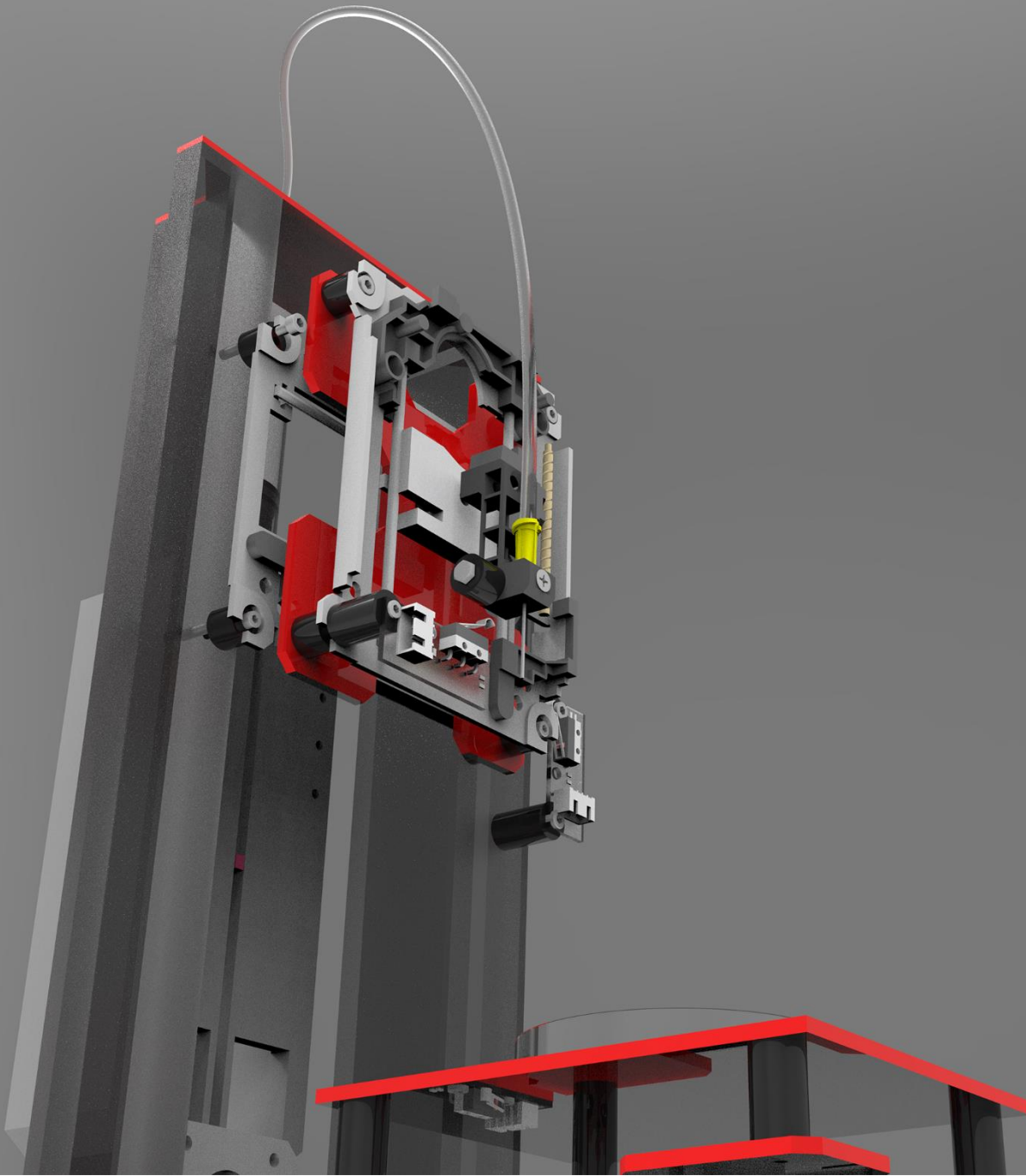


BIO-PT

ASSEMBLY GUIDE

DR. ISLAM SALAMA



إسلام

ABOUT THE PROJECT

Bio-PT: Open-Source 3D Bio-Printer V1.2

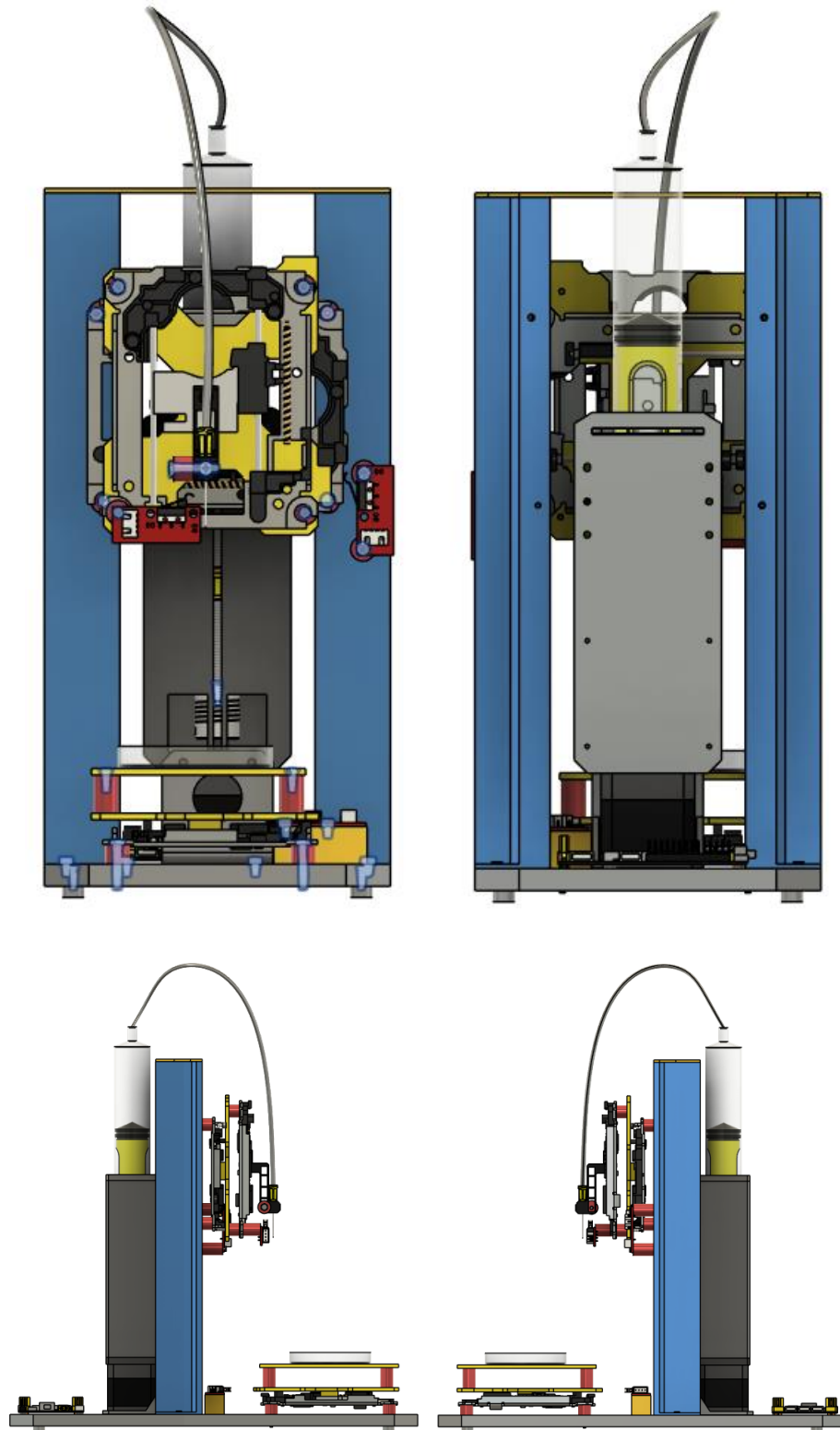
Bio-PT is an affordable, open-source 3D bio-printer designed to make bio-printing accessible to students, researchers, and makers worldwide. Built primarily from recycled materials and commonly available components, Bio-PT aims to reduce e-waste and carbon footprint while providing a powerful platform for bio-printing research and prototyping.

