

The root directory for PhysHall on the Qosain cloud is:

[Type B / PhysInstrument / PhysHall /](#)

### Mechanical Part:

These files are to be printed on the FDM printer. You are supposed to put x3g files in the printer SD card, these **x3g** files can be found at [...Machining Packages / Minimal](#) directory and the **3mf** project files of **Ultimaker Cura** can be found at [...Machining Packages / Source](#) directory. You can also find the CAD files in the [...R&D Files](#) directory. Following is the list of files you will need to print for PhysHall:

Part	File name (x3g)	No. of Parts in one x3g file	Printing time	PLA length (m)
PhysHall Bottom	Hall_Sensor_Casing_6.x3g	6		
PhysHall Top	Hall_Sensor_Cap_6.x3g	6		

Part	File name (x3g)	No. of Parts in one x3g file	Printing time	Resin Quantity (ml)
PhysHall Angle Adjuster	PhysHall_Angle_Adjuster_x5.pws	5 pairs	1 hour 44 minutes	6.56

Print both parts, do proper finishing with files (.). Now the parts will look like:

### Electrical Part:

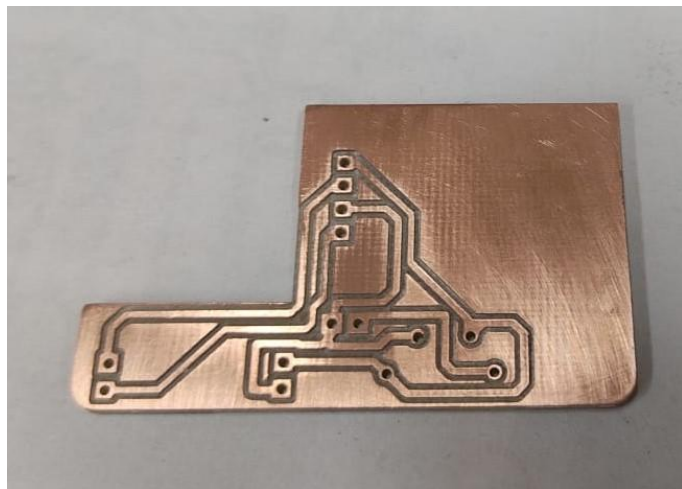
## PCB Routing:

The complete PCB designing is performed using proteus 8.11 version, so you will need 8.11 or later version to open the project file. All these router files are located at [...Circuits / Minimal](#) directory and the proteus project file is located at [...Circuits / Source](#). Following is the list of files you will need:

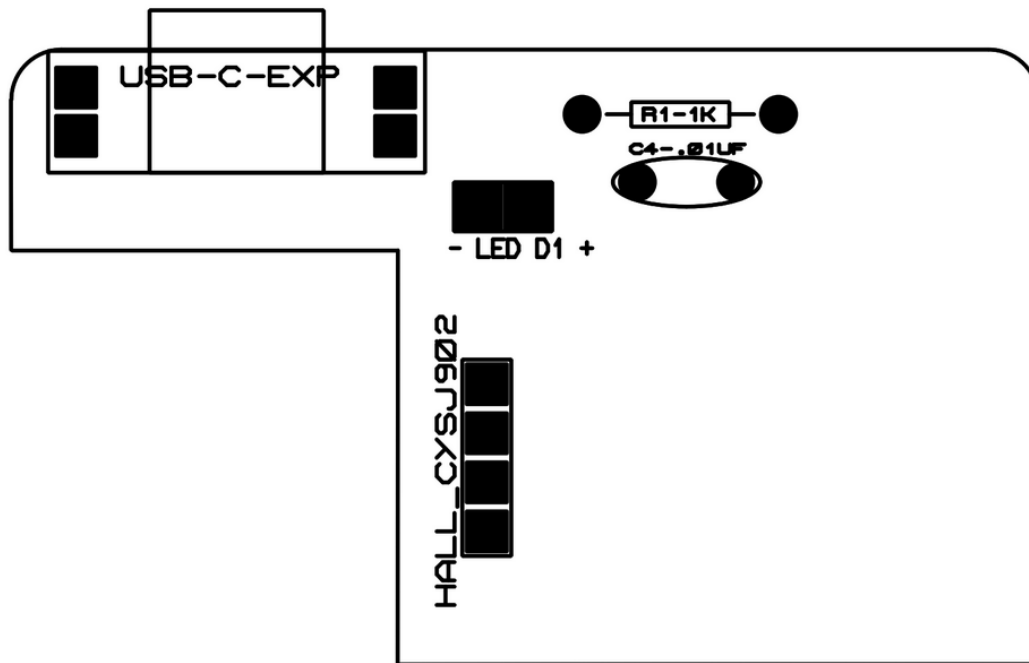
File name	File description	No of PCBs in each file
PhysTherm.pdsprj	Proteus project file	1
Hall_Probe_PCB_Mill_12.plt	Mill file for PCB router	12
Hall_Probe_PCB_Drill_1mm_12.DRL	1mm Drill file for PCB router	
Hall_Probe_PCB_Edge_12.plt	Edge file for PCB router	

