

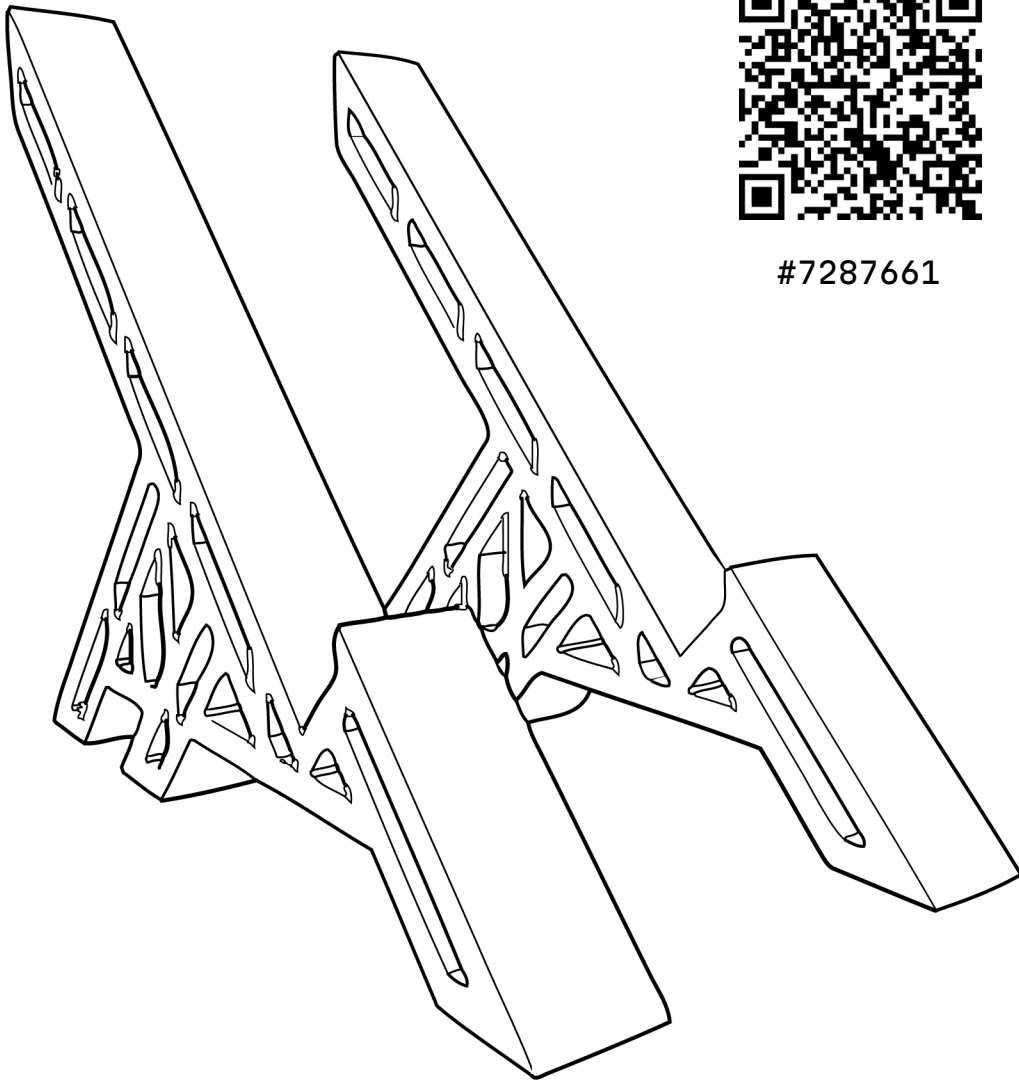
PROJECT GUIDE

TRIGONA KR2512-1

Thingiverse:



#7287661



TRIGONA

BY





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A. WHY?