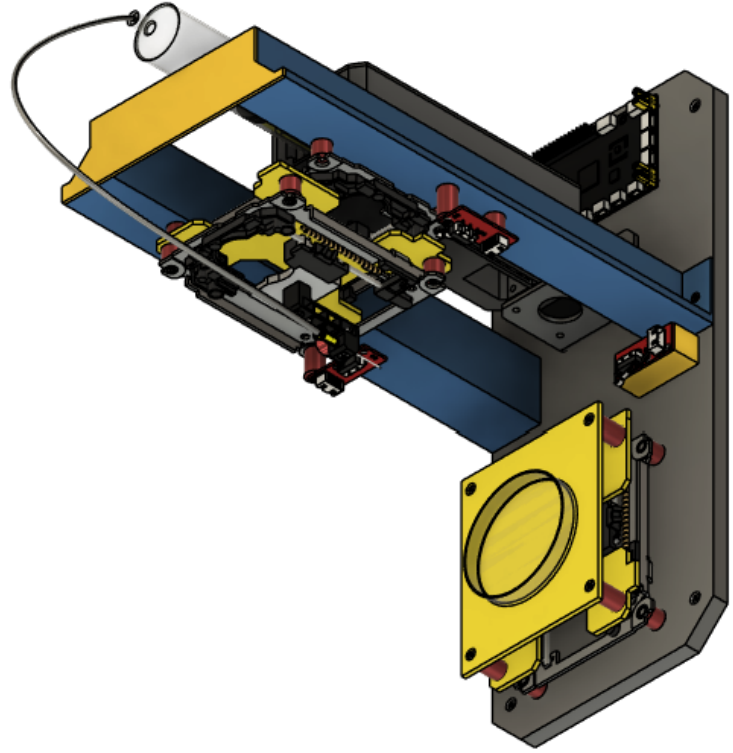
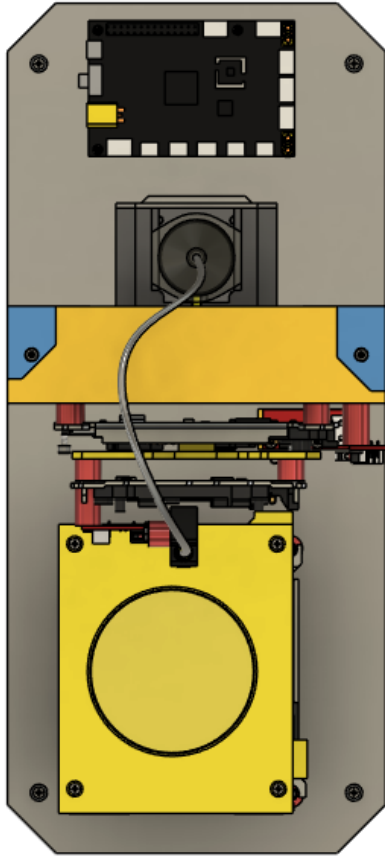
The Bio-PT operates using a modified version of Marlin firmware (1.1.9), termed **Bio-Marlin**, which enables the printer to work efficiently with an indirect syringe pump. The design uses CD-ROM drive motors, a 3D-printed frame, and an indirect extrusion system to minimize costs and weight on the X and Z axes.

FEATURES

- **Affordable:** Bio-PT is designed with low-cost components, making bio-printing accessible for academic and hobbyist purposes.
- **Sustainable Design:** The frame and majority of components are 3D-printed or sourced from recycled materials, reducing e-waste and overall cost.
- **Indirect Syringe Pump Extruder:** Lightweight, indirect extrusion reduces load on the X and Z axes, improving performance.
- **Modified Firmware:** Bio-PT runs on Bio-Marlin, a version of Marlin firmware modified to accommodate bio-printing needs.
- **Compatibility:** Works with RAMPS boards and MKS boards with built-in IC drivers.

PROSPECTIVE









BILL OF MATERIALS

Part	Quantity	Notes
3D Printed Frame	1 set	All parts are printable using standard FDM printer
CD-ROM Drive Motors	3	Used for X, Y, and Z axes
M3 x 6mm Fasteners	40	Available from any hardware store
M4 x 4mm Fasteners	5	Available from any hardware store
M3 Washers	15	Available from any hardware store
RAMPS or MKS Board	1	Open-source controller board
S.Pump Lead Screw M6 X16cm	1	Indirect extruder system
Nema 17 Stepper motor	1	For syringe pump extruder
IV Tube	1	For syringe pump extruder
60 mm syringe	1	For syringe pump extruder