After leaving the PCB router, a PCB unit will look like this.

It is necessary to rub these PCBs with sandpaper (use the smallest grit size sandpaper available, P220 grit size will be fine)



For the components placement, refer to the image bellow,



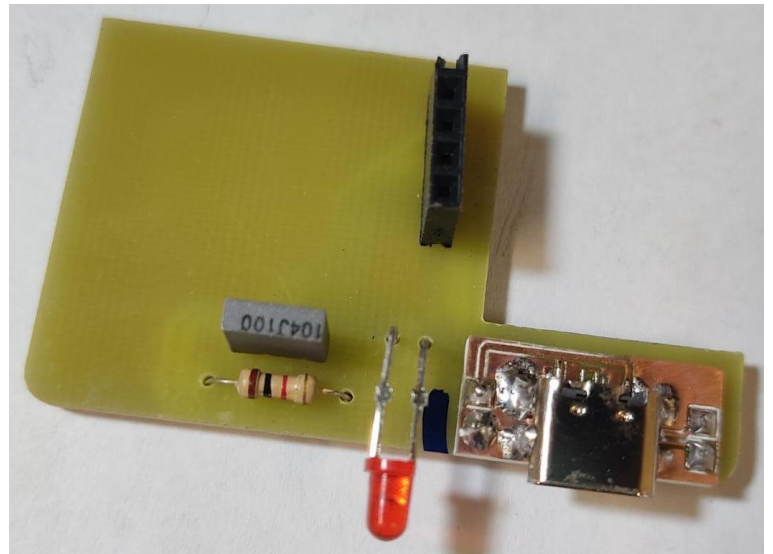
The list of all the electrical components is provided in **Appendix-A**.

### Soldering:

Now you need to solder the components on the PCB.

The USB C PCBs that are available here have headers attached to them. Looks like:

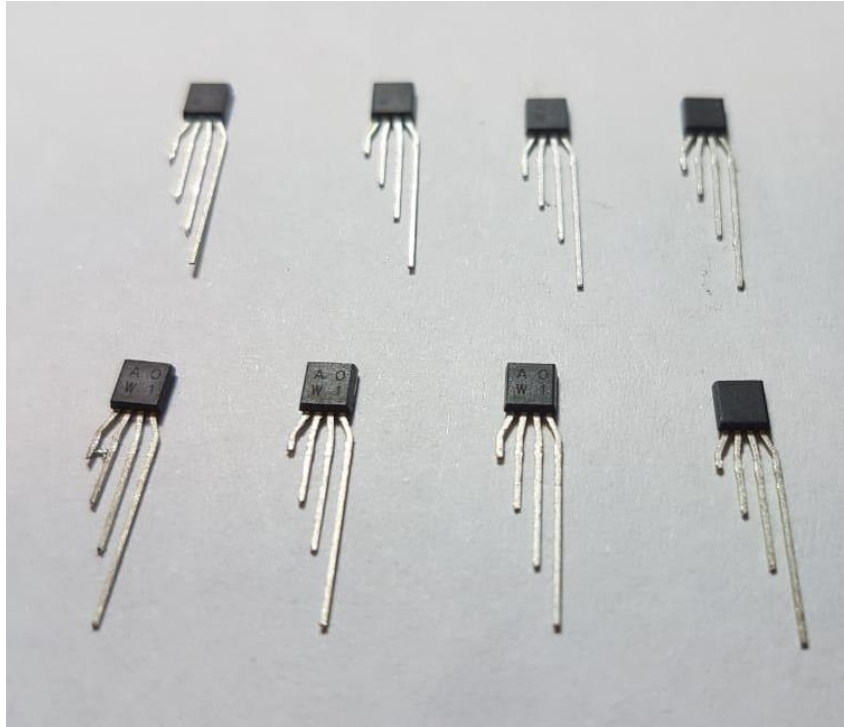
Refer to [...Photographs / PCBs](#) for more photographs.



