Observations -

- For bit of resin, corner dried later than middle part
- Liquid stability through reflection image (on roof)
- 1/4 size filling resin
- ~~Up-down~~ Down-up successive movement (second) → more in the upward motion.

Projector codes

- DLP - 3-D Printers -
  1) Lumi Pocket
  2) Lumi fold

- Ensure liquid filling in jar one-way motion.
- Liquid float height & drying penetration - one limb extension in frog model
- Curvature at the back
- Apparatus slows down if other works are done on laptop simultaneously

Projector specifications —

- 3200 lumens (but at what dist.?)
- Resolution → 800X600

Ports

RS 232

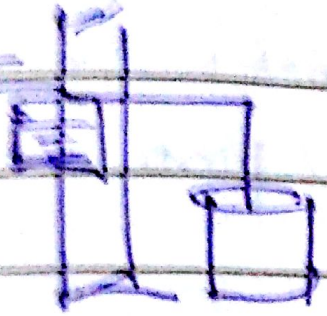
The colorwheel in the projector are used to filter the l
into Red, Green & Blue light and also filter out
UV.

Solus 3D - Infocus In8606HD or Vivitek H1185H
DLP® projector

Design - i) Vat size can be changed.
ii) Cover lifting mechanism
iii) Project to be kept horizontal to redu
vertical height (using mirror)

1) LCD screen 2) On-off button. (zero pos^n)
3) Alternate mechanism for liquid melting instead of down-up

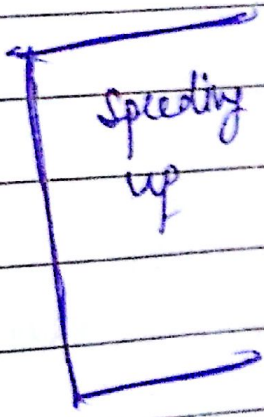
LCD → status → LCD screen



→ circuit design

4) Sensors to prevent exceeding of ranges.
5) Heaters (for easy liquification)
6) Alignment balancing
7) LED indicator

- Resin filling (Automatic & Graduated)



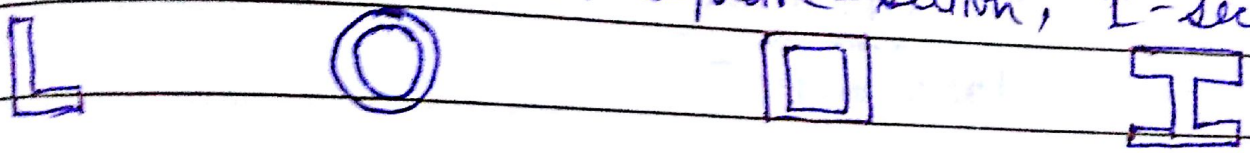
8) Cover
9) Material selection (resin; reusable - melt)
10) Color incorporation
11) Immiscible (heavier density) fluid to reduce resin requirem
12) Reverse movement (simultaneous) for high accuracy to maintain liquid movement
13) Feedback control Mechanism

Materials required -

- Alcohol
- Resin (search for better options)
- steel
- Aluminium
- Sheet metal (covering) [brush]

Telescopic channels.

L-section, circular-tube, Square-section, I-section.



Trivia -

- With DLP Projection, printing speed is not affected by object complexity or by the number of parts to be printed on the same tray.
- Increase the wall-thickness as the design becomes larger in scale:
  If (any dimensions $\geq$ 200 mm) wall thickness = 1 mm.
  else if ($\Sigma x, y, z$ dimensions $\in$ [250 400]) wall thickness = 2mm
  else 3 mm.
- Orientation of the design while printing influences the surface quality and strength.
- Model needs to be supported externally to keep it in place & prevent from collapsing while being printed if it is narrower than 30°.

Model specifications - 1 layer - 0.03mm

- slice thickness
- Exposure time
- No. of bottom layer
- Retract speed } Not much
- Lift speed }

Configure

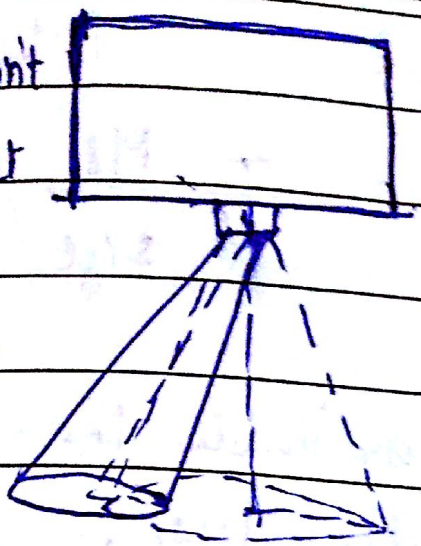
- Lift code

Exam dep -

- Features continued -
  - Base path marking
  - Static base positioning & avoiding fluid sticking
- Smoke venting
- G & M - code interpreter
- Adapters → Motor, arduino, etc.
- Speed variation with slope definition.

- Increase time exposure for smaller or finer are
- Software integration — Integrated 3D search e

that will let user browse online for 3D models.



Projector doesn't throw perfect cone about its centre. The base line lies straight & the image is projected upward (above that line).

Inclusions -
Sensors
Buttons
Projector plate
Plate connection

Connector mechanism in middle sheet.
Plate material enhanced (current L-section)
Mechanism change -

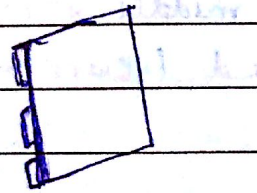
- Relative allowable movement bet. plate & projector as well as
  washer / screw (upto 1-2°)
- Triangular section

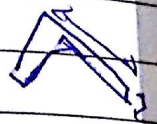
& Rod stopper → through holes. (solenoid valve)
Refill funnel
Heat exhaust (opening)
Electronics in the bottom part | closed | PCB designing (final stage)

Bearings in market - (L-shaped)
Circular bearings - M8, M9 size

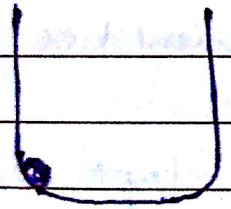
- L-section is readily available than plates. (easier if of same dimensions).
- Outer L-section edge consideration.

