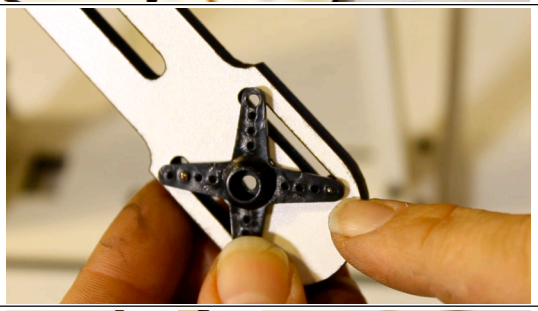
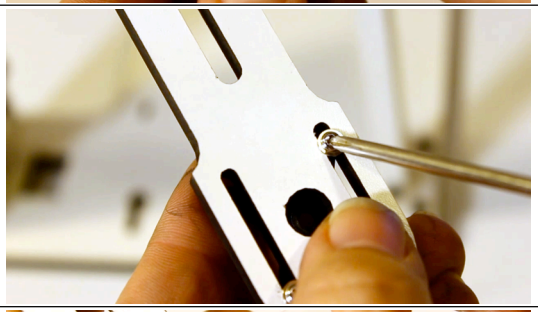
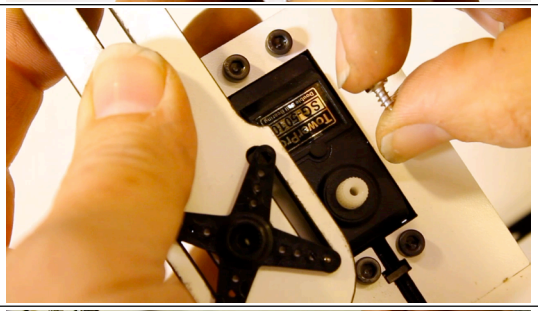
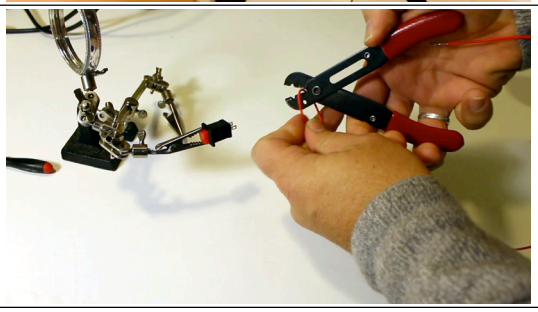
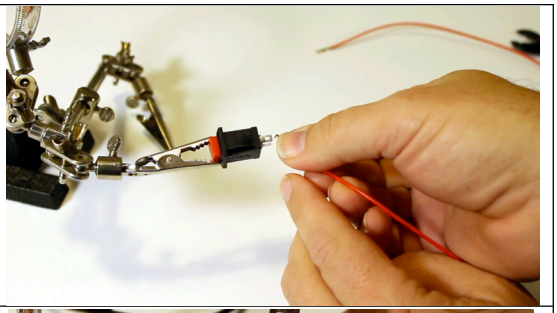
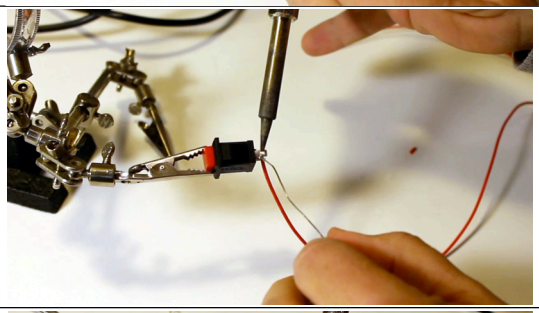
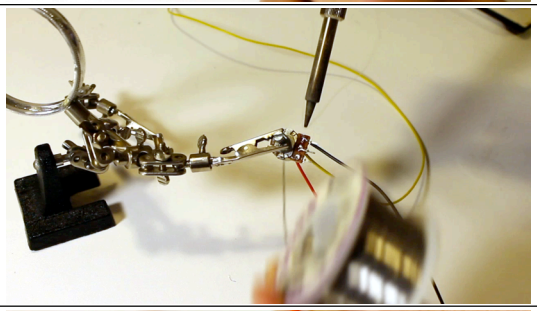
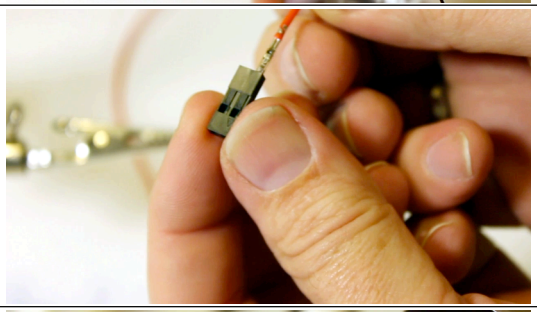
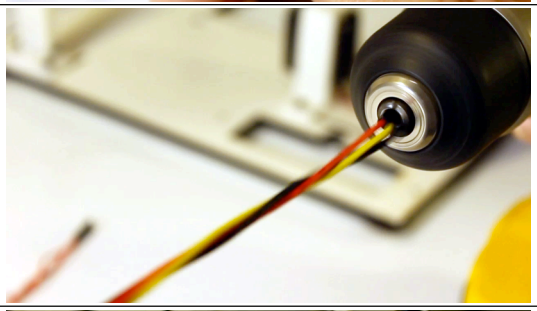
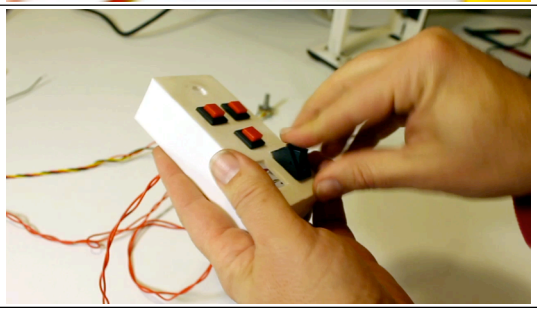
	