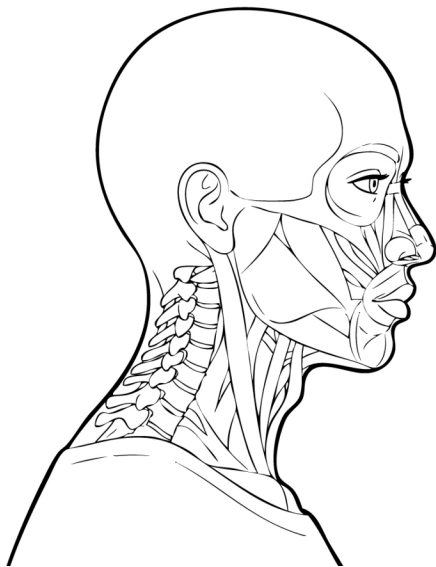
I had 3 problems.

A.1. Eye Strain

I use two computers. One desktop PC (daytime). And one laptop (evening/nights). I also use other equipment that affects eyesight, with the added glare from a screen.

A.2. Bad Posture

A typical (daytime) workday involves typing, writing on paper, and bending at an office whose chairs and tables are not made for non-standard body sizes. Effects include neck, shoulder and back strain.



Typical (night time) work involves typing at a laptop, drawing and writing in a paper notebook.

So, more stretching and bending (because touch-typing is not always possible).

Therein lie the ingredients for “tech neck”.

A.3. Desk Clutter

The desk must have space for typing, writing (on paper) and sketching. At the start of the project, it did not; the laptop stand had to be moved close enough for typing. Cable management, as a result, was...severely lacking.

My work setup had to change.

B. HOW?

B.1. Challenge #1

The solution must solve all 3 problems: eye strain, bad posture and desk clutter.

B.2. Challenge #2

The solution must meet **5/10** of Dieter Rams' most important Principles of Good Design.

Those principles, being, that:

GOOD DESIGN



1ST is innovative

2ND makes a product useful

3RD is aesthetic

4TH makes a product
understandable

5TH is unobtrusive

6TH is honest

7TH is long-lasting

8TH is thorough down to the
last detail

9TH is environmentally-
friendly

10TH is as little design as
possible

B.3. Initial Adjustments

(Recommendations from lookafteryoureyes.org)

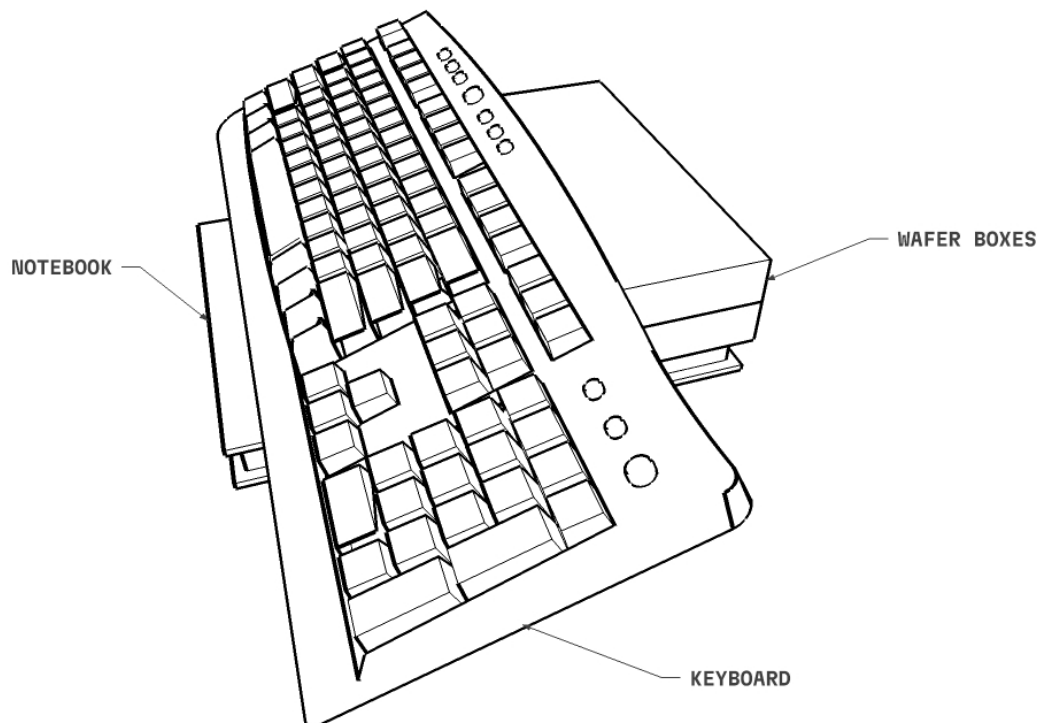
Ideal screen placement is 40cm to 76 cm away from face, with screen raised so the top is at eye level.

