ASM

AUTOMATIC STAMPING MACHINE
+
SOFT COPY CONVERTOR

Product Closure Report

Vishal Anand	B16040
Dilip Chauhan	B16018
Sarthak Shekhawat	B16033
Abhay Kumar	B16121
Ajay Kumar	B16086
Shashi Mohan	B16076

Faculty Member : Dr. Deepak Swami

Introduction

The world is digitalizing day by day, which helps automate things that were before very time consuming if done manually. There are many parts in India where paper work is done manually in bulk. One of them is stamping the papers. This seems to be a trivial problem but is indeed a very frustrating if there are tons of same kind of paper and needs to be stamped at the same place.

There are many parts of India where Govt work solely depends on the paper proof. There is no value of the form/Govt papers without the stamp . And this process needs time when there are tons of files. This product helps in digitalizing a part of Govt section and releasing this work load from officers.

Also, in schools and colleges, events like Sports fest, Cult / Tech fests occur frequently, and many students graduate every year. All the certificates needs to be stamped. And when the certificates are in thousands, then this stamping job which seemed to be trivial, is no more that trivial.

This project aims to tackle this problem. The user will enter the number of pages and set the position where the pages are to be stamped. The machine will automatically stamp all the pages. Also, after stamping each page, the machine will take a picture of the page so as to keep the copy of the originals. After the stamping of all the pages is done, all the photos are compiled into a single file (pdf format). This is done so as to recover the files (hard copy) if lost and also to save as a history of all the pages stamped till then.

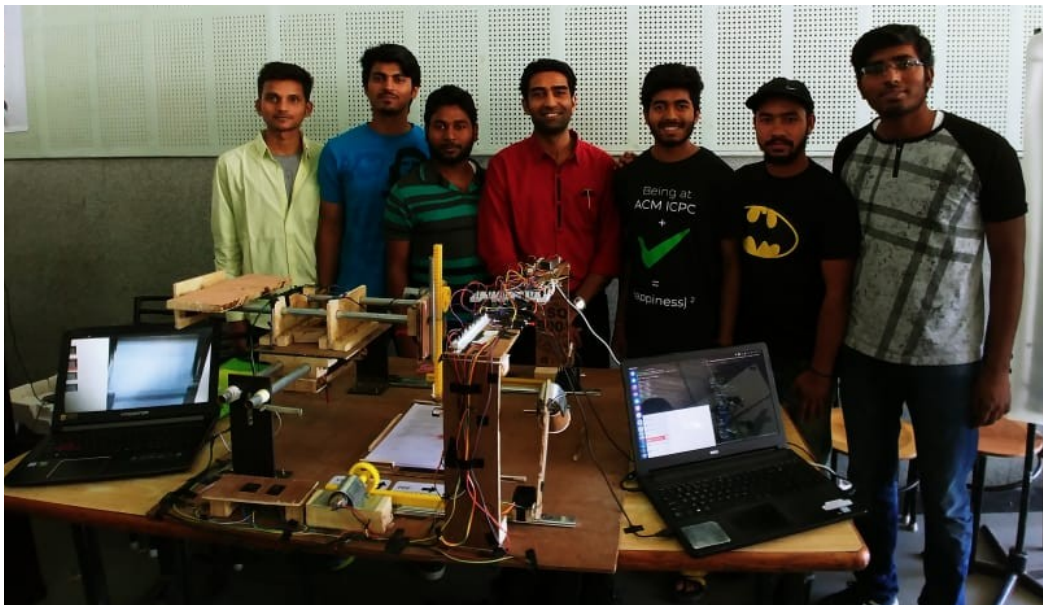


Fig1. The picture of the final prototype with all the team members and the mentor at the centre

Problem Definition

There are many events and places where mass stamping process takes place. Major of them are :

- Notary in Courts
- Post Offices
- Degrees and certificates

Some others applications of the automatic stamping machine are in:

- Banks
- Security Check at airport
- Insurance Company

The product “Automatic Stamping Machine” is about automating the stamping process on files/forms. It takes a lot of time and effort if there are tons of pages and is done manually.

The motivation behind the product is to make specially the section of Govt digitize by removing the burden of pen-paper work of stamping, leaving more time for the officer to do his other pending work.

There are many parts of India where Govt work solely depends on the paper proof. There is no value of the form/Govt papers without the stamp . And this process needs time when there are tons of files. This product helps in digitalizing a part of Govt section and releasing this work load from officers.

Apart from stamping the pages, there is also a feature which captures all the pages into a single file (pdf). This feature is introduced in case the hardcopy is somehow lost, so that there would be a softcopy of all the pages which have already been stamped. Also this would help us keep records of all the pages which have already been stamped.

Solution Methodology

Design Considerations

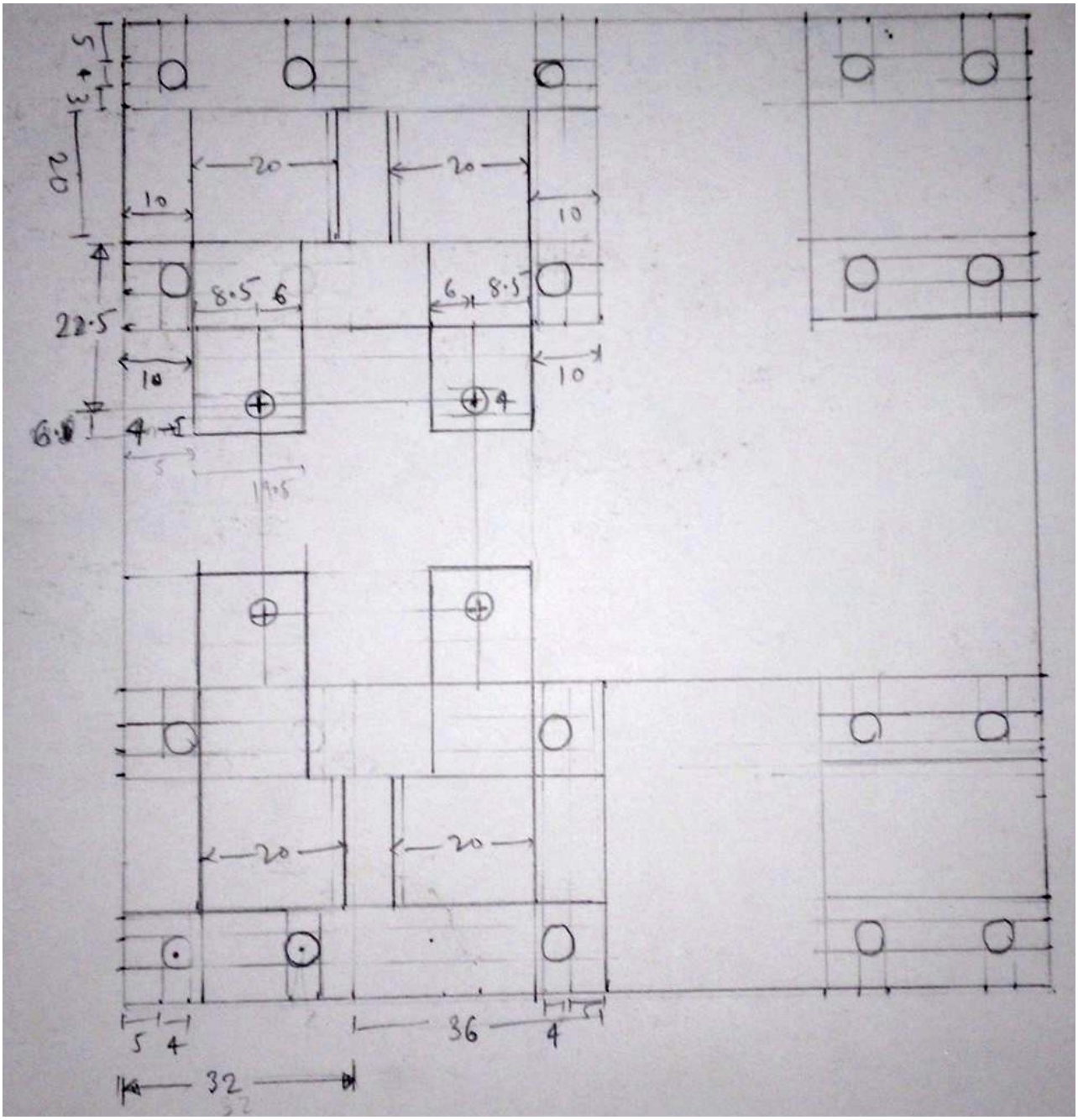


Fig1. ED diagram (TOP VIEW) of the chassis part containing 4xFig.6 parts going inside the plane at the 4 corners, a stepper motor coming out of the plane which is attached at the left side in this fig, and a stepper motor going inside the plane placed at the right side in this fig.