	
	
8 Piece Laser Cut Set 2 Packs of wires 1 Servo 1 Gear Motor 1 Power Supply 1 Control Board 1 Sensor Board 1 Laser 1 Ribbon Cable 3 Buttons 2 Switches 1 Potentiometer 6 1x3 Housings 1 1x3 Housing 1 Knob	3 Bearings 3 M3x10 Screws 10 M3x12 Screws 6 M3x16 Screws 8 M3x25 Screws 17 M3 Hex Nuts 7 M3 Square Nuts 3 M8 Nuts 2 M8 Washers 1 4mm PTFE Tube 1 6mm PTFE Tube 1 Threaded Rod 1 Magnet 4 Foam Adhesive Bumpers 4 Rubber Adhesive Bumpers

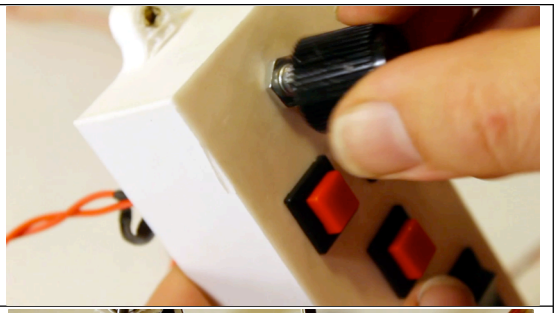
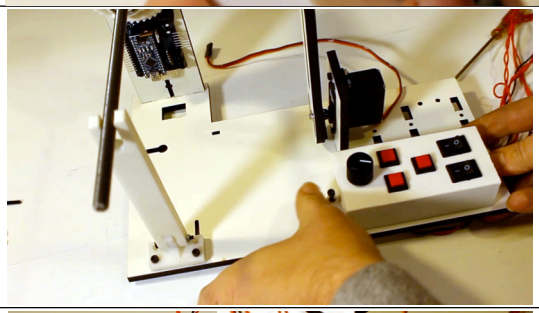
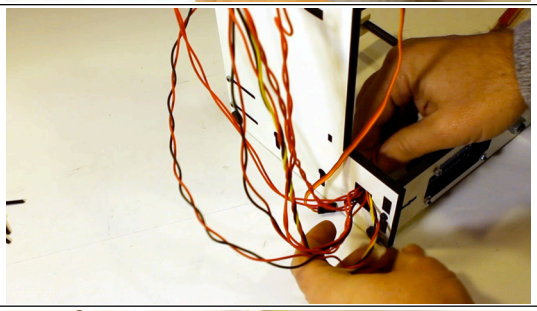
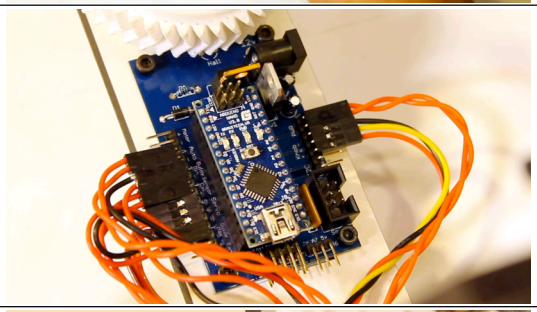
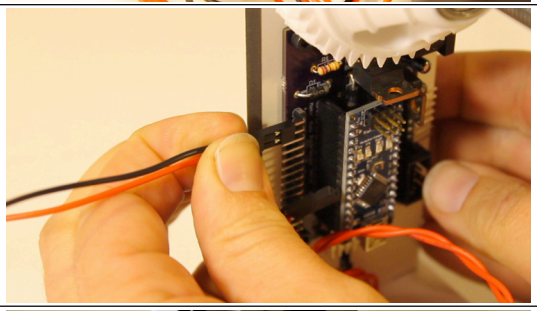
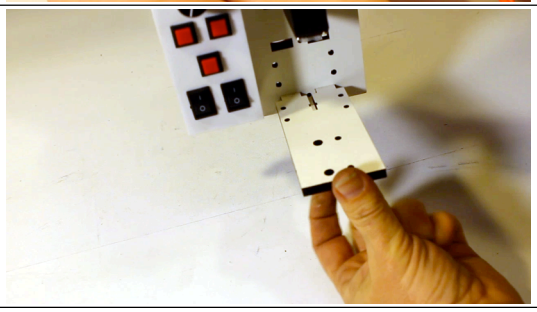
Print the control box face down. Support will be needed for the mounting tabs. The walls are thin enough that the perimeters should cause it to print solid.	
It's best to print the Drive Gear along with other objects so the small layers have time to cool.	
Depending on the printer, it might be a good idea to keep the speed down on the Spool Gear so there is no overshoot when printing the teeth of the gear. There is a single layer face across the middle which is there to make it possible to print an overhanging ridge. Trim it out with a hobby knife.	
The Spool Hub also has a single layer face in the middle, which should be trimmed out.	
The Support Base should be printed solid. The holes might need to drilled with a 3mm bit, depending on the printer and its calibration.	
The Support Bar doesn't need to be solid, but should have a minimum of 4 perimeters.	