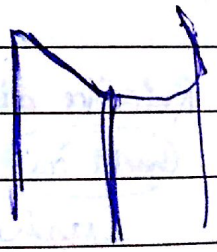
S20h
304, 316
used on
corrosion % of Ni)



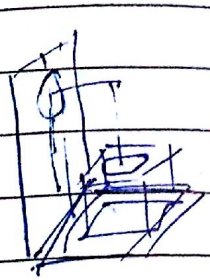


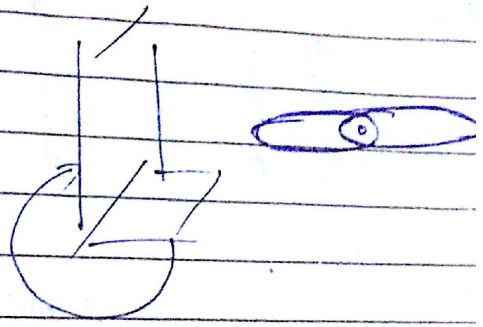
L-shaped rod - 3cm x 2mm

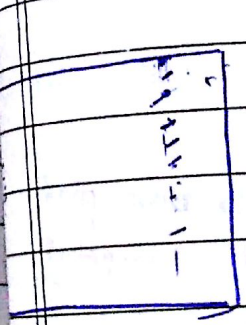


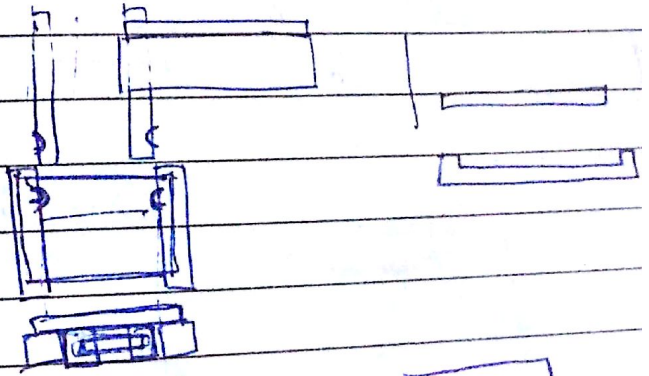


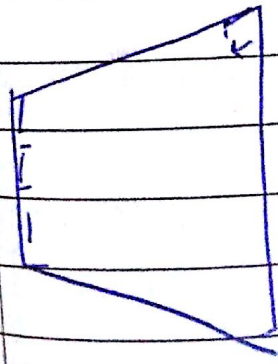
Printed models - 1) T-Rex → Jaw
39.71 x 29.23 x 19.26

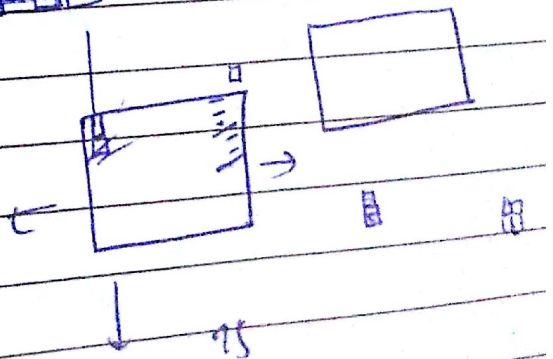


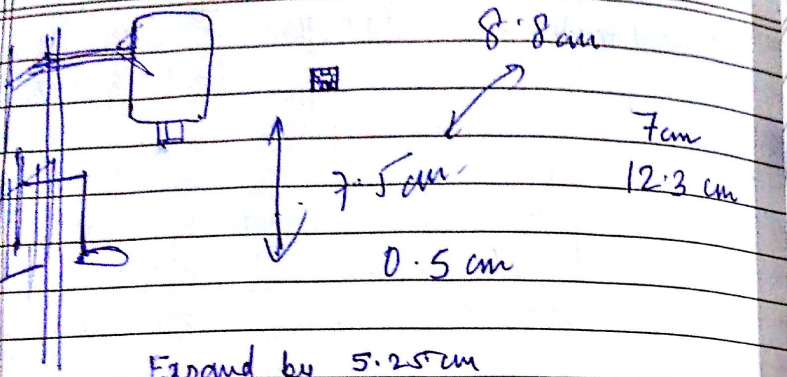










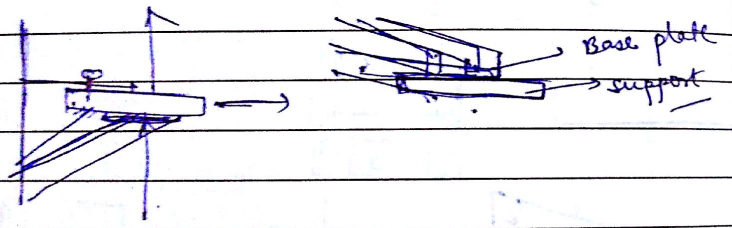


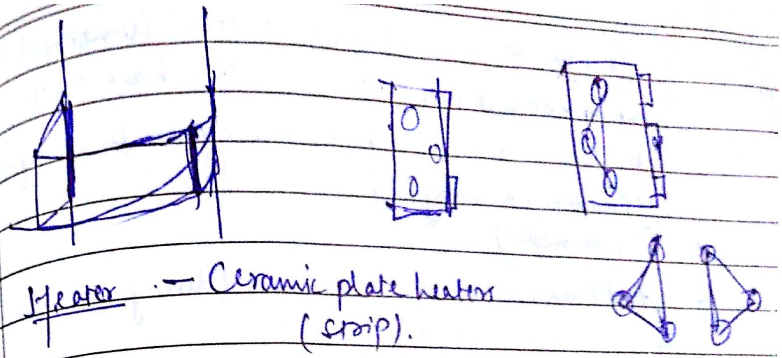
Expand by 5.25 cm

160 × 123.8

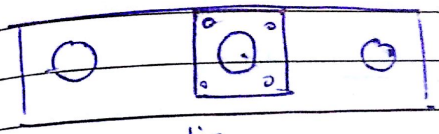
51.9

51.9 × 1.9





Heater :- Ceramic plate heaters (strip).



dia

Nuts with less than 2cm ⌀ ≤ 1 mm

drgoogle.com/p/lemoncurry/wiki/main

A runaway heater safety circuit is recommended to
fire or overheating.

