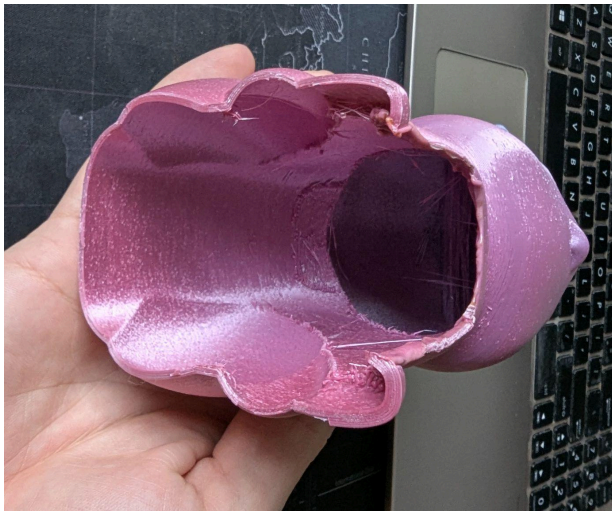
1. Preparation and Procurement

3D Printing Guidelines

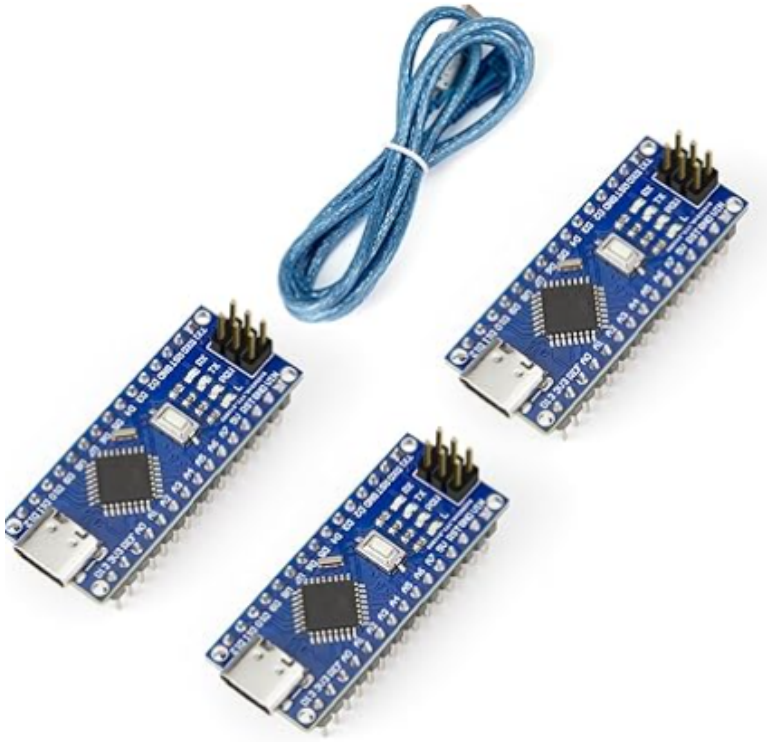
The structural components must be printed with specific settings to ensure the internal mechanisms fit correctly.



- **Cat Paws/Arms:** The paws should be oriented with the paw pads on the print bed. This creates an approximate 30° to 45° angle. These settings have been verified to print successfully on entry-level hardware, such as the Anycubic Kobra Neo.
- **Infill Requirements:** It is mandatory to set the **infill to 0%** for the cat model. Printing with any infill will render the project non-functional, as the internal volume must remain hollow for the hardware components.

Equipment Acquisition

- **Bulk Purchasing:** Most required components are sold in sets. While it is possible to build a single unit, the quantity of parts provided in standard sets makes it highly efficient to produce three units simultaneously.



2. Software Implementation

This section details the requirements for the dual-layer code configuration. You must deploy two distinct files to synchronize the hardware with your computer's input.

Arduino Configuration (Microcontroller)

The Arduino handles the physical motor logic based on signals received from the computer.

- **Pin Assignments:** The code is configured to use **Pin 9 and Pin 10** for controlling motor speed and direction.
- **Variable Adjustments:** Users can modify the run time and motor speed variables located at the beginning of the script to suit their specific mechanical resistance.

Python Configuration (Host Computer)

The Python script monitors keyboard activity and sends commands to the Arduino.