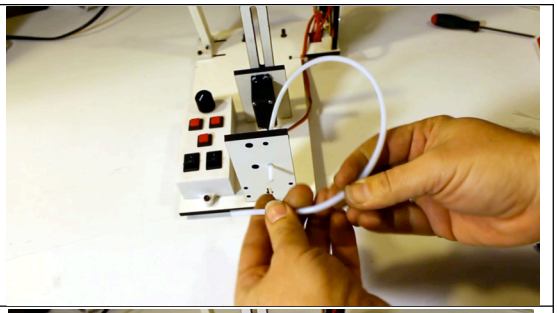
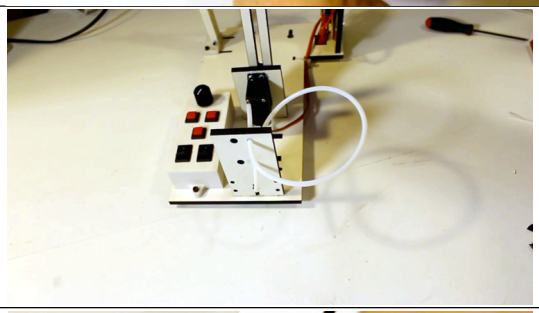
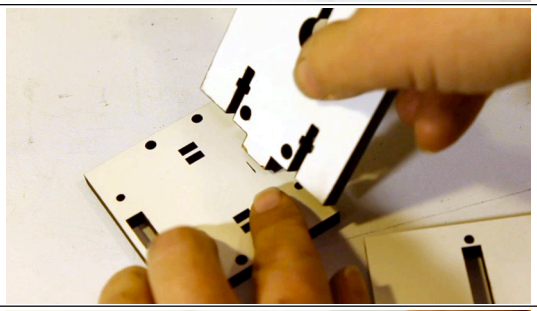
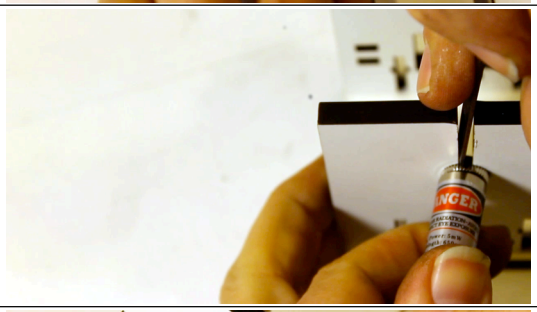
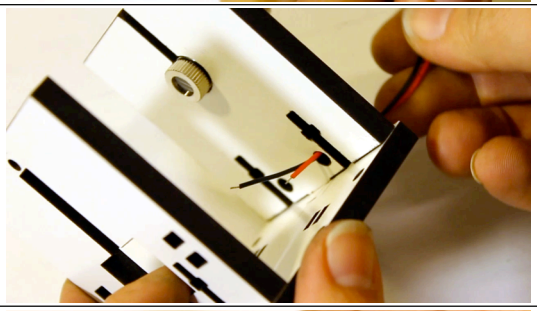
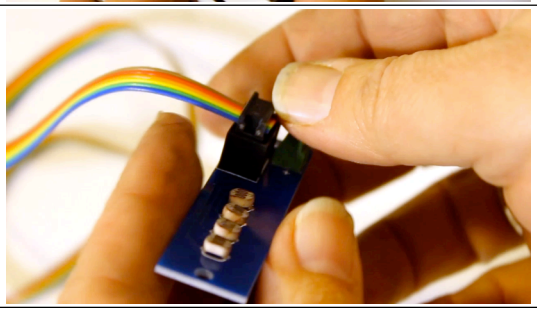
Peel the masking tape from both sides of all of the laser cut pieces. If any soot remains on the white surface it can be wiped away with acetone. Pick up the motor mount and the gear motor with the thick part of the motor near the top. Put the shaft through the large hole and turn the motor until the holes in the motor line up with the slots.	
Use two M3x10 screws through the slots to secure the motor. Tighten them down enough to hold it on, but loose enough to slide in the slots.	
Put a hex nut in the slot on the back of the small drive gear and screw a M3x10 into it just enough to catch a few threads.	
Slide the drive gear on to the motor shaft with the nut facing the motor and positioned over the flat of the shaft. Tighten the screw the rest of the way so that it just contacts the flat of the shaft. If you over tighten, once the screw can't go any further through the nut, the nut will instead rise up and break out of its slot.	
Use 4 M3x12 screws to mount the control board with the hall sensor (the little black square at the edge) pointing toward the motor.	
Thread a M8 nut a few cm onto the threaded rod and add a washer. Put the rod through the hole below the motor and add a washer and M8 nut on the other side.	