Bottom-up —

— should not stick with the base at first. (Container was moving with model)

— Materials (container) that others have taken

Non-sticky surface required.

— Model shouldn't break in between (during print).

up-down-up	up-only
No benefit so far Significant	

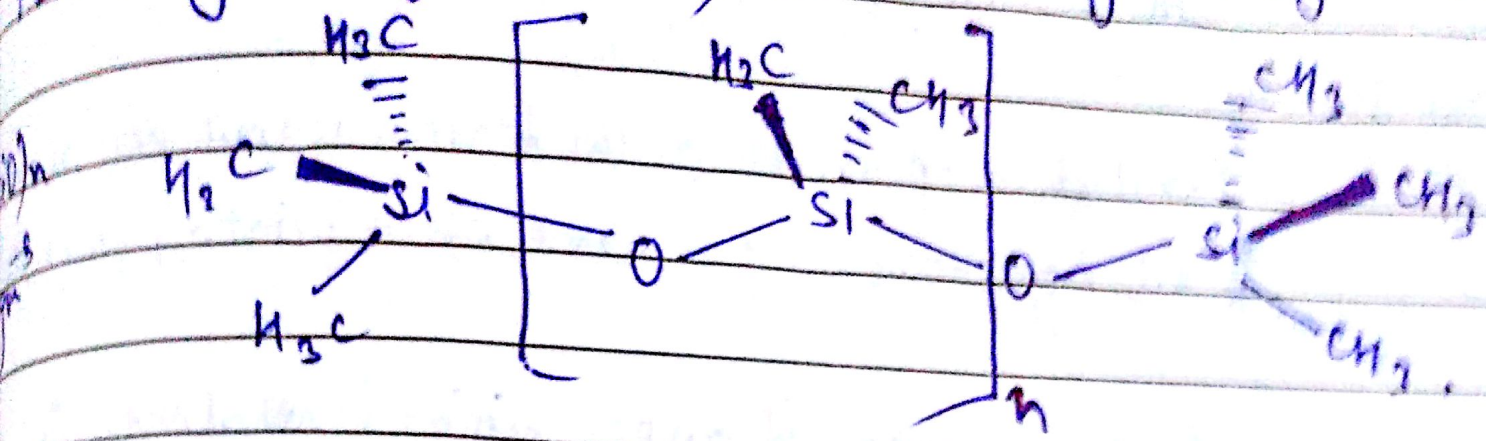
Good trades

PDMS silicone coating —

- application method
- transparent
- wiping / removal
- Ensuring whole surface coverage.
- Permitted surfaces which it is applicable on

• Cytop fluoropolymers 809

PDMS (Polydimethylsiloxane) – Polymeric organosilicon



- Known for its rheological (or flow) properties.
- Optically clear, inert, non-toxic & non-flammable.
- Alias 'dimethicone' & one of the types of 'silicone oil' (polymerized siloxane)
- present in shampoos, food (antifoaming agent), Vineth cand...
  (dimethicone makes hair shiny & slippery)

Mechanical Properties –

- Viscoelastic – At long flow times (or high temp.), it acts like a viscous liquid (like honey). However, at short flow times (or low temp.), it acts like an elastic solid (like rubber).

Observations (tree frog print with silicone oil) -

1) up-down-up

- Whitish appearance at the bottom of container after oil application — prominent ~~after~~ as printing proceeds

- Bubble formation if proper mixing is not done

Estimated time → 12:40 time-taken → 13

translucent container

- No sticking to container
- Not much sticking with the plate
- poor layer distinction
- poor base quality (parts sticking)

Weight to be on container

problem

- Continuous slope change not observed
- small features like distinct parts will little dist. didn't appear well.

Only-up → - Height reduced
— Layer formation after 25-30 layers
— Parts didn't complete upto top. print
— Previous problems persist.

Expected time - 7:28. , time taken →

Up-down-up → Changed parameters —
exposure time - 1500 ms.
Z-lift dist. — 1 mm.
G-code - Delay - 1200 ms.

Expected time — 19:11 , Time taken -

Observations - Oil layer expansion-contraction with model printing.
(vacuum creation clearly observable)
- Whitish layer are clear off the model area.
- Vacuum lifting the container bottom, releasing it with sudden impact.

Resins that people have used -

- Bucktown Polymers (http://bucktownpol
- Spot-Cr resin from spotamaterials
  (garyhodgson.com/reprap/06/dlp-resin-p

HBP → Heat Build Platform

Non-stick shell materials -

- silicone oil
- Sylgard 184 or Qsil 216 2-component silicones
- FEP sheets } FEP flexvats.

up-only (with glass container, silicone & resin)

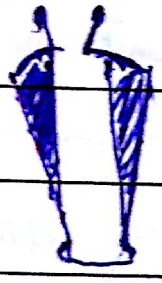
- Model didn't stick to the support. Instead stuck to the base.
- Model was printed inverted
- Vibration in support (More in up-down-up)
- We did get better quality than before.
- Model stuck strongly to the glass, hardened really well.
- Leg got stuck with both glass & support but we left the support later & got ~~pera~~ stuck with glass instead. (better affinity with glass).