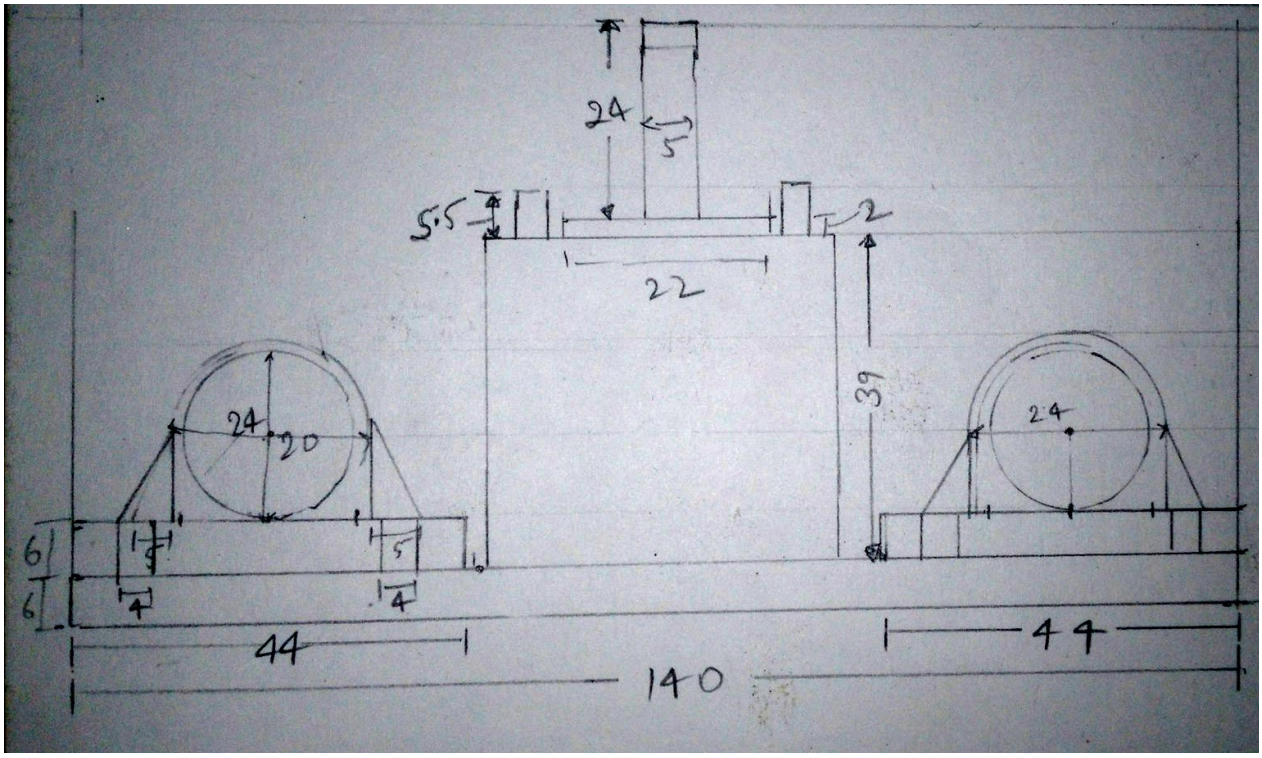


Fig2. ED diagram (SIDE VIEW) of the X-axis part contaning the Fig6. part both the sides through which PVC pipes will run, a chassis acting as the base holder for the Y-axis part and a stepper motor attached to this chassis.

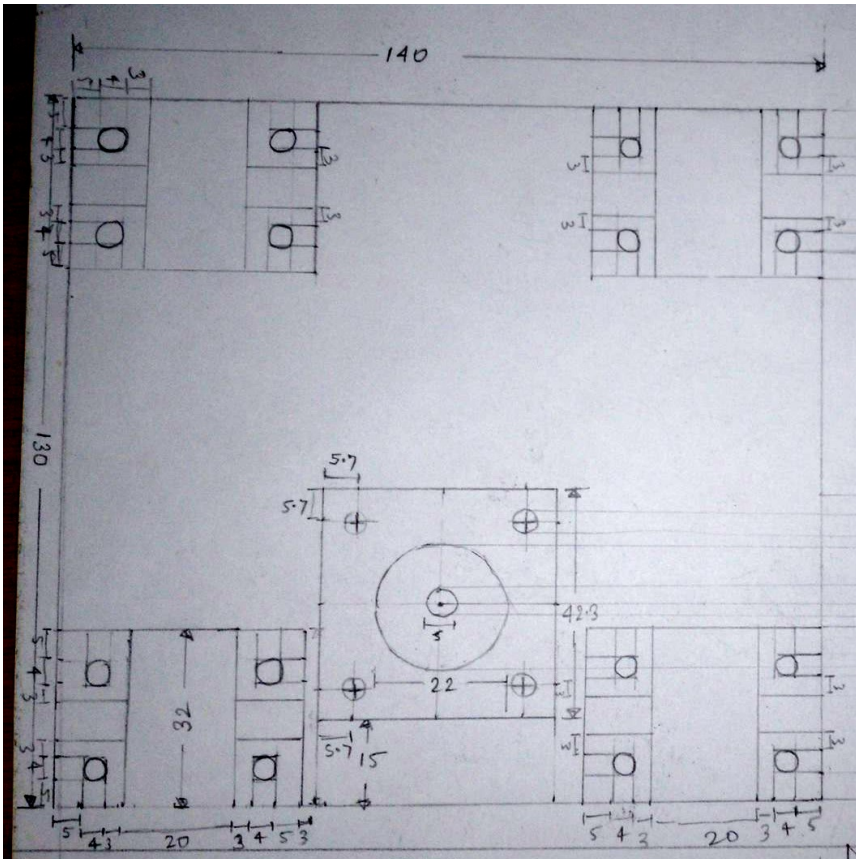


Fig3. ED diagram (BOTTOM VIEW) of the chassis part containing 4xFig.6 parts coming the plane at the 4 corners, a stepper motor coming out of the plane which is attached at the bottom side in this fig, and a stepper motor going inside the plane placed at the top side in this fig.