- **Communication Port:** The script is currently set to **COM4**. You must update this variable to match the specific port your Arduino is assigned to on your machine.
- **Baud Rate:** The data transfer rate is set to **9600**. This can be adjusted if you are performing serial monitoring or testing before final implementation.
- **System Customization:** This code was originally developed for a laptop with an integrated keyboard. If you are using a USB-based external keyboard, the script may require minor modifications. It is recommended to use an LLM (such as Claude) to assist with these specific system augmentations.

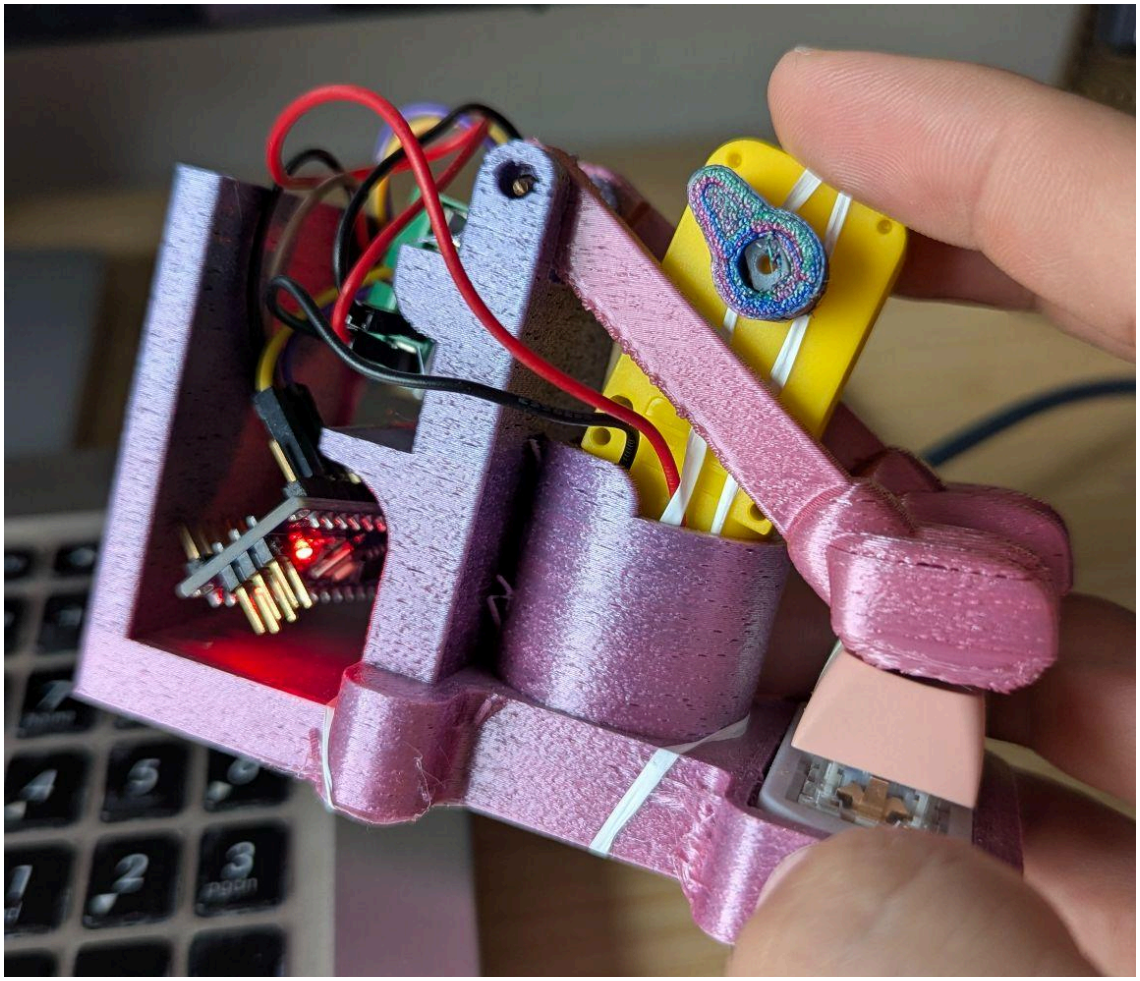
3. Mechanical Assembly and Modification

This phase requires manual adjustments to the 3D-printed components to accommodate the internal hardware. These solutions are hobbyist-grade and prioritize functional integration over aesthetics.