Top-down Process (with large quantity of resin) with larger base

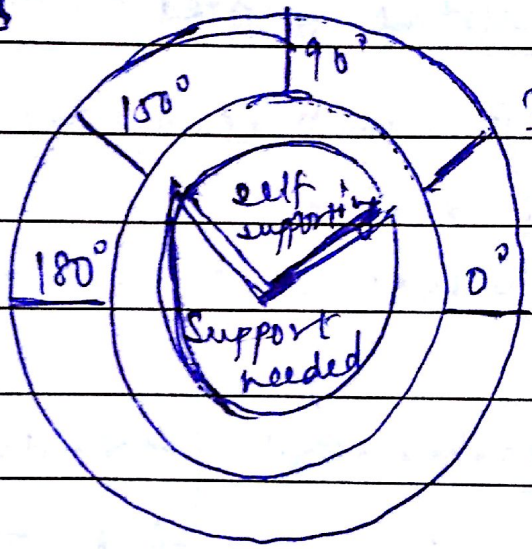
- Bubble formation at the top layer. (search for method to stabilize)
- Proper liquid filling at each subsequent step is still an issue
- Light penetrated the holes at more than 1/2" depth (about 1.3 cm).
- → section got printed (problem with transparent resin)
- Layer smoothness was good.

Trivia [Continues] — i.materialise.com/material transparent-resin/design-g

Internal support - 30° rule still applies. Any model an interior section narrower than 30° needs to be suppo



Rule of 30° -



Avoiding support - The best way to avoid support is by applying fillet but the horizontal surfaces will still nee support if they stick out more than 2mm.

Base for FEP sheets -

- Experiment with hoop (tape spool or something) with just FEP at the bottom

(2) Testing Continues -

(6) Transparent resin (top-down process) ~~down-only~~

- light penetration went upto 1".
- base stuck well & plain upto few layers but later layers didn't come off well. (surface tension)
- layer at the top starting turning milky, so rough surface started printing off.
- Problem to remove the model from support. (heater is required).
- When broken in two - ~~half~~ half, lateral layer is smooth

Exposure time → 10000 ms.

(7) Transparent resin (top-down ; up-down-up)

- Exposure time - 900 ms.

(8) White color-mixing - (layer-thickness → 0.05 mm
Exposure time → 4000 ms.
Delay → 750 ms)

- model came out smooth.
- Features didn't come off well. Leg got attached to body while there is a gap in design. (because of vibration in support)

Delay time (while going down) → 1.5s.
Layer thickness → 0.05 mm
Exposure time → 1.5s
- layers came off smooth.
- Leg got attached to the body (same support shaking problem).
- light is still partially penetrating the resin causing extra filling at the sharp corners. (Get the color proportion right!).

With smaller support → Slice thickness → 0.05 mm.
Exposure time → 800 ms.

Anti-aliasing enabled | z-lift dist. → 0.5 mm.
Cy-code → projector delay → 750 ms.
Estimated time → 1:48.
- Bubble formation was observed at the bottom while print finished.
- Legs were printed too thin & delicate. Broke while deattaching from the support
- Fine features like mouth-lining & eyes didn't come off well.
- New legs still getting attached to front legs & body.
- Model didn't dry well. Easily scratched with granular texture. Layer smoothness is OK though.

(11) Cube design → Bottom exposure → 3000 ms.
Estimated time → 14:38

— Model is sticking to ~~b~~ support while quite strongly
— The standing pillar got printed good but the horizontally lying bars didn't come off straight.
— The top layer wasn't printed good. Extrusions are observed on edges.
— Model was very elastic. Just after printing finished, ~~edg~~ edges could be easily moved (or broken).

Tab Bottom with retraction.

Layer thickness (mm)	Exposure time	Exposure	Layer
0.03	800 ms	(5) 500	
0.05	"	(6) 800	
0.08	"	(7) 1000	
0.1	"	(8) 1500	

0.05 | 800 ms — 8:45

0.05 | 800 ms — — Not hard at all 3:24 5:14

0.05 | 800 ms — 3:24

0.1 | 800 ms → Model dissolved

0.01 | 800 ms → 25:14

Time taken for printing

(6) | 0.05 | 500 ms ⟶ 3:24

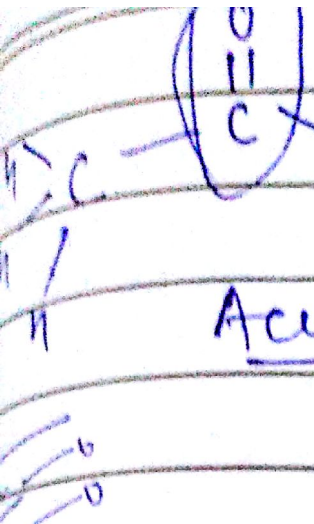
Space for remarks

(7) | 0.05 | 1000 ms ⟶ 5:21

(8) | 0.05 | 800 ms ⟶ 5:17 | white color added

(9) | 0.05 | 800 ms ⟶ 5:17 | more white color added

(10) | 0.05 | 800 ms ⟶ 5:17 | Red color added



Acetone

C_3H_6O

Polar.

2	40
2	20 — 0
2	10 — 0
2	5 — 0
2	2 — 1
2	1 — 0

10,000

(11) 0.05 | 800 ms ⟶ 5:17 (more red color added)

0.05 | 1200 ms ⟶ Bottom exposure ⇒ 6000 ms. 08:08

0.05 | 1200 ms ⟶ bottom layers - 10 08:18
(more red color added)

— color saturation wor. print quality

0.05 | 1200 ms — 10 ⟶ frog model 06:48

Websites visited -

→ i.materialise.com

→ garyhodgson.com/reprap/2012/06/dlp-resin-printer/

→ https://groups.yahoo.com/neo/groups/diy_3d_printing_and_fabrication/info

→ www.flickr.com/photos/13723140@N04/6979464065/in/album-72157629564335469/

→ www.buildyourownela.com/forum/viewtopic.php?f=16&t=1584

→ projectsinterestsandetcetera.com

- fill level determination - arrangement for overfill drainage.
- LCD positioning → Percentage completion
  - Time remaining
  - Error
  - start/stop greeting.
- Base/Home positioning sensor
- Wire ports (opening). [Micro USB in Ardui
- Logo space with lighting.
- Removable support slit mechanism.
- Acrylic hinges.