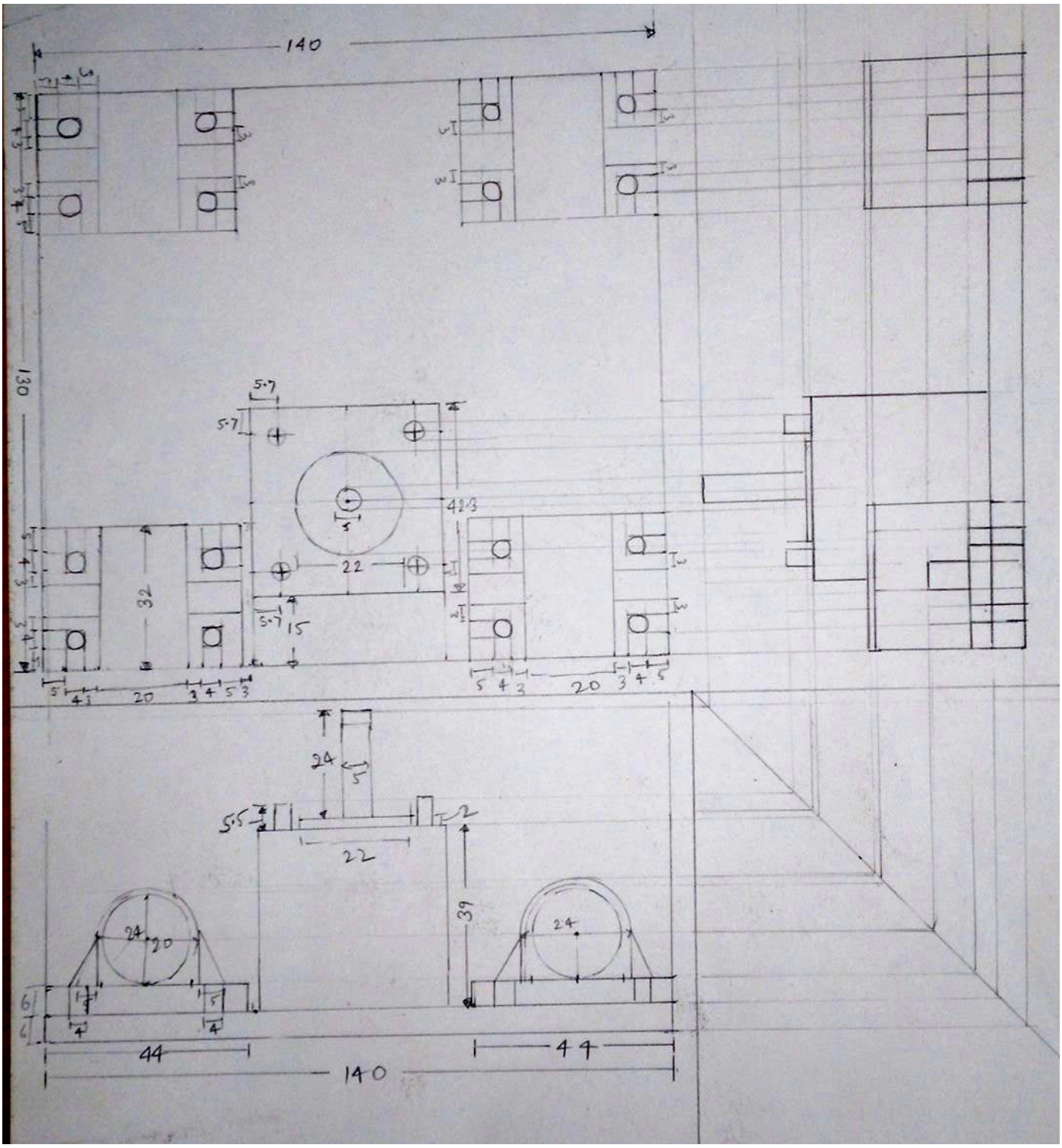


Fig4. Bottom View, Side left view and the Front view of the chassis containing the stepper motors and Fig6 part through which pipes will run.

Flow Chart / Block Diagram:

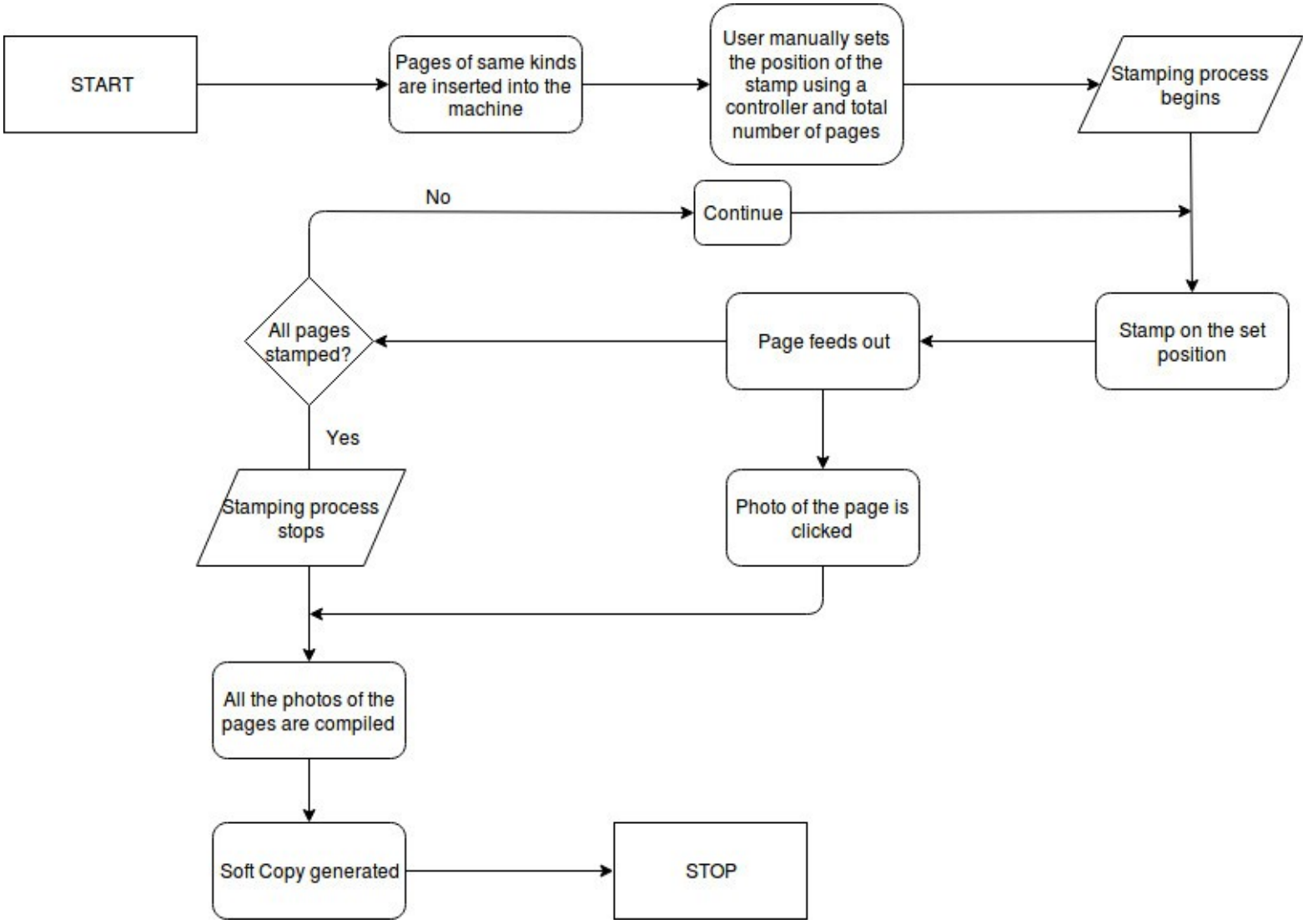


Fig5. Flow chart overviewing the mechanism of the machine.

Product Design

The product covers all the three engineering fields:

1. **Mechanical Aspect:** This includes -

    - The designing of the components in the Solid Works and making of all the components in the mechanical workshop.
    - 2 Aluminium pipes each for the X and Y movement and their connection with that of the stamping machine for the smooth movements.
    - Clamping of the stamp and its movement in the Z direction.
    - The air suction attached at the end of the paper for sliding each paper out.
    - A structure / design containing a camera at the top for captuing the pages.

2. **Electrical Aspect:** This includes -

    - The Raspberry Pi and its connections with the motors, camera, motor drivers, lipo battery, controller (containing left, right, up and down button), etc.
    - Making of required circuits on the breadboard.
    - Soldering of wires and glue gun the connections to make them undetachable.

3. **Computer Science Aspect**

    - Installing the required Raspberry Pi OS and softwares into the PC.
    - Felicitating the movements of the motors (X and Y directions) on pressing the left, right, up and down buttons of the controller.
    - Felicitating the automatic movements of the motors (Z axis – for stamping), air suction for sliding the papers out, camera to click the photos of each page and synching this process.
    - When done with all the pages compiling those into a single pdf.