PREPARING PARTS

Parts to be 3D printed

please check the folder “STL for print “after downloading the files from github

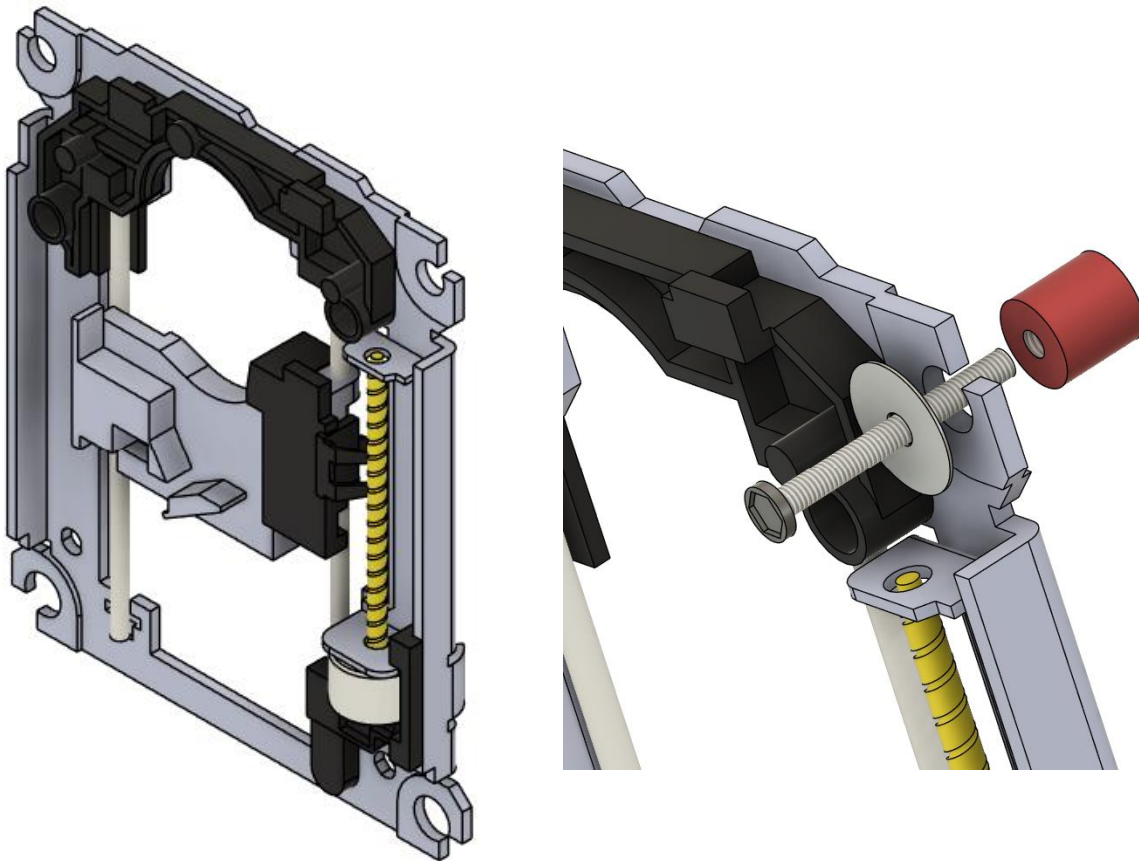
 STL For Print	11/10/2024 10:16 PM	File folder	
 Assymble docs	11/12/2024 2:09 PM	Microsoft Word D...	3,340 KB
 Bio-PT 3D bio printer	11/10/2024 12:50 PM	Autodesk Fusion 3...	12,482 KB
 BioPT 3D bio printer	11/10/2024 12:49 PM	BambuStudio	6,988 KB

COMPONENT NAME	NUMBER OF PRINTS	RECOMMENDED MATERIAL	NOTES
Extruder Files			
Main frame outer cover	1	PLA	
Main frame	1	PLA	
Nema 17 Bracket Base	1	PLA	
Plunger	1	PETG , PLA , CF	
Printer Files			
Axis plate	2	PETG , PLA , CF	For Y and Y
Base	1	Acrylic , PLA	Can be cut in 5 mm acrylic
Bed	1	PETG , PLA , CF	
Legs	4	PLA	
Long spacer	8	PETG , PLA , CF	
Rail 1	1	PETG , PLA , CF	
Rail 2	1	PETG , PLA , CF	
Short spacer	13	PETG , PLA , CF	
Upper Plate	1	PLA	
Y axis switch block	1	PLA	