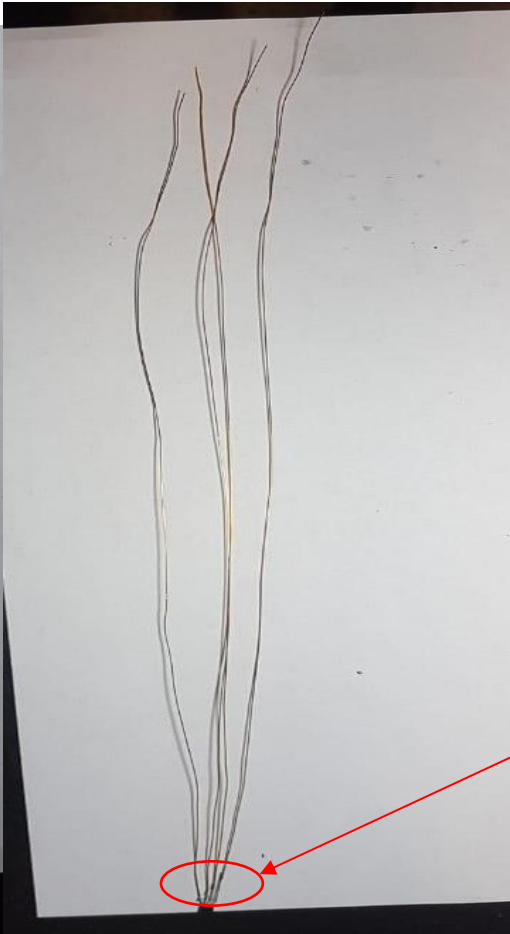
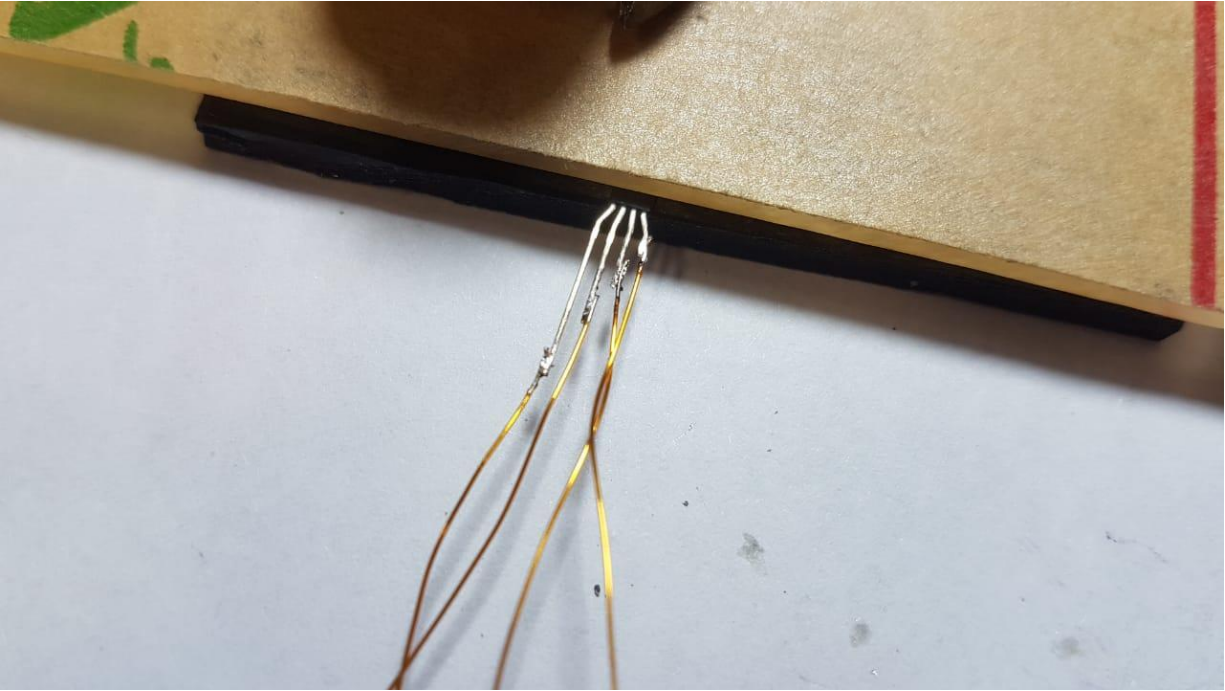
## Assembling:

Assembling the PhysHall is a rather lengthy and tricky part. You need to embed an IC into the hall sensor. So, follow the following steps carefully.

Take the IC and cut its wires in an order, as a result with its face **upwards**, it should look like:

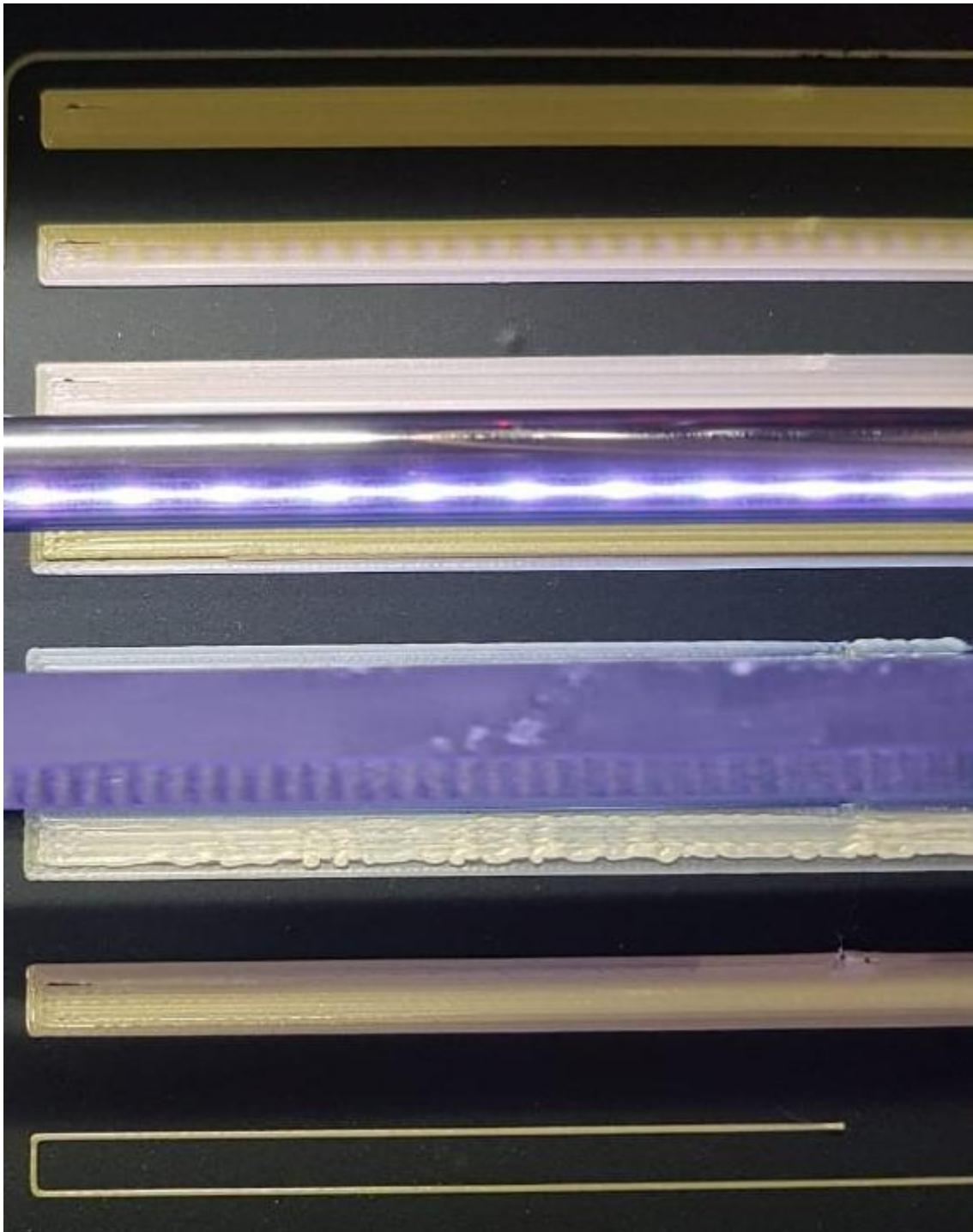


Now solder 4 wires (1 feet length) to the IC legs, so that the other terminals of those wires should also be in the same order. As shown here:



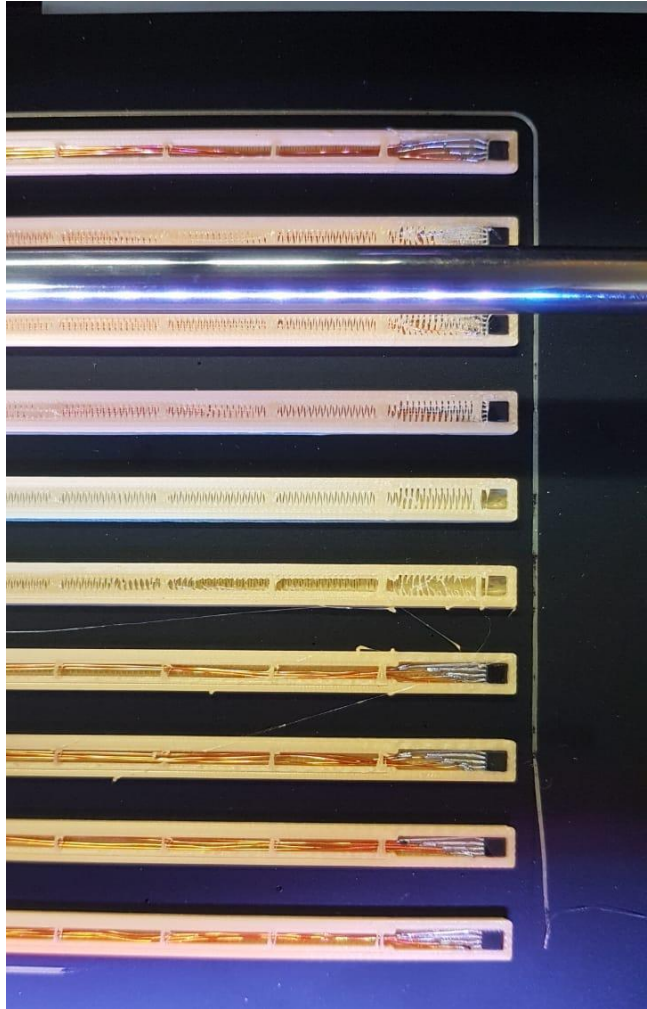
IC

Now while the hall sensor part is printing, you need to first see if the printing is going as expected or not. The printer needs to be calibrated as always. So here is a photograph showing the worst to the best printing:



So, make sure that the printer starts well, as expected. You will have to stand by the printer to see the first couple of layers.

When the printing reaches its mid-point (**indication???**), then in the printer's front panel, select **Change Filament** (selecting **pause Build** will not be useful in our case). Now the extruder will move up and the build plate will come down. Leave the printer as it is, because we don't actually mean to change the filament obviously. Now you need to put the IC with the wires (that you have prepared), in the casing like this:







Make sure that the IC is faced **downwards** in this case. Also check the IC pins for the **shortage**. Bend the wires that are coming out of the other terminal of the casing, beneath the build plate.