Adjusted the laptop stand so its height would match that. It was also moved back to lean (almost) against a wall. It was high – and far – enough. But its keyboard was difficult to reach.

Connected an old wired mechanical keyboard to the laptop and rested it on the table under the stand. Touch-typing is not always possible, so it had to move closer and there would be no space on the desktop to write or draw. Not with the keyboard resting flat on the surface: it would have to slant.

Created a structure with empty wafer boxes. With each box stacked on top of the other, the keyboard could be raised at an angle. This freed up some space, but not by much.

Enter an old hardcover spiral notebook, onto which the boxes could be stacked. This raised the keyboard from the desk and freed enough space for an A5 book to lay flat (for writing).



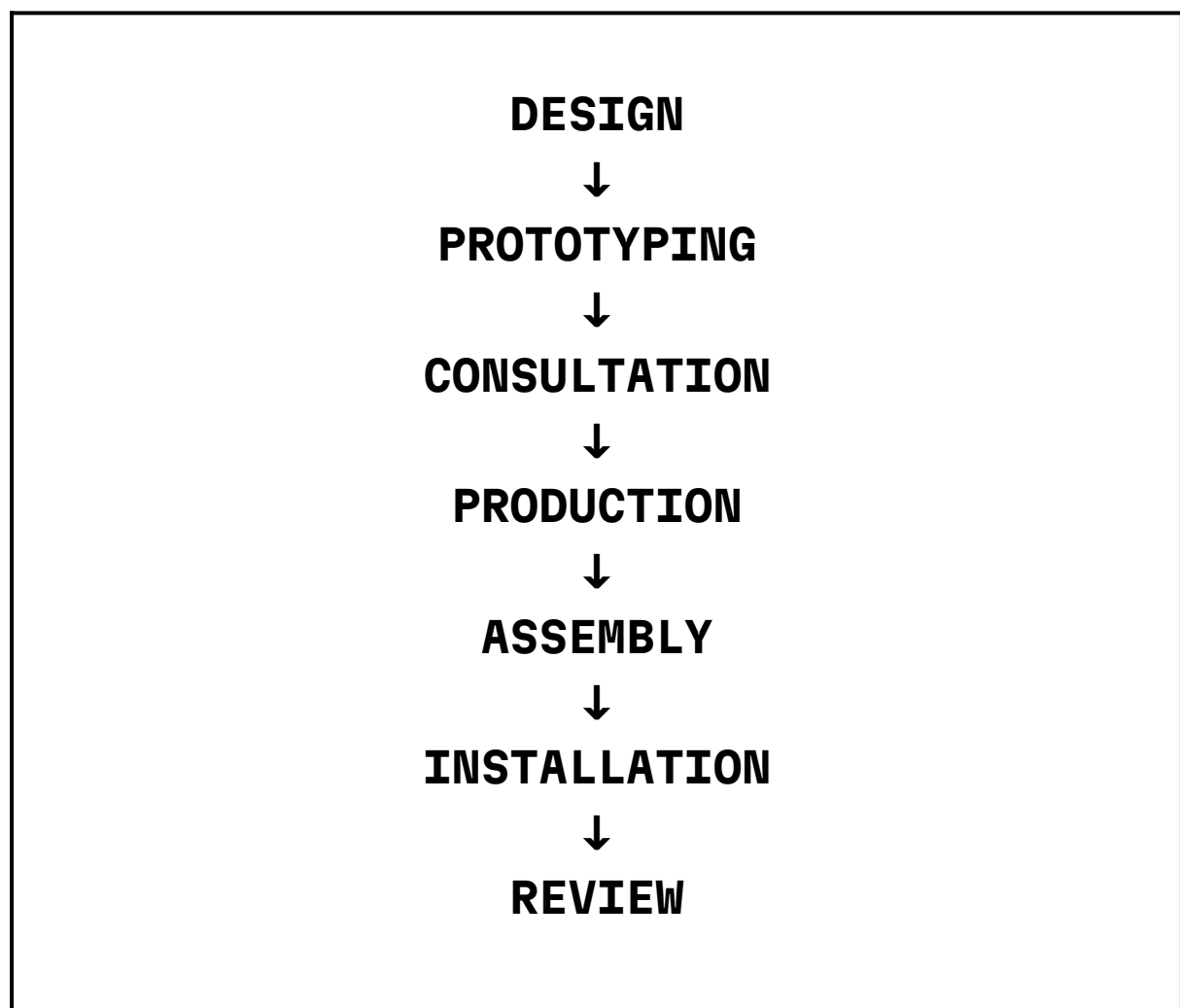
This initial (makeshift) setup remained in use from November 2025 to February 2026, with adjustments to the