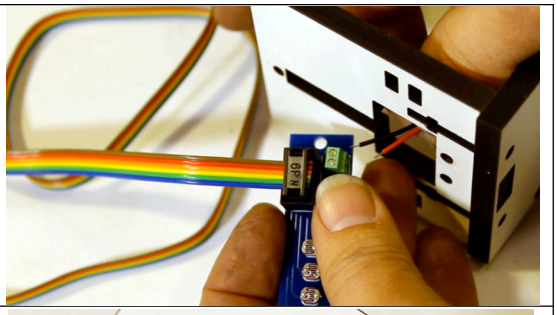
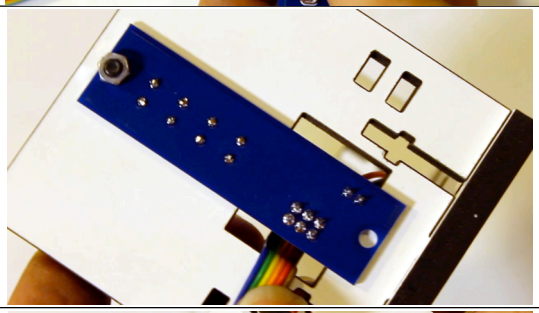
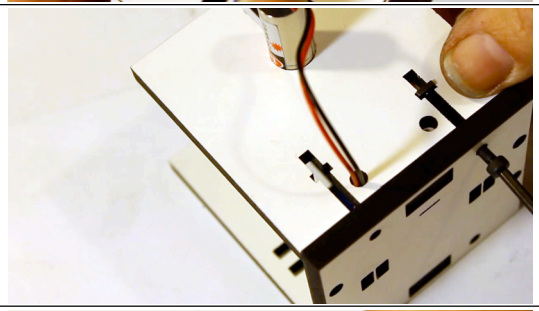
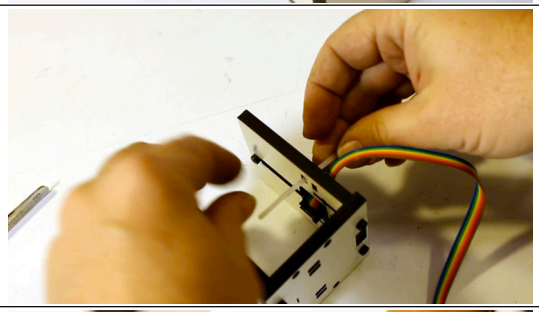
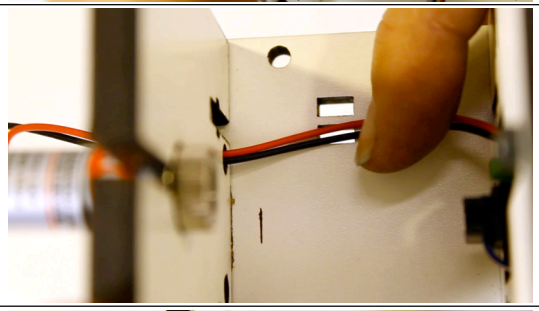
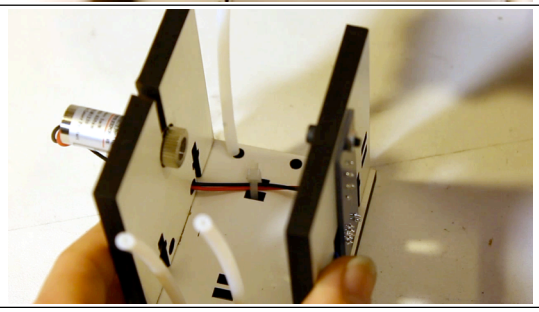
Slide the tabs on the bottom of the motor mount into the slots at the side of the base. It will be a very tight fit, but applying steady pressure and a little sideways rocking will get it to slide in.	
Put a finger under the nut trap and drop a square nut into it. Slide a M3x25 screw through the hole at the bottom of the base into the slot, and thread it through the square nut. Tighten it just enough to be secure. Over tightening could crack the wood.	
Put bearings into the front and back holes of the spool gear.	
Put the magnet on the table and flick it a few times so it spins freely and is able to orient itself to the earth's magnetic field. Make note of the face that points north, perhaps coloring it with a marker. Place the magnet in the small hole on the flat side of the spool gear with the marked pole facing outward. Don't glue the magnet in until you have tested it and are certain the correct pole faces outward.	