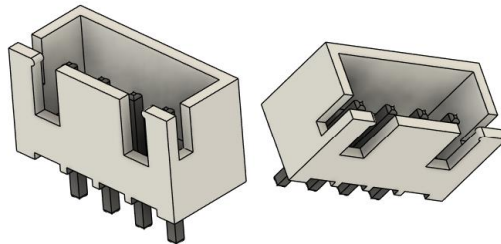
Please note: Components mounted on the printer’s axes are best printed with lighter yet stronger materials to safely enhance the printing speed. I recommend using nylon reinforced with carbon fiber filament and reducing the infill density to minimize weight. However, printing with this type of filament may not be feasible on standard printers, so I suggest conducting research on infill percentage and infill patterns to achieve the strongest parts at the lowest possible weight.

CD Room Driver motors

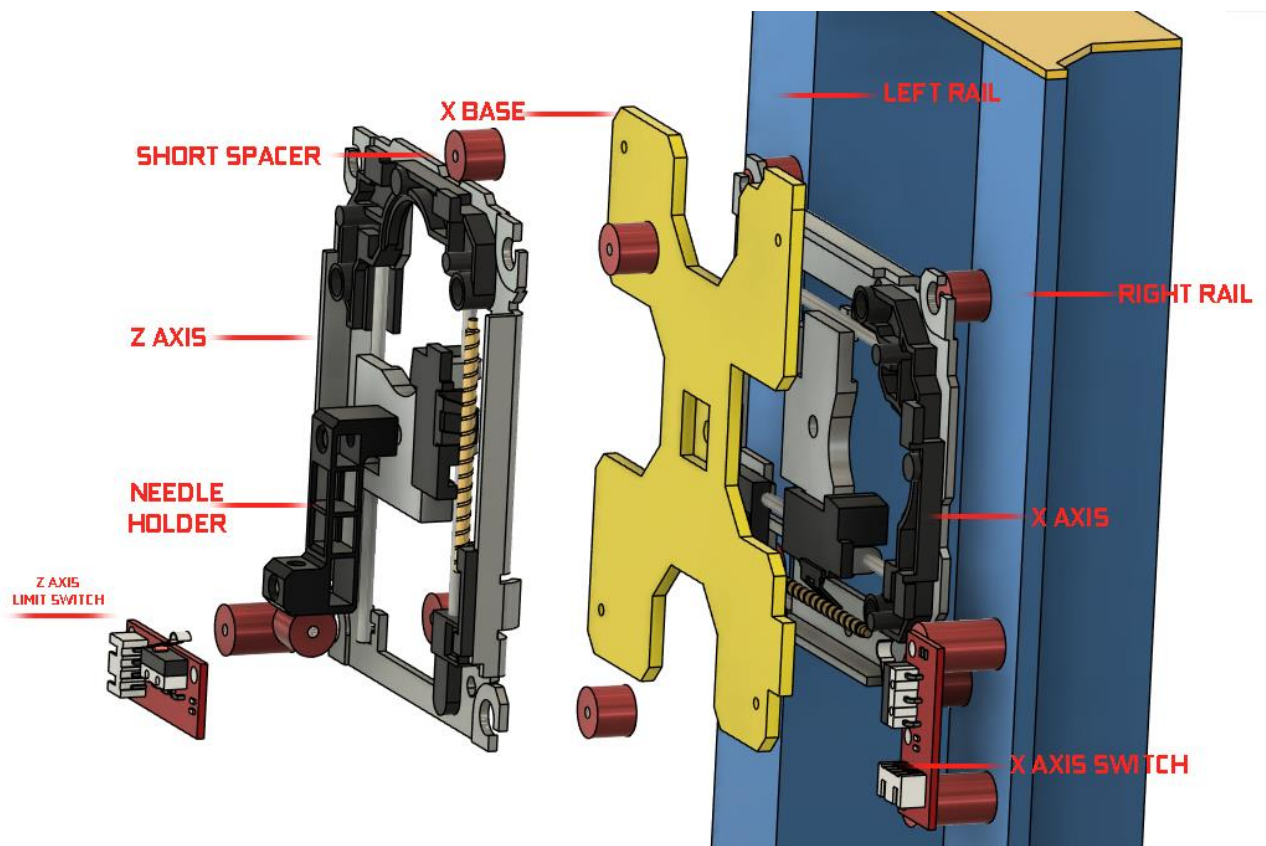
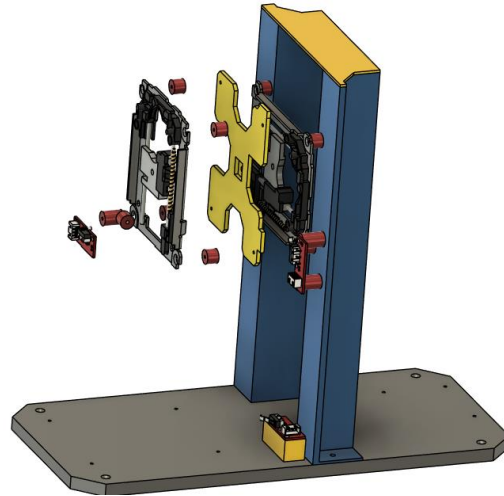
All CD-ROM drives use small stepper motors that offer sufficient torque for compact 3D printer applications. However, these motors lack the power required to directly drive a large extruder with a NEMA 17 stepper motor, which is why this project incorporates an indirect extrusion mechanism. For this build, we will need three CD drive motors, which can be sourced from old computers or scrap hardware stores. Most CD-ROM drives have a similar size and footprint, though slight variations may exist in some models. These differences should be taken into account during the assembly process, as adjustments may be necessary. For instance, you might need to slightly enlarge the rail holes to ensure proper leveling and alignment for the printer.