boxes and angles to find the most comfortable layout. This probably would NOT be ergonomic for someone of “standard” arm length, height and dexterity. But this is not primarily for them.

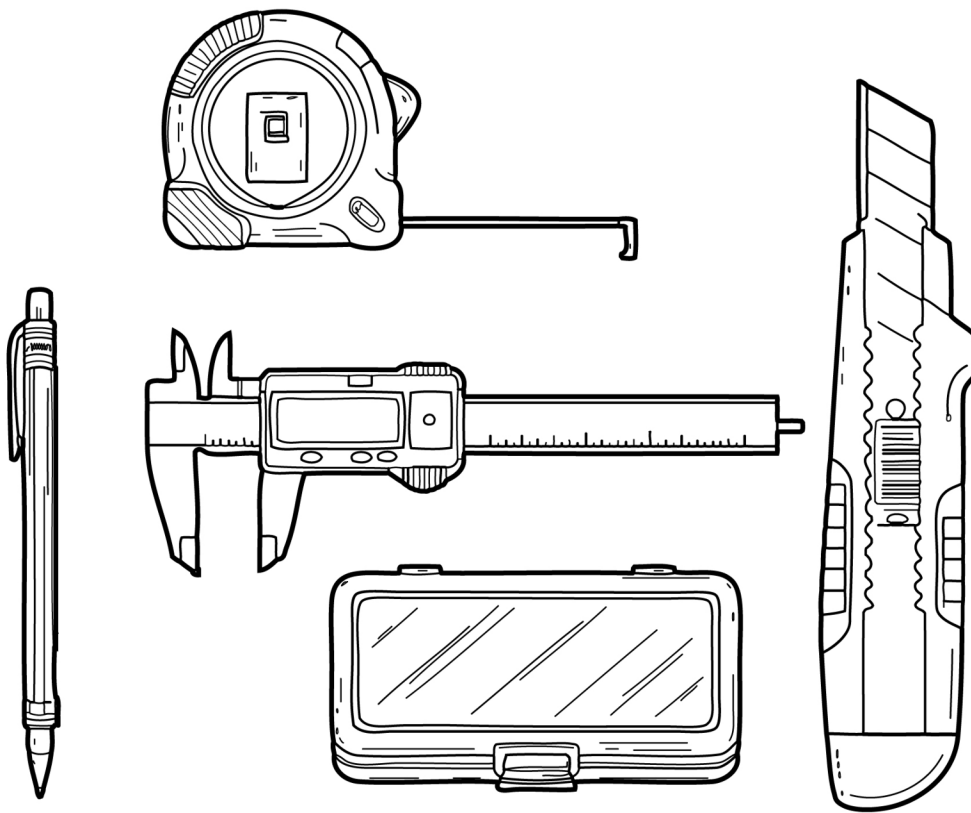
The wafer boxes began to deform, shift and sometimes collapse. Also: notebooks are for writing, and reading: not propping up computer accessories. There had to be a better way.

