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Version	Description of Change	Name	Date
1.0	Initial	Prabhat Gaikwad	2023-07-10
2.0	Updated after finalized assembly	Rajat Joshi	2023-07-14

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1 Subject

A pen plotter is a type of computer-controlled device that uses pens or markers to create precise and accurate drawings on paper. This project aims to develop a functional pen plotter using specific components and technologies that showcases the integration of hardware, software, and mechanical components to achieve a specific task.

This document presents the Bill of Materials (BOM) for the pen plotter developed and fabricated by us as a part of our Workshop Mechatronics project. This product combines hardware, software, and mechanical components to create precise and accurate drawings on paper.

The BOM serves as a comprehensive inventory list, detailing the specific components and technologies utilized in the construction of the pen plotter, highlighting their crucial role in achieving the desired functionality and performance.

The Bill of Materials presented in this document provides a comprehensive inventory of the key components and technologies employed in the construction of the pen plotter.

These carefully selected components and technologies are instrumental in achieving the precise and accurate drawing capabilities of the pen plotter, showcasing its exceptional functionality and performance.

2 Bill of Material

Bill of Materials

Item	Description	Material	Source	QTY	Measurement	Unit Price	Total Price
Mechanical Components							
M01	Guiding Shaft 6mm	Steel	University Lab	4	Piece	€ 3.00	€ 12.00
M02	Timing Belt GT2	Nylon	University Lab	1.2	meter	€ 2.06	€ 2.47
M03	M3 Nut	Steel	Hellweg	20	Piece	€ 0.10	€ 1.99
M04	M3 Bolt	Steel	Hellweg	7	Piece	€ 0.09	€ 0.60
M05	M4 Nut	Steel	University Lab	5	Piece	€ 0.10	€ 0.50
M06	M4 Bolt	Steel	University Lab	5	Piece	€ 0.20	€ 1.00
M07	M5 Nut	Steel	University Lab	12	Piece	€ 0.10	€ 1.20
M08	M5 Bolt	Steel	University Lab	12	Piece	€ 0.20	€ 2.40
M09	Wood screw 3.5x30 mm	Steel	Hellweg	10	Piece	€ 0.15	€ 1.50
M10	SS Screws M3x15mm	Steel	University Lab	20	Piece	€ 0.06	€ 1.20
M11	Silicon-Grease		Amazon	5	gram	€ 0.12	€ 0.59
M12	Super Glue		Amazon	10	gram	€ 0.45	€ 4.50
M13	2mm Magnets		Amazon	60	Piece	€ 0.03	€ 1.80
M14	2mm Brass Rod	Brass	Hellweg	0.5	meter	€ 2.39	€ 1.20
M15	Cable tie 2.5x100mm	Plastic	Hellweg	100	Piece	€ 0.02	€ 2.00
M16	Spruce Board 40x45x1.8cm	Wood	Sonderpreis	1	Piece	€ 4.50	€ 4.50
M17	Plastic cable guide	Plastic	Hellweg	2	Piece	€ 0.10	€ 0.20
M18	Fold back clip 32x13mm		Muller	2	Piece	€ 0.20	€ 0.40

Item	Description	Material	Source	QTY	Measurement	Unit Price		Total Price	
M19	6mm LMU-N6 linear bearing		University Lab	6	Piece	€	1.10	€	6.60
M20	Tension spring 15mm	Steel	Hellweg	2	Piece	€	0.05	€	0.10
						Subtotal		**€**	**46.73**
Electrical Components									
E01	ESP32 Board		University Lab	1	Piece	€	3.20	€	3.20
E02	Motor Driver L298N		Amazon	1	Piece	€	3.00	€	3.00
E03	DC Motor 48:1 geared 6V		University Lab	2	Piece	€	4.23	€	8.46
E04	Limit Switch SPDT AC 250V 5A		University Lab	4	Piece	€	1.00	€	4.00
E05	Perf-Board 5x7cm		Amazon	1	Piece	€	2.00	€	2.00
E06	Screw terminals		Amazon	6	Piece	€	0.02	€	0.12
E07	DC Solenoid Electromagnet HS-0530B DC12V 5N		Amazon	1	Piece	€	6.19	€	6.19
E08	OLED 128X64 0.96 Inch Display		Amazon	1	Piece	€	5.50	€	5.50
E09	Adaptor 12V (DC Power)		Amazon	1	Piece	€	16.91	€	16.91
E10	MOSFET Switch		Amazon	1	Piece	€	1.30	€	1.30
E11	49E Hall Sensor		Amazon	4	Piece	€	0.60	€	2.40
E12	DC-DC Buck Voltage Converter		Amazon	2	Piece	€	1.15	€	2.30
E13	Multi strand wires		Amazon	16	meter	€	0.19	€	3.00
E14	Red Push button (18mm)		University Lab	1	Piece	€	1.00	€	1.00
						Subtotal		**€**	**59.38**
3D Printed Components									
P01	Encoder Wheel	PLA	University Lab	2	Piece	€	1.00	€	2.00
P02	GT2 15T Motor Pulley	PLA	University Lab	2	Piece	€	1.00	€	2.00
P03	GT2 15T idler pulley	PLA	University Lab	2	Piece	€	1.00	€	2.00

Item	Description	Material	Source	QTY	Measurement	Unit Price	Total Price
P04	X Axis Idler fixture	PLA	University Lab	1	Piece	€ 1.00	€ 1.00
P05	X Carriage	PLA	University Lab	1	Piece	€ 6.00	€ 6.00
P06	Y Axis Motor Fixture	PLA	University Lab	1	Piece	€ 11.00	€ 11.00
P07	Y Axis Idler fixture	PLA	University Lab	1	Piece	€ 8.00	€ 8.00
P08	Y Carriage	PLA	University Lab	1	Piece	€ 16.00	€ 16.00
P09	Base Board Cover	PLA	University Lab	1	Piece	€ 20.00	€ 20.00
						Subtotal	**€ 68.00**
			Grand total				**€ 174.11**

3   Conclusion

The total cost of manufacturing the pen plotter is approximately 175 euros, which is significantly less than the permitted cap of 200 euros and in accordance with User requirements.

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