Please note: CD drive motors need wires soldered with XH JST 2.54 connectors to enable easy connection to the controller board.



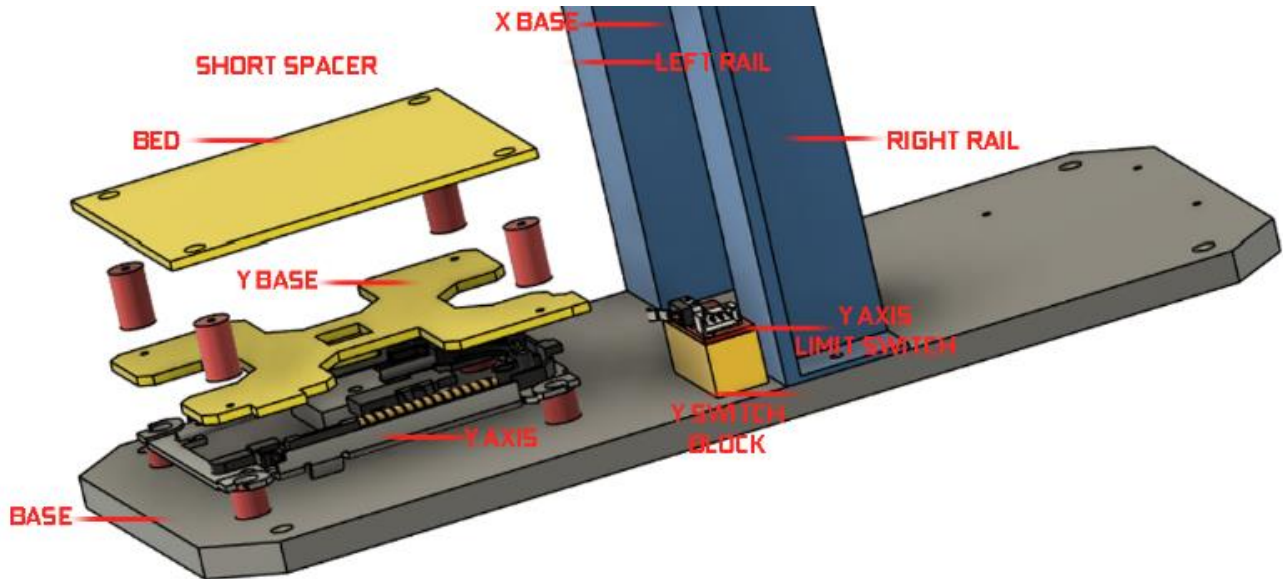
ASSEMBLE PRINTER X , Z GANTRY



Assemble Y Axis

all printer components use 3mm fasteners, except for joining the X and Y plates to the CD drive and attaching the needle holder to the Z-axis, which may require M4 or M5 fasteners.

Please note: Between the bed and the Y base, you can use springs and thumbscrews instead of long spacers. This setup allows for more precise bed leveling.



SYRINGE EXTRUDER ASSEMBLE



REAL WORLD ASSEMBLE PROTOTYPE