LED Array Instead of projector (powerful)

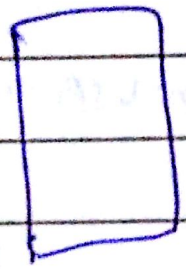
- Alcohol evaporates
- Projector can't work as good as UV heaters
- Projector (as UV source) may affect the resin.

New Parts Dimensions —

1. Rod — 3 cm x 2 mm x 72.5 cm
   Fillet → 5 mm radius.

2. Storage-container — Fillet → 2 mm.

sheet width → 259 mm



- Plate connection — ① Push/Push type SD card connector type mechanism.
  ② Magnetic strip.
  ③ Solenoid lock — Sparkfun

Appx. 10

AstroPrint → Cloud OS for 3D printing
www.astroprint.com.

Slic3r

Cb Creation Workshop

Skinforge

New Design (Bottom up)

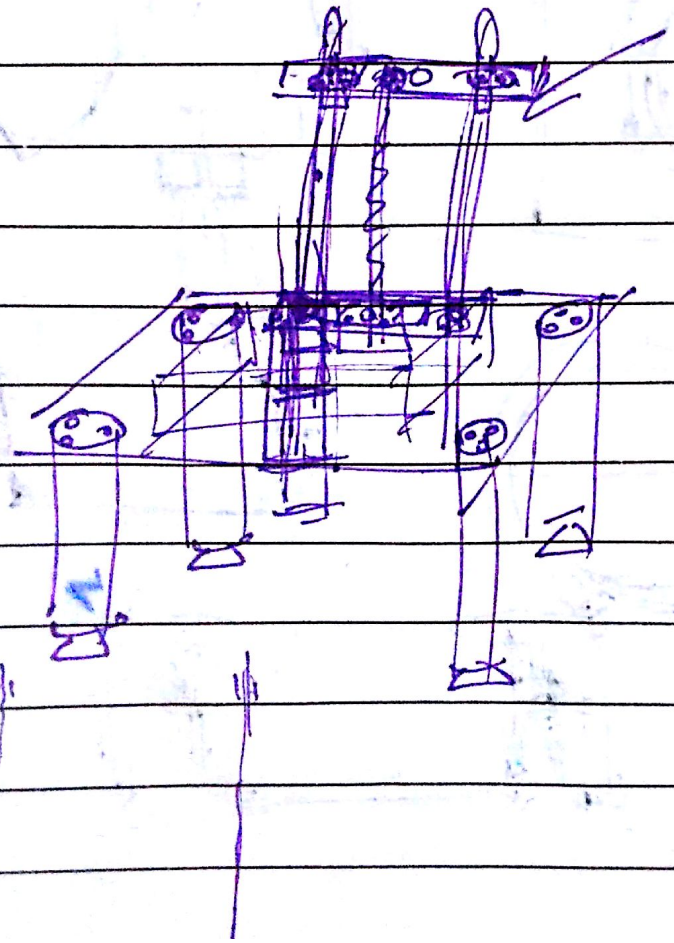
1. **Base plate** → 180 X 135 mm

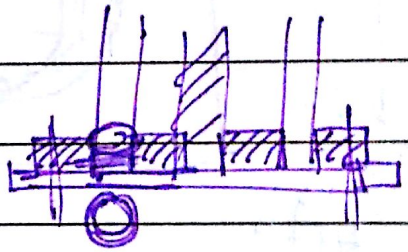
   Hole → ϕ20 mm Δ (extrude) → 1 cm.

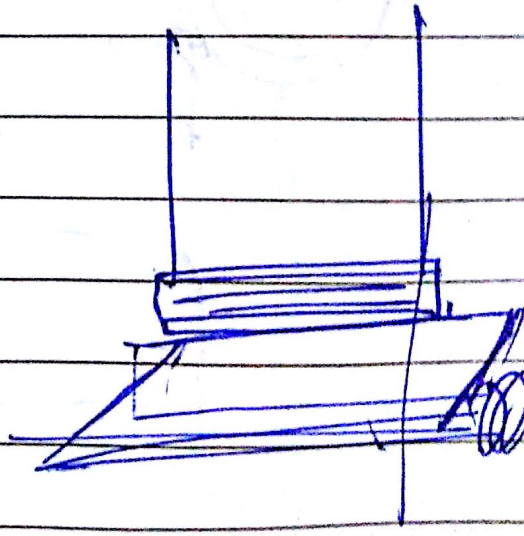
   Nut → ϕ40 mm Δ → 1 cm.