Design in Solid Works

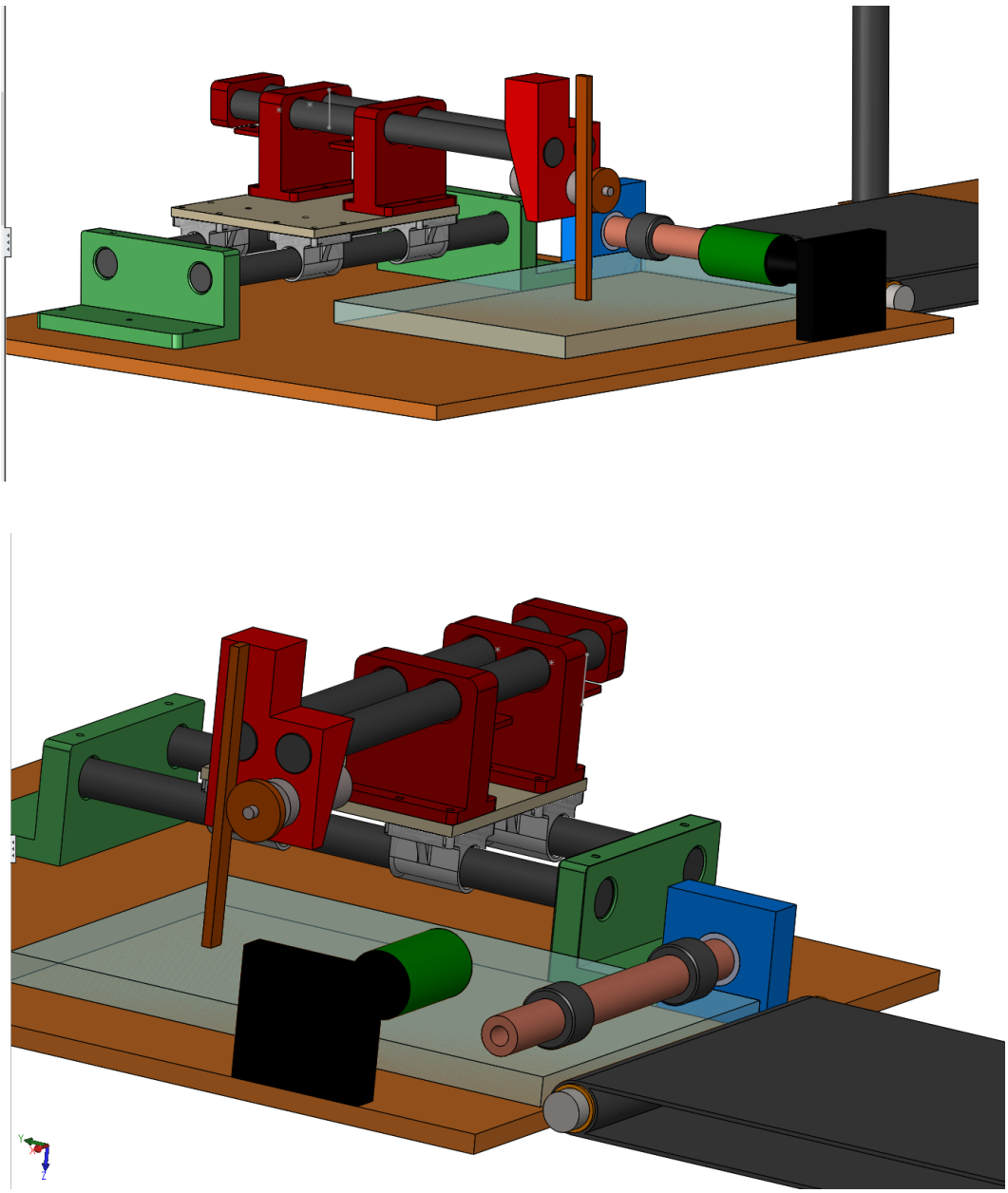


Fig6. Isometric View of the Stamping section: The X-Y movement with the help of Assembly attached to the Al pipe, Z-axis movement containing the stamp with the help of rack-n-pinion mechnanism and air suction to lift and slide the paper to the next section.

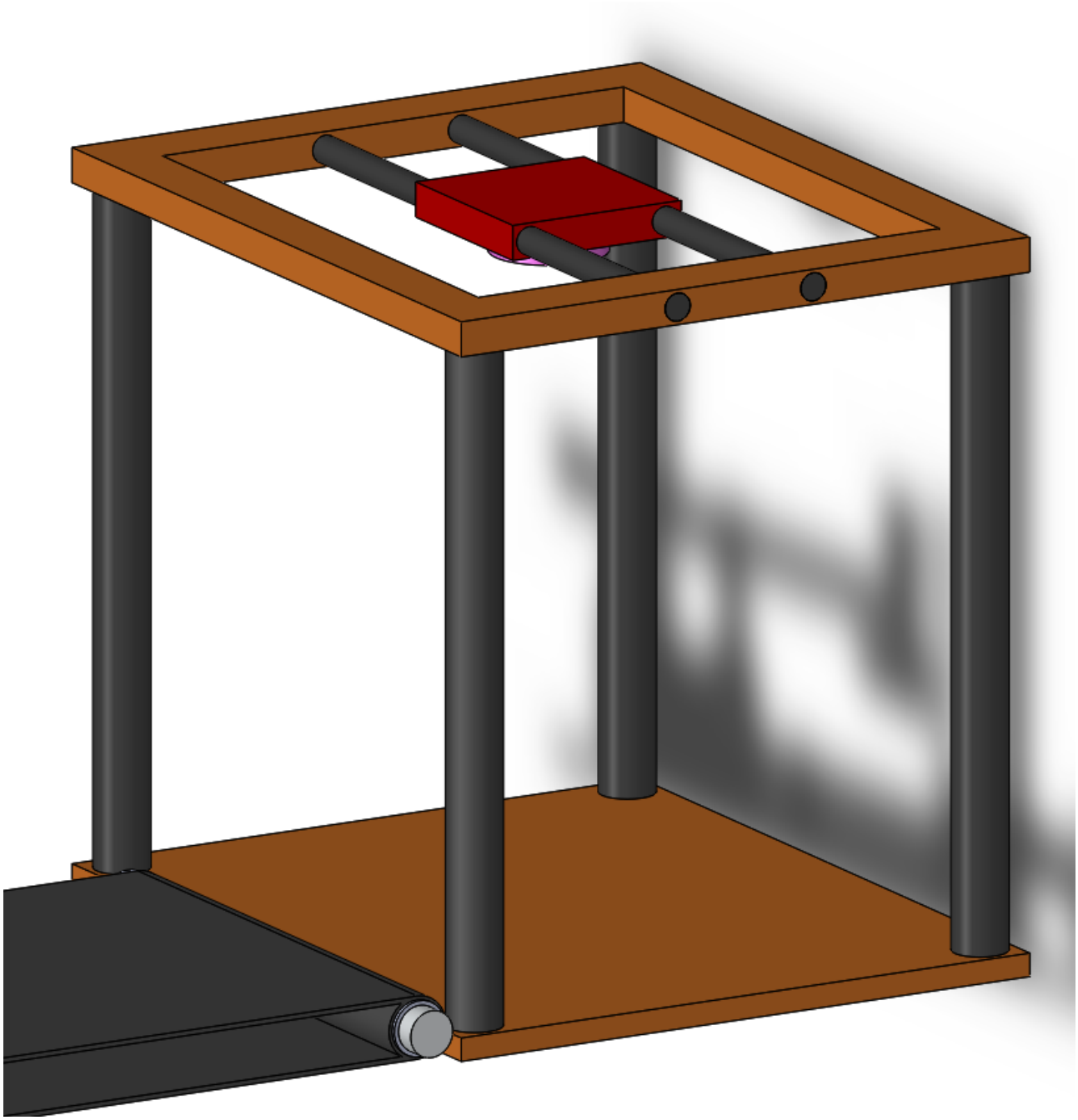


Fig7. Isometric view of the Soft Copy convertor section. Rasperry Pi and the camera module is setup at the top of this setup.