So this project (officially) began in December 2025, with the first rough sketches.

B.4. Process



B.5. Equipment



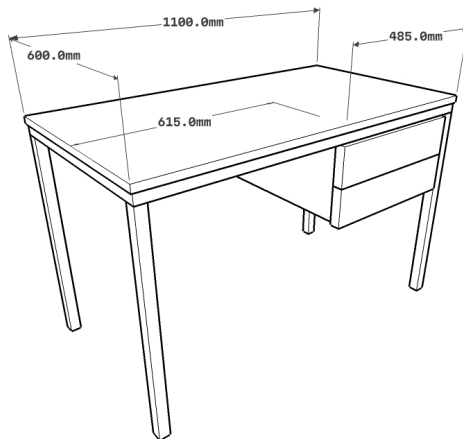
#	Item
1	Square Ruled Exercise Book
2	Pens (Ballpoint)
3	Ruler (millimeters/centimeters)
4	Tape Measure
5	Vernier Calipers (Digital)
6	Drafting Paper (A4)
7	Drafting Kit (with Mechanical Pencil)
8	Geometrical Set
9	Adhesive Felt Mats (square)
10	Cutting Mat (A4)
11	Crafting Knife

C. DESIGN

C.1. Measurements

Measuring done with vernier calipers, rulers, digital weighing scale and a stiff tape measure.

The Desk



Full desk dimensions
(length x width x
height):
1100mm x 600mm x
700mm.

Full desktop:
1100mm x 600mm.

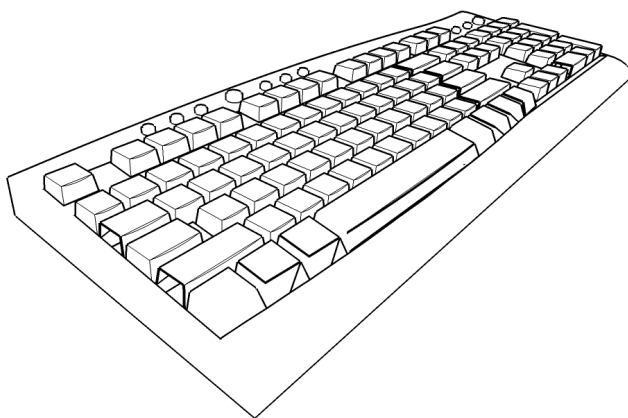
Usable space: 615mm x
600mm.

Blocked space: 485mm
x 600mm.

The “blocked” space cannot be used while seated because of the drawers and a desktop shelf.

The shelf, while being a prominent feature of the workstation, has no direct influence on this project so is only depicted in the final setup.

