

# HOW TO MAKE AN SCP ACTUATOR

POOJA PATEL

## 1. MATERIALS

1. Sewing Thread Shieldex 235/34 dtex 4 ply + HCB (PN: 20012123535HCB).
2. DC power source.
3. paper clips.
4. weights (100 grams).
5. stand clamp.
6. Stepper Motor NEMA-17 size - 200 steps/rev, 12V 350mA.
7. jumper cables.
8. ESP 8266.
9. breadboard.
10. 3D printer.

## 2. PROCEDURE

### 2.1. Uploading the Code.

Upload the attached code to the ESP 8266 and use the image as a guide to connect the stepper motor to the appropriate pins using the breadboard.

### 2.2. Assembling the setup.

Use the attached solidworks file to 3D print a part to fit onto the motor shaft and a part to prevent rotation of the weight. Then press fit the motor shaft attachment appropriately.

### 2.3. Coiling the Thread.

Measure a length of the sewing thread that is 4 times the length of the desired coil length. Attach both ends of the thread to paper clips. Attach one end to the motor shaft attachment and the other end to the 100 gram weight.

Powering the motor at 12 V and the ESP with a 5V USB cable, begin the coil insertion process. Stop the coiling once the entire thread is coiled according to visual inspection.

### 2.4. Annealing the Thread.

Ensure that the coiled thread does not uncoil. Attach the alligator clips to the paper clips such that the current through the actuator is 0.30 A. Perform 12 cycles of on for 30s and off for 30s.