Slide the spool gear onto the rod. Note that if you plan to use a spool with a 80mm hub you may need to add a washer between the nut and the spool gear to keep the spool from catching on the electronics. Loosen the motor screws so it can slide down to engage the drive gear with the spool gear. Adjust the position of the drive gear on the motor shaft to line them up if necessary. Tighten the motor screws.	
Mount the support base in the slots across from the motor mount using two M3x16 screws. Use the holes in the base that are not next to the hinge. Use a M3x25 screw to attach the support arm to the base, keeping it loose enough to turn freely.	

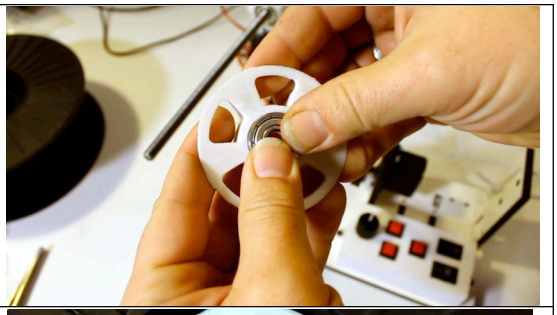
Place the servo mount onto the front of the servo with the wire pointing down and secure it with four M3x12 screws.	
Slide the servo mount into the slots nearest the motor mount. Use a square nut and M3x25 screw in the T-slot to hold it in place.	
Take the cross shaped servo arms and sharp Phillips screws from the servo pack. Use the screws to mount it to the slots at the bottom of the laser cut guide arm with the socket facing away from the wood.	
	
Slide the socket of the servo arm onto the white servo hub and test the guide's range of motion. The guide should turn far enough to touch the base on both sides. Keep adjusting its placement on the servo hub until it does, and secure it with the short screw from the servo pack.	
Take the pre-crimped wires and cut them in half. Strip the insulation a few mm from the cut ends.	