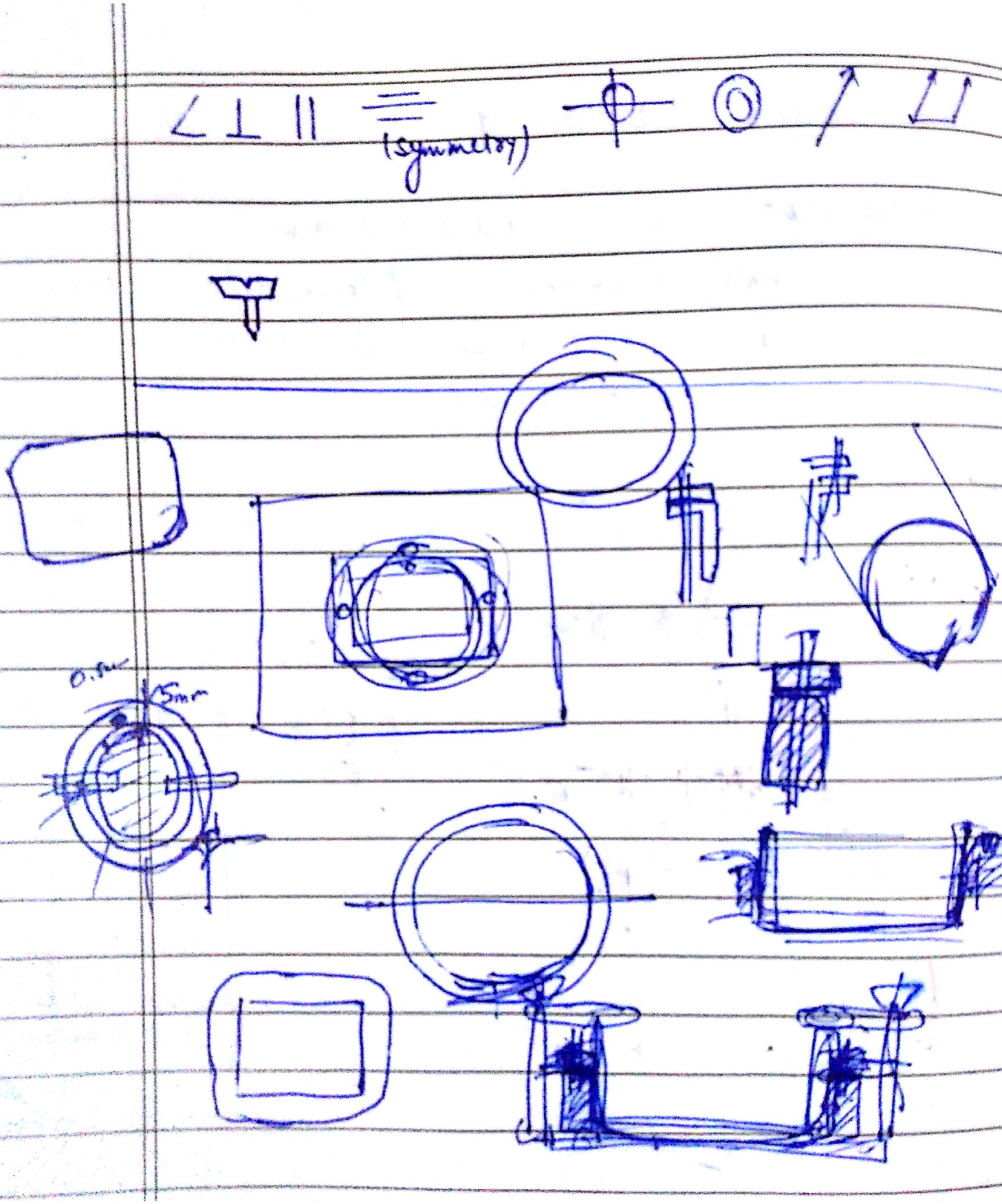
   Fillet → 3 mm.

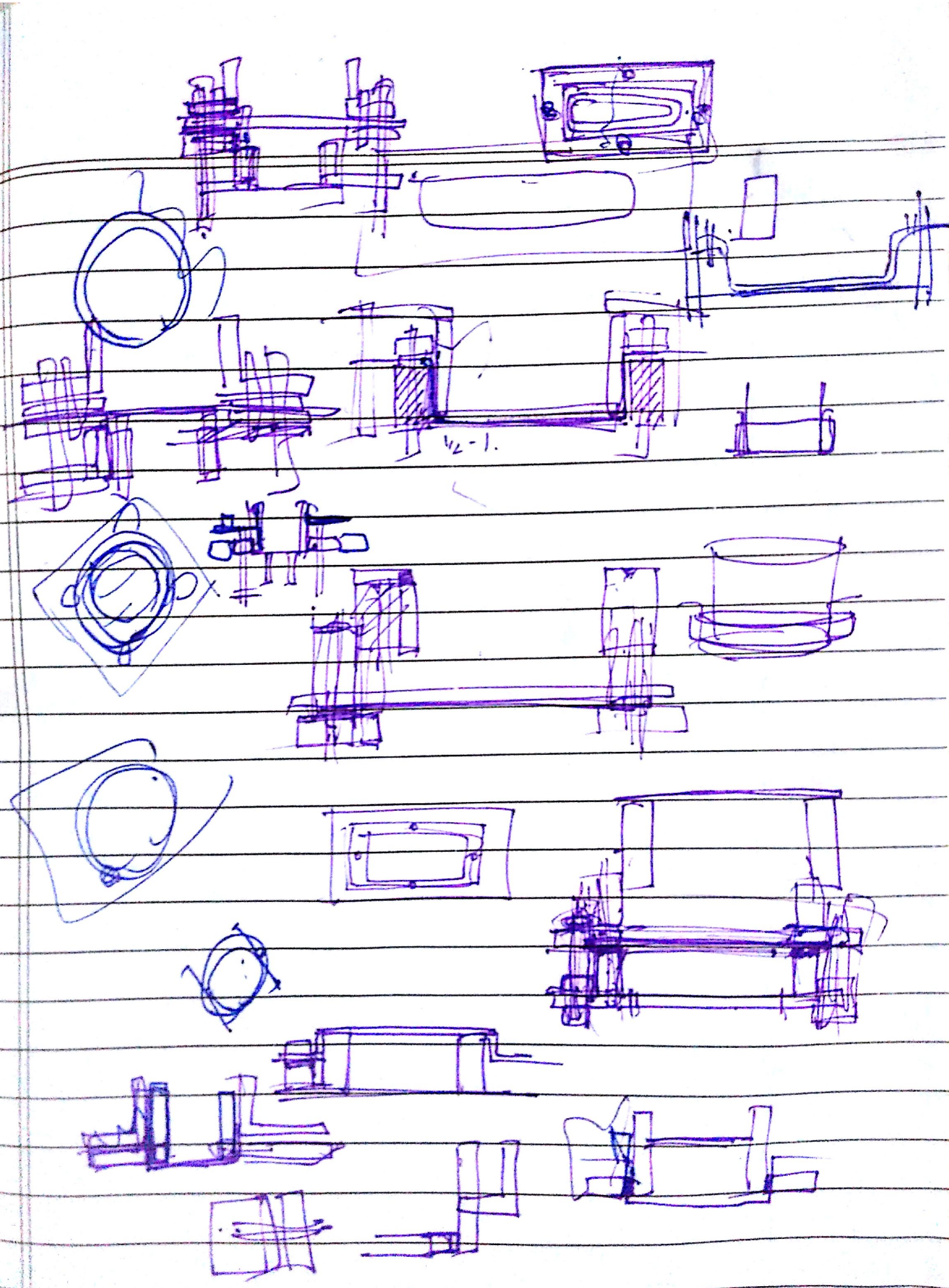
2.