Model Preparation

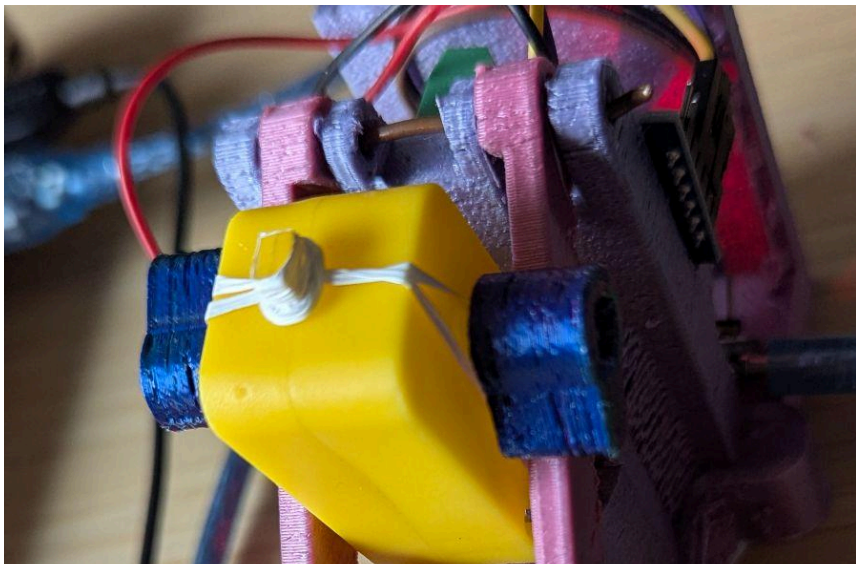
The cat model must be modified to serve as a housing for the electronics.

- **ZERO INFILL:** It is imperative that the cat is printed with **ZERO INFILL**.
- **Base Removal:** Because the model is printed with no infill, you should be able to manually pull off the bottom layers of the print to leave the entire internal cavity hollow and open.
- **Stomach Excavation:** Using a soldering iron, cut out the stomach section of the cat. Follow the pre-designed indent on the model as a guide. It is recommended to cut conservatively; you can always remove more material later, but you cannot replace it.
- **Cable Routing:** Once the structure is assembled, identify where the Arduino USB cable exits. Use a soldering iron to cut a custom pocket in the cat's shell for the cable to pass through, allowing for a more compact footprint.

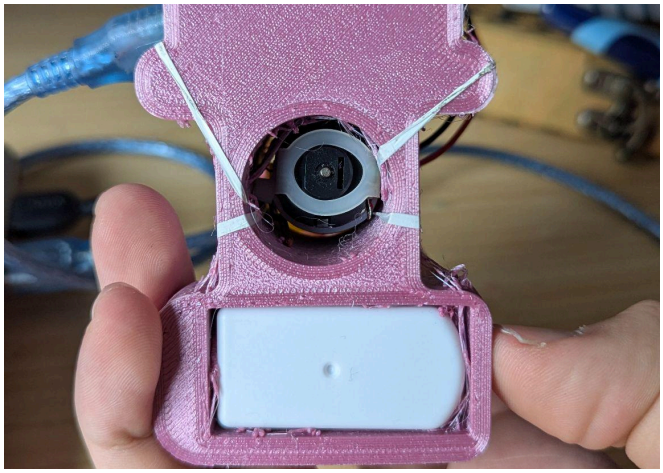


Motor Stabilization

During operation, the force of the keys typing creates upward pressure that can dislodge the motor from its housing.