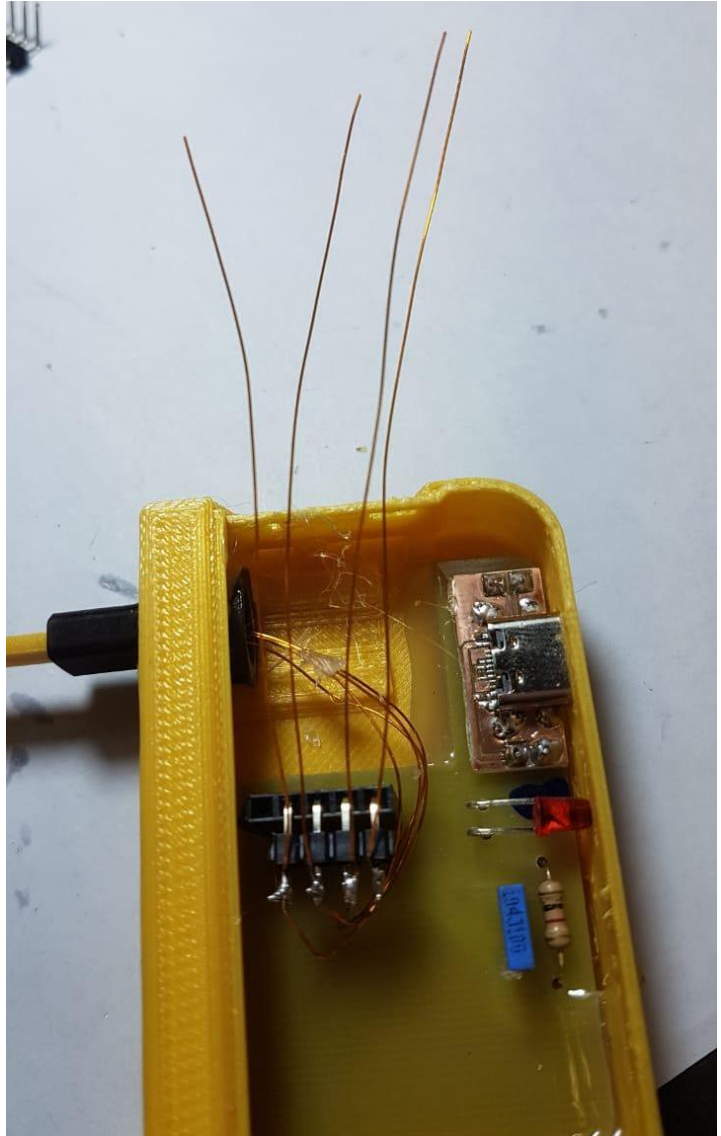
Now resume the printing i.e. let printer know that we have changed the filament.

When the printer finishes up, insert the other end of the sensor (not the end with the IC embedded) into the **Resin printed angle adjusting part**. And fit it in the PhysHall casing.

Now bend the wires carefully in the particular order as shown in the figure bellow:

You can see that the longest wire is at the right most and so on,

Now solder the wires to the male header and cut the residual wires with the cutter.



**Appendix A:**

<b>Bill of Materials for PhysHall (Electrical)</b>		
<b>Item name</b>	<b>Count</b>	<b>Cost (Rs)</b>
.01uF Capacitors	1	2
1k Resistors	1	0.8
LED-RED	1	1
4 pin Female Connector	1	2
HALL_CYSJ902 IC	1	200
USB-C-Exp	1	25
PCB size for 12 PhysHall PCBs	(176 x 99) mm	115
Total		240

For 3D printing:

<b>Bill of Materials for PhysHall (Mechanical)</b>			
<b>Part</b>	<b>No. of Parts in one x3g file</b>	<b>PLA length (m) per x3g file</b>	<b>Cost (Rs)</b>
R Probe Bottom	6	21 m PLA	230
R Probe Top	6	12 m PLA	130
PhysHall Angle Adjuster	5	6.56 ml resin	150
<b>Total cost for the lot</b>		510	
<b>Total calculated cost for one unit</b>		85	

<b>Total cost for a PhysHall unit</b>	<b>325 Rs</b>
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