(symmetry)


½ - 1.

SS → 202, 304 (grades)

- Max. thickness of acrylic that can be cut | No hard curves fillet
  → Bending of acrylics / availability of tubes
- Machining on acrylic /
  - Rates
    - File type
    - On metals too
    - shop opening, location
      alternative availability of materials.
    - type of files (format)

1/2"

- Cracks on acrylics | color
- M4 | M6 | M8 holes | transparency

Quantity → just sample, small

premplastics@yahoo.com.

→ 3–15 mm thick | 6-4, 8-4 foot

₹30/mm/sq.ft

10-12 mm | Rate → ₹70 / 5mm / Sq. ft

Size - 8-4

cut size → Available

3202 D.B Gupta Road

drug

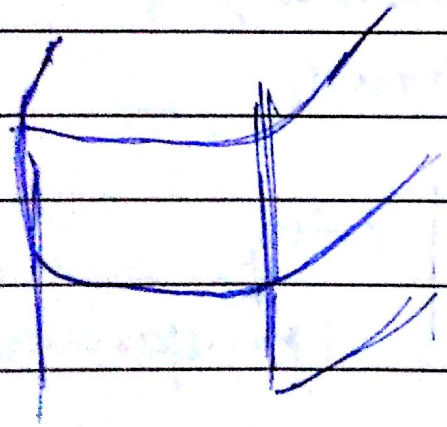
Drawing format

12 mm

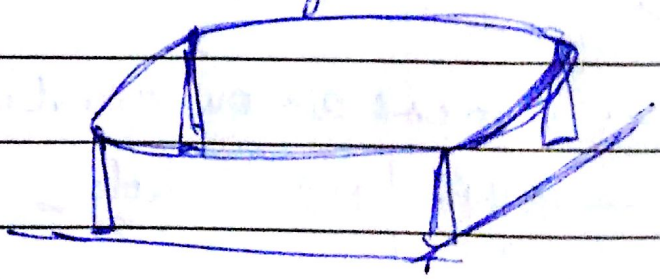
Shop No. — 2139, Gali Number 2,

Chuna Mandi — Paharganj, Del

— 110055



Kitchen legs.



Position sensors / linear position sensors + Angular sensor

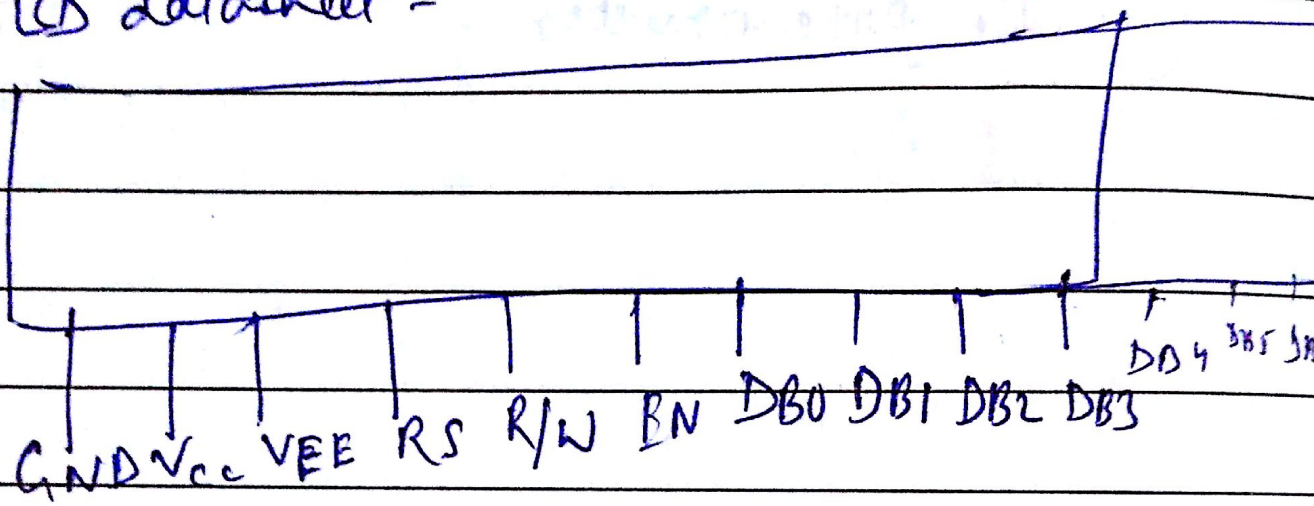
The potentiometer

Assembling

— welding part

- Base plate (aluminium)

16X2 LCD datasheet -



\r → Enter.

16/3

320 The etiquettes of 3D printing

- 3D modelling
- 3D scanning
- Augmented reality

{ Reality computing } term by Autodesk

Arduino Coding - Functionality Addition

Baudrate → 115200

```
char startChar = '<';        ——— start
char endChar = '\r';         ——— end
char gcodeStartChar = 'G';
```

G1 → Motor movement F — movement

I → Indication. — movement type

— Doubt (utility) —

- ~~Fitstepper object~~
- Serial object (defined in which header?)
- shutterclosed · shutteropen

→ 5

```
Servo.attach(servoPin);
servo.write(shutterclosed);
```

→ 45 — current

```
xtop_limit → 19 } // 40, top limit switch pin
xbot_limit → 15 } // 41, bottom limit switch Pin.
```

LEDs code also defined.

```
on_top_limit = false
on_bottom_limit = false
```

default

```
shutterclosed
projection angle.
printing3d = false.
```

```
sStringString = false;   // flag to put the data in our buff
```

— Glow yellow LED while the process is running

~~Relay~~ → micro controller.