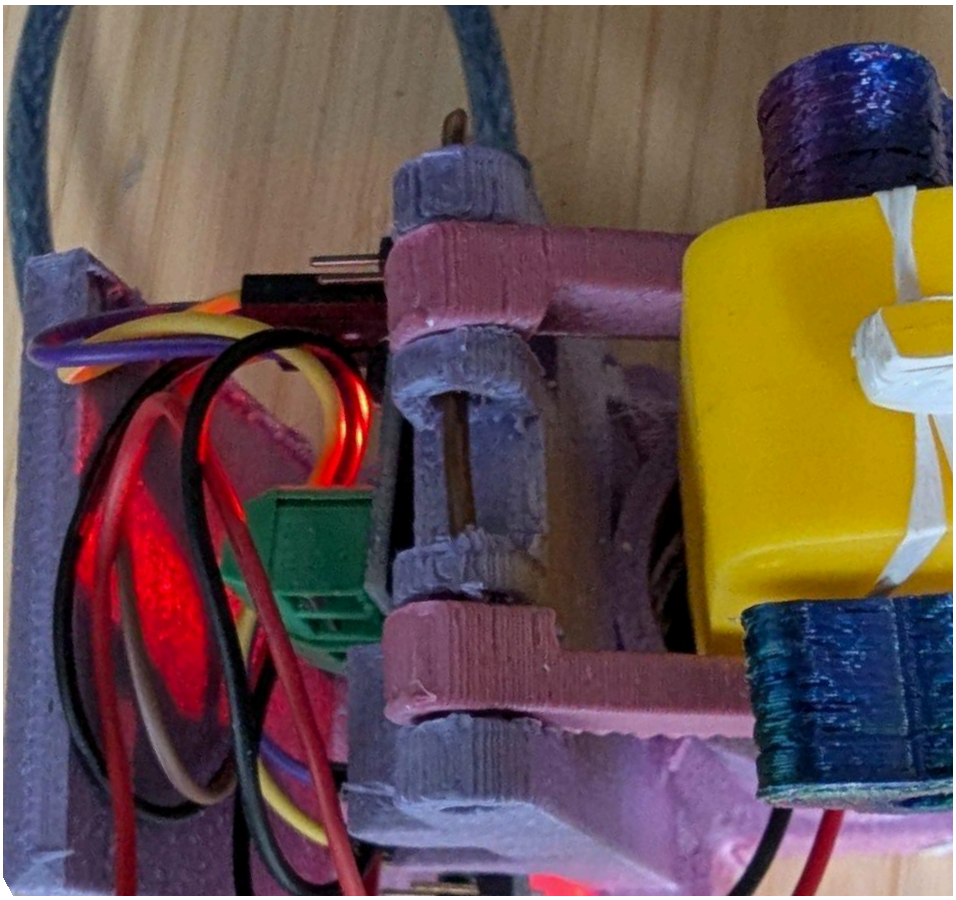


- **Floss Tie-Down:** To secure the motor, thread high-strength floss through the hole at the top of the motor. Pull the floss down into the motor cavity and tie it securely to the main structure.
- **Range of Motion:** This tie-down method prevents the motor from lifting out of the pocket while still allowing necessary side-to-side flex.
- **Cam Adjustments:** If you wish to reduce side-to-side swing, you may adjust the size of the cams. However, ensure the center bore of the cam remains compatible with the motor pegs; changing the internal diameter will prevent proper fitment.



Final Integration

- **Arm Hinge:** The arms are connected to the main body using a hinge mechanism. Insert a **16-gauge wire** through the arm holder to act as a dowel for the hinge.
- **Wiring:** Route the wires through the internal cavity toward the Arduino. Most remaining structural components are designed for a press-fit connection and do not require additional fasteners.



5. Troubleshooting

While the assembly is straightforward, the following points address common challenges encountered during development and testing.

Scaling and Dimensions

The files provided are intended to be scaled correctly for the internal hardware. However, due to variations in 3D printer tolerances:

- **Fitment:** If the components do not mesh correctly, minor scaling adjustments may be required in your slicer.
- **Iterative Printing:** Expect some trial and error with printing and re-printing to achieve the perfect fit for your specific motor and structural components.

Motor Stabilization and Torque

One of the primary challenges is the inconsistency of motor output caused by physical resistance. When pressure is applied to the keys, the motor tends to twist clockwise or counter-clockwise within its housing.

- **Secondary Stabilization:** To combat this twisting, a **16-gauge wire** can be inserted into the side of the motor housing to provide additional lateral support.
- **Alternative Adhesives:** For a more permanent solution, hobbyists may use glue or mounting putty to further secure the motor against the torque generated during typing.

Support and Contact

This project is the result of significant testing and refinement. If you encounter issues not covered in this guide or have specific questions regarding the assembly of your Typing Buddy:

- **Reach Out:** Feel free to contact the developer personally for assistance. I will do my best to help you troubleshoot your specific system and hardware configuration.