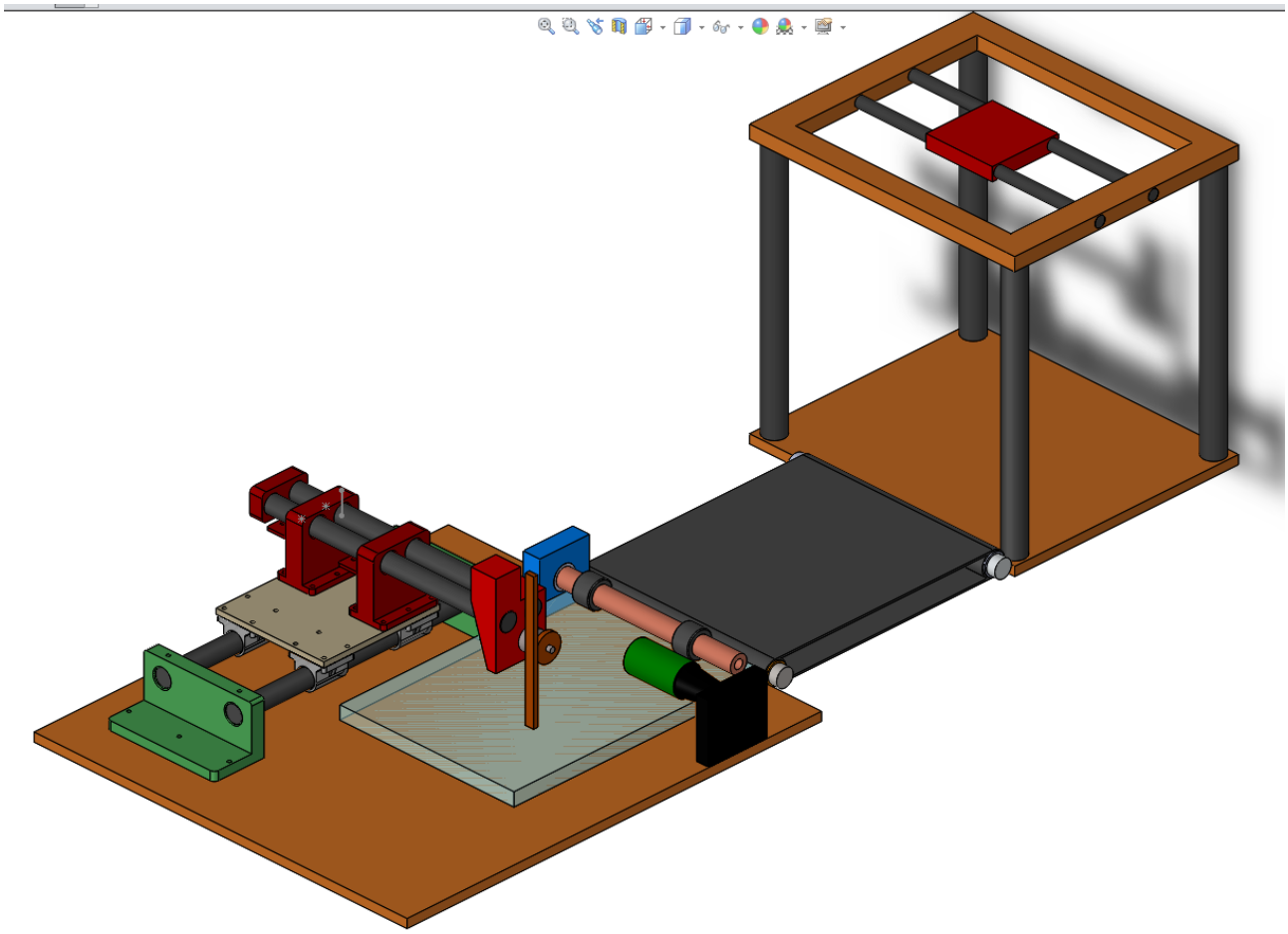


Fig8. Isometric view of the whole prototype.

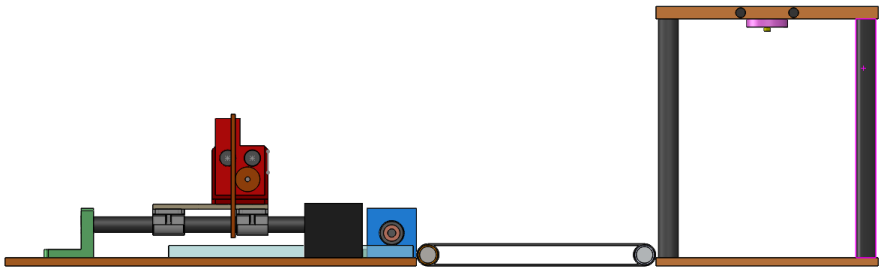


Fig9. Front View

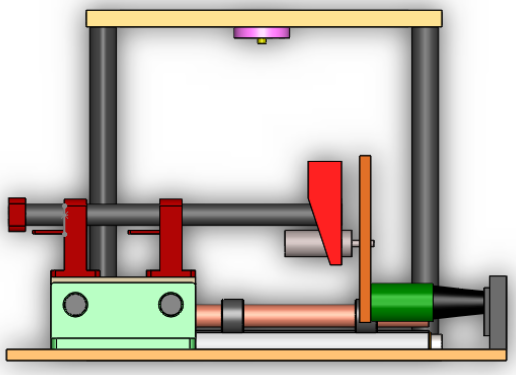


Fig10. Side View

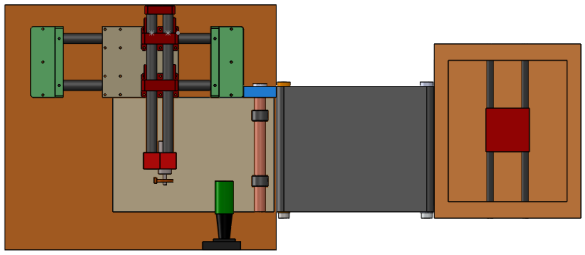


Fig11. Top View

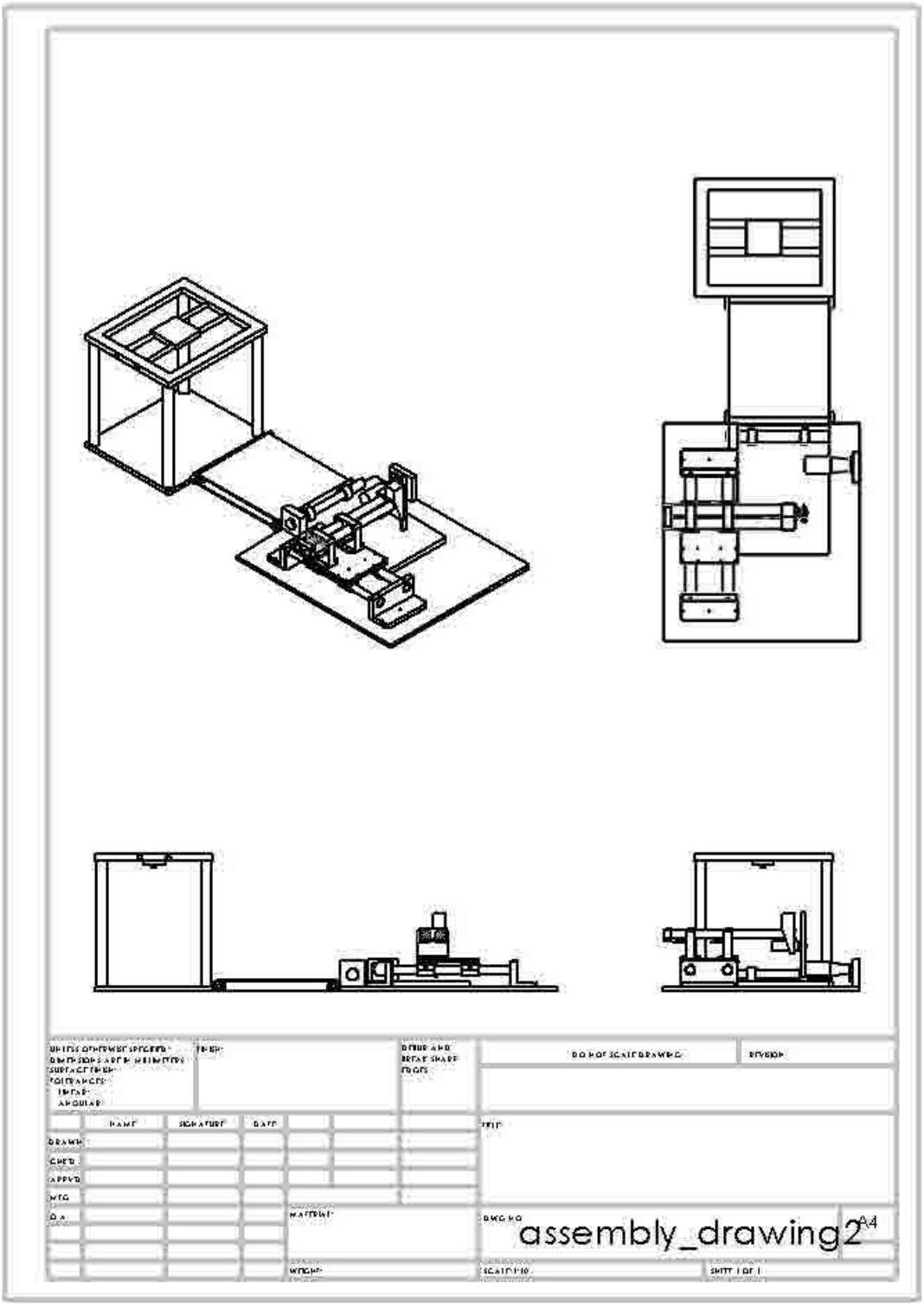


Fig12. Assembly Drawing

Assembly Process

The following components are made in Solid Works and finally made in the Mechanical Workshop from wood:

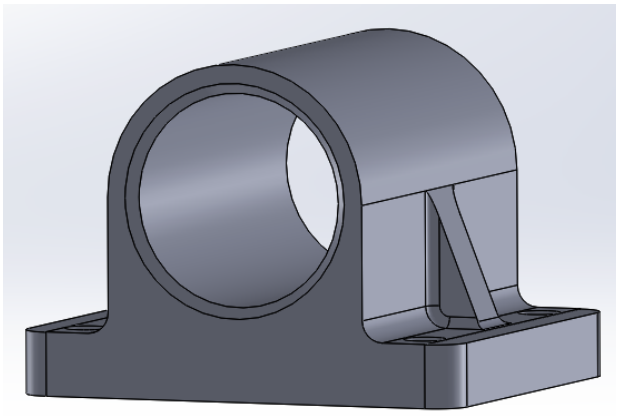


Fig13. 4 such parts will be required. One Al pipe will go through 2 such parts. 2 Al pipes are required to complete the base of the X-axis part.

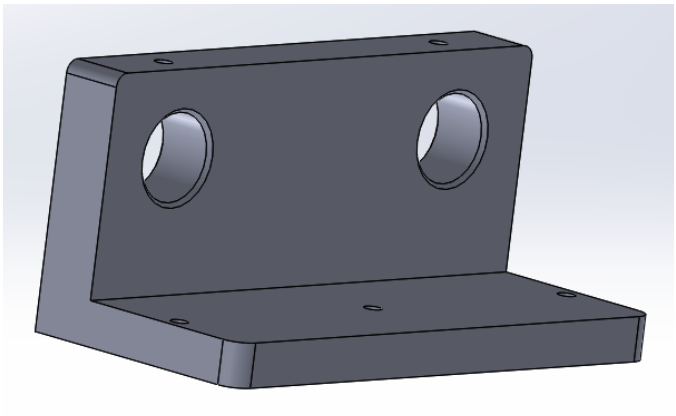


Fig14. This is the base of the whole structure which is directly attached to the X-axis part. Two copies of this part would be attached to both the ends of the 2 X-axis Al pipes.

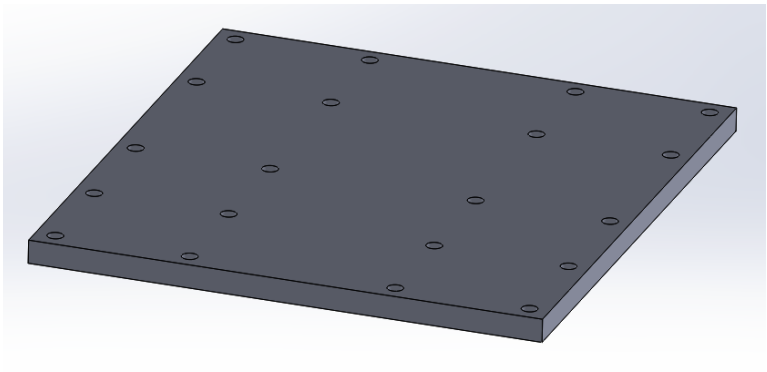


Fig15. This is the chassis attached to the top of Fig5 part. Other components such as stepper motor, the base for the Y-axis are attached to this chassis.

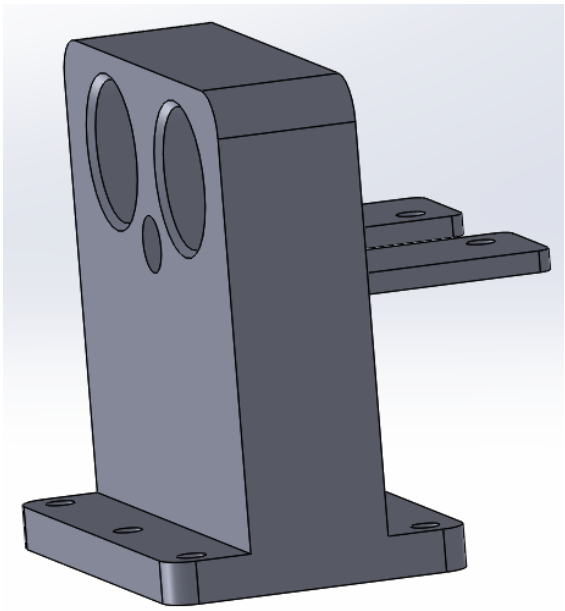


Fig16. This part is attached to the chassis (Fig8.) Two holes are given through which 2 pipes supporting the Y-axis will pass. A stepper motor will be attached using the two extruded parts.

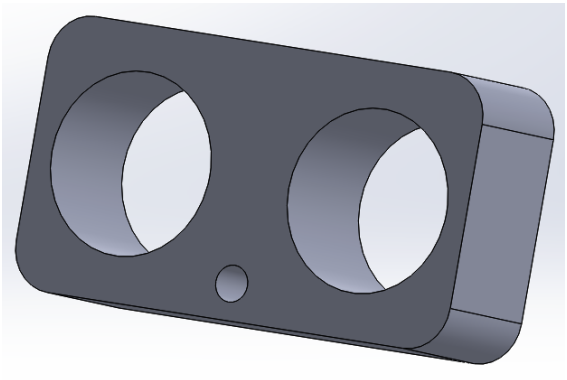
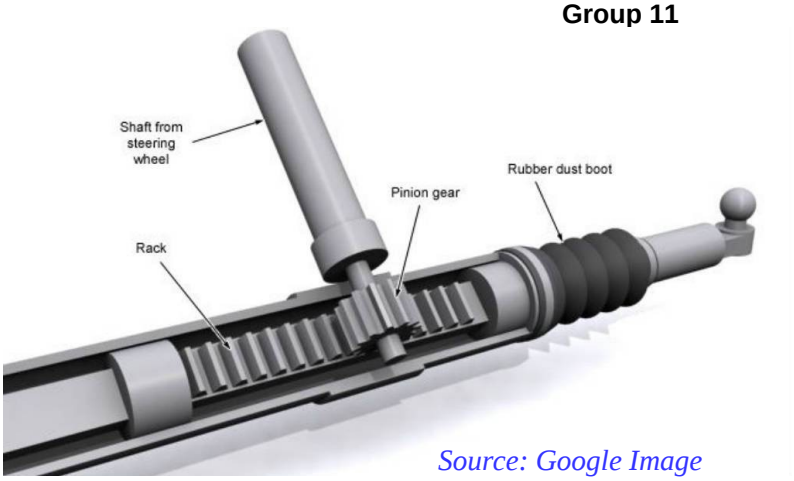


Fig17. This part is attached to the two ends of the PVC pipes of the Y-axis opposite to where the stamp has to be attached.



Source: Google Image

Fig18. The rack and pinion with the help of which the stamp will be attached and will felicitate its movement in the Z direction.