On top/bottom position — Red.
In working position — green.
When in ready - yellow.

Touch bot-limit & then raise to reach home posn.

25

320 → 1km

110 → 0.5km

00

to write ← — 0

Mbyte

Homepos = 0

Reset.

A ± (9 steps) — save.

300

An EEPROM write takes 3.3 ms to complete. The EEPROM memory has a specified life of 100,000 write/erase cycles, so be careful about how often do you write to

millis() in arduino →

Returns the number of milliseconds since the Arduino board began running the current program. This number will overflow (go back to 0) after approx 50 days.

Parameters → None

Returns - Number of milliseconds since the program started (unsigned long).

Note: Errors may be generated if a programmer tries to do math with other datatypes, such as ints.

Ex:-

```
unsigned long time;
void setup(){
    Serial.begin(9600);
}
void loop(){
    Serial.print("Time: ");
    time = millis();
// prints time since program started.
Serial.println(time);
// wait a second so as not to send massive
    amount of data
delay(1000);
}
```

Finish - Starttim = 19 sec.

79 79 @ 1:60 01:19.

start time.
end time.

if (starttime != 0)
function call
RemTime

millis > (starttime + 7000)
starttime = 0

build start time

while Running.

25% Complete.
Elapsed Time
Remaining Time

00:15
09:45

Completed
10:45

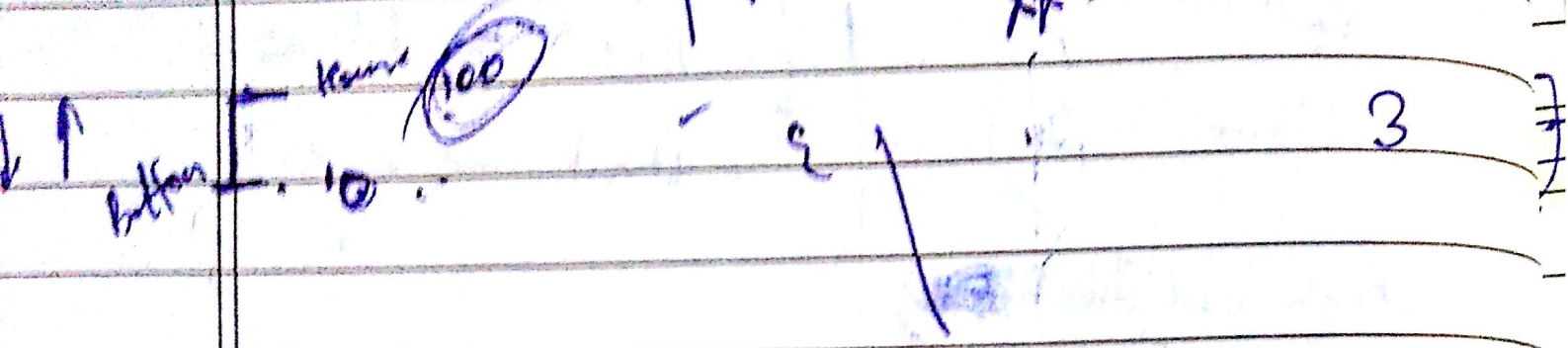
G9 = Completed.
G8 = Init
Total
G7 = Total no. of S
G6 =

Ready.
At Home Position

- define motorSpeed, motorAccel.

From my side - on_top_limit = false;
on_bottom_limit = false;
printing3d = false.

if position (100) && homeflag: false.



Arduino Micro -

PWM → 3, 5, 6, 9, 10, 11 & 13 — Provide 8-bit PWM output with the analogWrite() function.

Analog inputs — A0 - A5, A6 - A11 (on digital pins 4, 6, 8, 9, 10, & 12)

— Total of 12 analog inputs, pins from A0 to A5 labelled directly on the pins & the other ones that you can access in code using the constants from A6 through A11 are shared respectively on digital pins 4, 6, 8, 9, 10 & 12. All of these can also be used as digital I/O.

SPI library

I C&P connection.

Motor → LiftMotorDirPin
LiftMotorStepPin
LiftMotorEnablePin
} OUTPUT [10, 11, 12] 11, 12, 10

LCD → LcdInput → INPUT
6 pins A0 – A5

Switches → SpringTop
SpringBottom
} OUTPUT INPUT 6, 7.

LedPinGreen
LedPinYellow
LedPinRed
} OUTPUT [2, 3, 4]

half

RS → A0 (Grey)
Enable → A1 (Black)
D4 → B
D5 → R
D6 → 0
D7 → Y
R/W (white) → Gnd

B → 10
B → 10
R → 6
O → 3
Y → 4
G → 5
B → 6
W → 7
G → 8
W → 9

cathode – Anode

wordpress.org

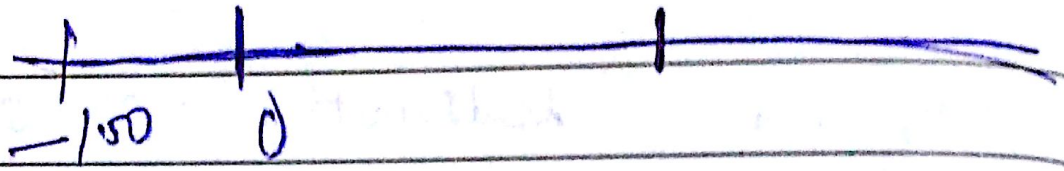
CMS

100.

time point.
(sec., column)

dir
retcurrentPosition.

4864



GO
→ INIT
Dir → home

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