Twist the strands until they are tight together and give them a bend. Hook the wire into the hole in the terminal of the button and bend it over.	
Put a dab of solder on the wire to secure it to the terminal. You can choose to use different colored wires for each terminal, but the polarity doesn't matter. Do the same for the each of the other buttons and switches	
For the potentiometer, use one color for the left and right pins and a different color for the middle pin. Attach the wires with a dab of solder, keeping the iron in contact for as short a time as possible. It is possible to overheat the potentiometer and ruin it, so if the solder doesn't melt on contact with the tip, take the iron away and wait a few seconds before trying again.	
Slide the crimps for the buttons and switches into the 1x2 housings. The open side of the crimp faces the side of the housing with the holes. Push them in until they click. Slide the crimps from the potentiometer into the 1x3 housing taking care that the middle wire from the pot goes into the middle position in the housing.	
You can quickly twist the wires by lightly chucking the housing into a drill and spinning it.	
Push the buttons and switches into the control box. Mark the wires with tape, or by writing on the housing so you can identify them at the control board. L for Left, R for Right, C for Center, A for the Auto switch (on the left) and P for the Power switch on the Right.	

Insert the potentiometer through the hole from below and secure it with the thin nut. Slide the knob onto the shaft of the potentiometer. This is an important point as I've found that the servo can behave erratically when the potentiometer is turned with the bare hand.	
Mount the control box to the base with two M3x16 screws. You can run the wires through the hole under the base, or up through the notch next to the box to run them over the base if preferred.	
If the wires are run under base, take them up through the hole in the base below the control board. The small hole near the inside corner of the base is for attaching a zip tie to secure the wires. Stick the clear adhesive bumpers to the four corners of the bottom of the base to provide clearance for the wires and screw heads.	
Plug R into Guide Min, L into Guide Max, C into Sensor Cal, A into Auto. Plug the servo into Servo with the brown wire at the bottom. Plug P into PWR on the right side of the board and plug the potentiometer into Knob. If, when first operating the winder you find the knob is working backwards, flip the plug over.	
Put the crimps for two wires into a 2x1 housing, and plug it in to the headers marked Motor. Cut the wires to the length needed to reach the motor and strip the ends. Hook the bare wire through the motor terminals and tack them down with some solder. It doesn't matter which terminal the wires go to. If the motor turns the wrong direction, plug it in with the other wire on +.	
If you will be operating the winder mounted vertically to the wall, insert the intake plate into the slots and secure it with a square nut and M3x25 screw in the t-slot. If the winder will sit horizontally, mount the intake plate flat to the base with two M3x16 screws.	

Cut 12-14” (35cm) of 4mm PTFE if you will be extruding 1.75mm filament. Push one end down through the hole closer to the bottom of the plate, and up through the hole near the top of the plate.	
If you will be extruding 3mm filament, do the same with the 6mm PTFE in the larger holes.	
Begin building the sensor by pushing the laser mount into the slots which have a small line scored near them. Push the sensor mount into the slots on the other side.	
Place something like a flat head screwdriver into the slot at the top of the laser mount and use it as a lever to widen the gap as you push the laser into the hole. When the laser is far enough in for the focus ring to be past the other side, release the lever so the mount grips the laser.	
Run the laser wires through one of the holes near the t-slots and through the center of the sensor mount.	
Plug one end of the ribbon cable into the sensor mount, and the other end into the control board.	

Use a tiny flat head screwdriver to loosen the screws on the terminal block. Insert the laser wires with the red one on the left and tighten the terminals down.	
Mount the sensor to the back of the plate with M3x12 screws, and run the ribbon cable across the back.	
Secure the laser and sensor mounts with square nuts and M3x25 screws in the t-slots.	
Use a zip tie to secure the ribbon cable to the back of the sensor plate.	
Use another zip tie to secure the laser wires to the base. Stick the soft foam bumpers to the four corners of the underside of the base. They will keep the sensor from getting dragged around by the ribbon cable.	
Cut the remaining 4mm PTFE into 4 pieces and put them into the holes at the sides of the base. These will guide the filament through the sensor.	

Put the last bearing into the flat side of the spool hub.	
Push the spool up against the spool gear and hold it from the other side with the spool hub. Tighten an M8 nut up against the spool hub with pliers. It should be tight enough that the spool won't slip if the filament gets a little hard to pull, but will slip if it hits a kink that will not go into the tube.