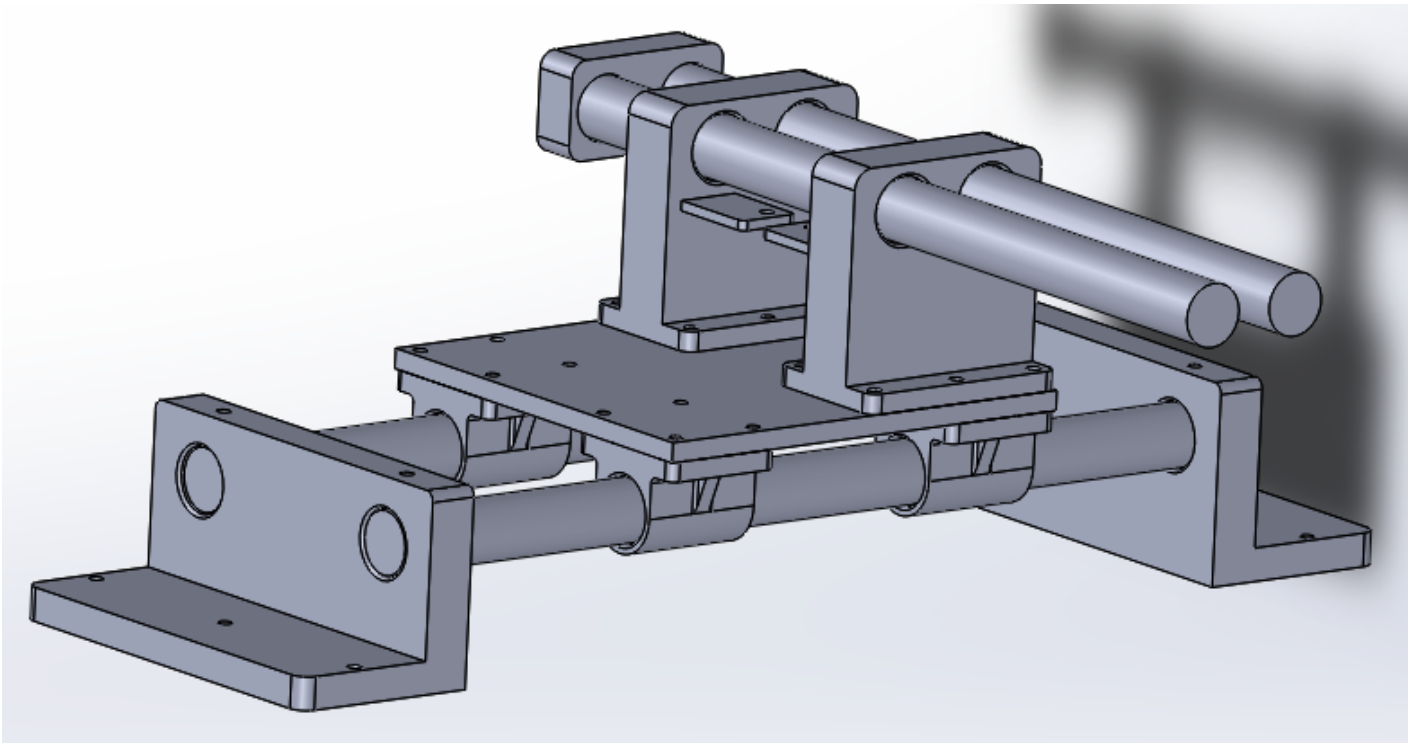


Fig19. The assembly of all the components from Fig13 to Fig17.

Bills

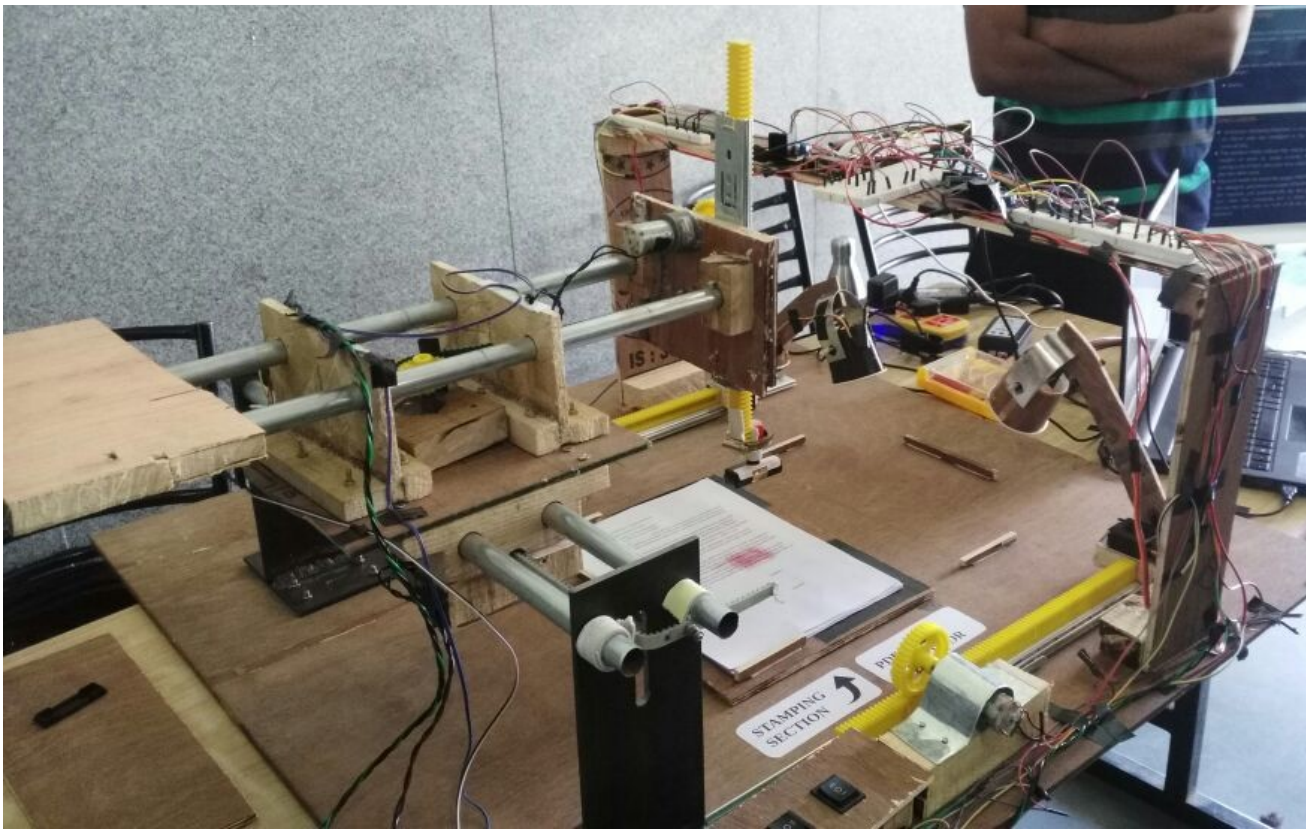
SNO	Item	Cost per item	Quantity	Total Cost
1	Coreless Motor with Propellers for Drone	144	4	576
2	25 Teeth Plastic Gear	50	4	200
3	TowerPro MG996R 11kg-cm 180° Servo Motor	350	1	350
4	Eleganza Self Ink "DELIVERD"	290	1	290
5	DURA db stamp CASH PAID Pre inked stamp	270	1	270
6	1 Inch Double Sided Foam Tape Roll	45	1	45
7	1 Inch Double Sided Foam Tape Roll	15	2	30
8	Glue Gun Stick	15	4	60
9	HDMI to HDMI Cable PVC 3Mt	290	1	290
10	L293D Duel DC Motor or Stepper Motor Driver Board	89	5	445
11	Raspberry Pi 2 or 3 Micro USB Power Cable	90	1	90
12	Raspberry Pi 3 1GB Ram Single Board Computer in Built WiFI and Bluetooth	3090	1	3090
13	1 Inch Double Sided Foam Tape Roll	30	2	70
14	10x6 Inch Single Sided Copper Clad PCB	120	2	240
15	1500 RPM 12V DC Metal Gear Motor Torque 2 kg-cm	190	6	1140
16	35x25 Nylon Robot Caster Wheel	40	1	40
17	840 Tie Points Breadboard	70	1	70
18	Arduino Uno R3 ATmega328PU with USB Cable	399	1	399
19	Female to Female Jumper Wire	3	10	30
20	Glue Gun Stick	10	4	40
21	HC-05 Wireless Bluetooth Transceiver Module	309	1	309
22	IR Obstacle Sensor Module	70	4	280
23	L293D Duel DC Motor or Stepper Motor Driver Board	120	4	480
24	Male to Female Jumper Wire	3	10	30
25	Male to Male Jumper Wire	3	10	30
26	MAX232 Dip IC Serial to TTL, TTL to Serial Level Converter	20	3	60
27	Powder Coated Robot White Chassis	120	1	120
28	Resistor 1/4 Watt R=100 Ohm	1	20	20
29	Resistor 1/4 Watt R=220 Ohm	1	20	20
30	Resistor 1/4 Watt R=1K Ohm	1	20	20
31	Resistor 1/4 Watt R=10K Ohm	1	20	20
32	Ribbon Wire	20	1	20
33	Robot Wheel 9x4 cm Black Base	100	4	400
34	Raspberry PI 5MP Camera Board Module	669	1	669
35	MagiDeal Fiber Reinforced Rubber 5m GT2 Open Timing Belt 6mm Width for Reprap Prusa i3 3D Printer 3D Printing Parts	880	1	880
36	6 In 1 Soldering Iron Kit	299	1	299
37	Easy Electronics - 120 Pieces Jumper Wires Ribbon Cables Kit Wire 40 Pin M/ M, 40 Pin M/ F, 40 Pin F/ F for Arduino, Breadboard	299	1	299
38	Aluminum GT2 Timing Pulley For 6mm Belt 16 Tooth 5mm Bore- 2Pcs	319	1	319

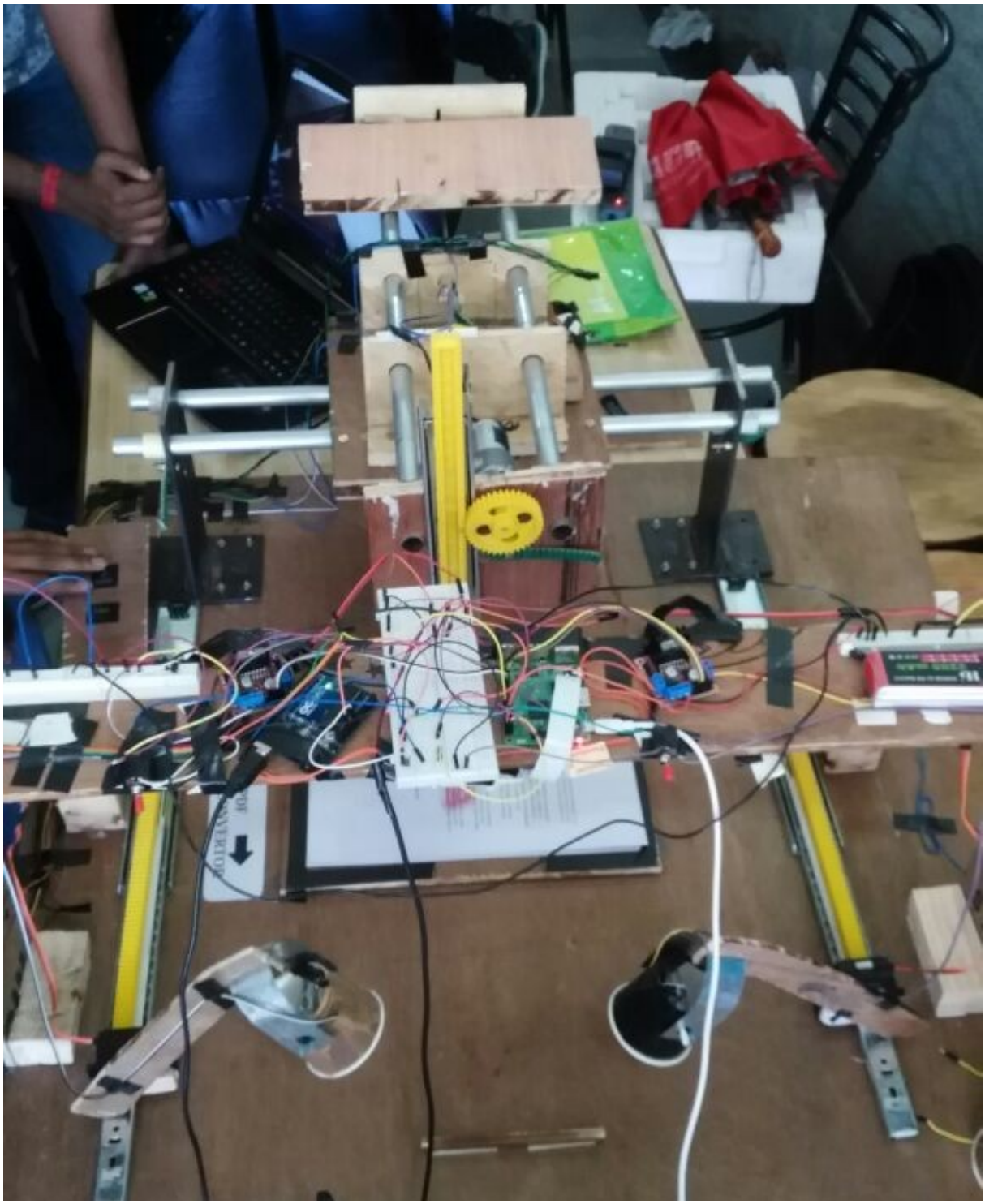
39	2.54mm 24AWG Pure Copper 40pin Dupont Wire Flexible Rainbow Color Flat Ribbon Cable - 1 Meter	319	1	319
40	Raspberry PI 5MP Camera Board Module	749	1	749
41	Generic SKU340 Lipo Battery 2200mAh 35C 11.1V 3S	1999	1	1999
42	REES52 8944130045321 IMAX B3 Lipo Battery Balance Charger for RC 2 ~ 3 Cells 7.4V 11.1V Lipo Battery	500	1	500
43	Robo India TECSW Tecsw Tactile Switch Micro - Push to On Button, Set of 20	69	1	69
44	M- Screw 1.25 inch	1.25	80	100
45	M- Screw 2 inch	1.5	80	120
46	Hex Nut	30	2	60
47	Double Side Tape	40	1	40
48	Battery AA	10	4	40
49	Electric Tape	12	1	12
50	feviquick	5	4	20
51	plywood	868	1	868
52	Raspberry Pi 3	3174	1	3174
53	Lipo Battery 11.1V	1984	1	1984
54	Double Side Tape	47.2	3	141.6
55	L298 Motor Driver Board	177	4	708
56	Geared Motor 100RPM	177	2	354
57	Jumper Cable 1F-1F	3.54	40	141.6
58	Jumper Cable 1F-1M	3.54	40	141.6
59	Jumper Cable 1M-1M	3.54	40	141.6
60	Servo Motor MG996 180 Degree	413	2	826
61	L293D Single Side Board	106.2	8	849.6
62	Plastic Gear 25 Teeth	47.2	2	94.4
63	Plastic Gear 38 Teeth	94.4	2	188.8
64	15 Inch Plastic Rack	236	2	472
65	840 Tie Point Breadboard GL12	59	1	59
66	3*10 Machine Srew Packet	23.6	1	23.6
67	3*15 Machine Srew Packet	23.6	1	23.6
68	Nails,Nut,Bolt,Srew	495		495
69	solder wire	70	1	70
70	solder wax	70	1	70
71	3*10 Machine Screw Packet	23.6	1	23.6
72	NAils,S4	95		95
73	Pointer leaser	500	1	500
74	Gear belt	335	5	1675
75	Aluminium Pipe	110	1	110
76	Sliders	413	2	626
77	Nails and Boult	77		77

The total cost of the project = Rs 26831 /- (Excluding the TA)

The total cost of the prototype = Rs 16100/-

Few Images of the prototype





Conclusion

It is concluded that the product “Automatic Stamping Machine” is of a great use for those who are indulged in the stamping work all day. The product helps reduce the stress and work burden at least to some extend, therefore saving a lot of their precious time which can be put into other work. Also there is a need of just one common machine for every officers as it works independently for each one of them and can be accessed only with passwords. They just need to change the stamp which is clamped into the machine and enter the login credentials to access the machine. The user just needs to insert the pages which has to be stamped under his name, and press a couple of buttons and the machine will automatically do the job for him. After the stamping job is done, he’ll receive the soft copy as well of all the pages stamped. Therefore one doesn’t have to invest much money on this machine.

Link to the working of the prototype

https://drive.google.com/file/d/17Lar-C3aE1eOFvdxh5LPgz54dE8b5bmn/view?usp=sharing

References

Air Suction Idea for lifting the paper : https://www.youtube.com/watch?v=FT7NWbXyM7Q

X-Y-Z movement idea for the stamp : https://www.youtube.com/watch?v=OuCiHp43q20&t=54s

Few existing stamping projects : https://www.youtube.com/watch?v=FwiGPVqmz78

https://www.youtube.com/watch?v=aDD_xUXMlhs