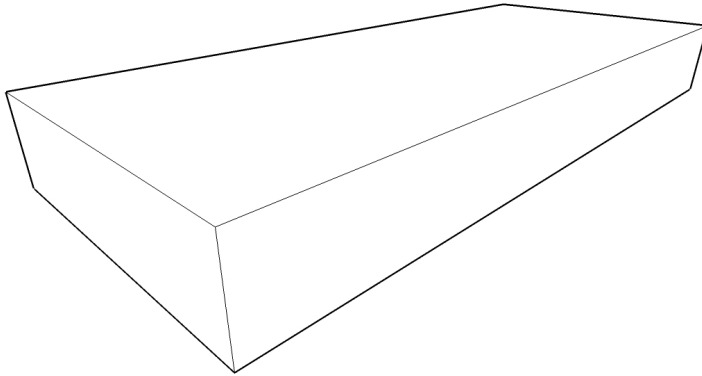
The Keyboard



Keyboard dimensions
(length x width x
height):
460mm x 70mm x 25.2mm

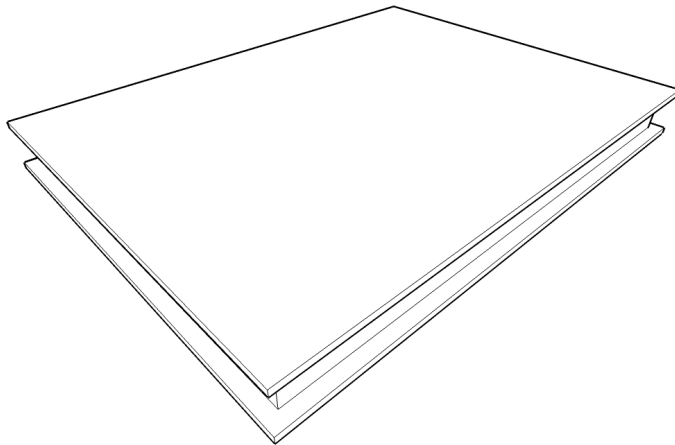
Keyboard weight:
600grams

Wafer Boxes



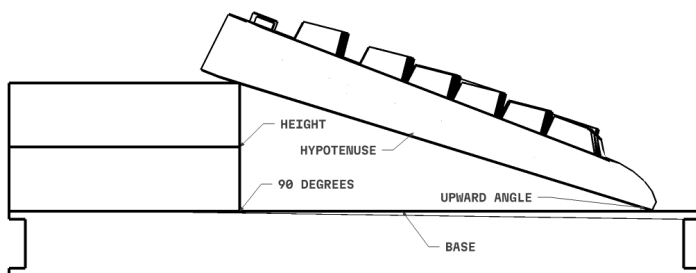
Wafer box dimensions
(length x width x
height):
220mm x 90mm x 25mm

The Notebook



Notebook dimensions
(length x width x
height):
212mm x 150mm x 20mm

The Makeshift Setup (again)



Taken at profile
(viewed from the
side), what does the
gap between the
keyboard and boxes
resemble? If you
thought “right angle
triangle”, you’re
right.

Trigonometry is your
friend.

C.2. Linguistic Diversion

Trigono means “triangle” (Greek).

Trigona means “triangles” (also Greek).

C.3. Product Sketches

Used pen and (square ruled) paper to create rough drafts that would then be used to make measured prototypes. The sketches continued until after the 4th and 5th prototypes.

C.4. Refined Diagrams

Created refined diagrams in Sketchup Make(2017), with standard left, right, front, back, top, bottom and isometric views.

This was repeated with every viable paper prototype, with adjustments for practical 3D printing and functional requirements.

C.5. Philosophy

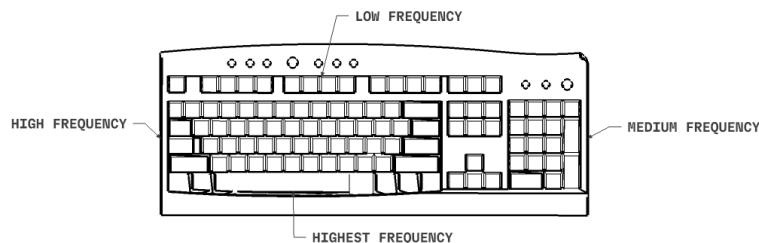
An ode to trigonometry and practical design.

...
FORM
WILL ALWAYS FOLLOW
FUNCTION
...

And if the original function does not work, the solution will be used in other ways. As book/phone stands. As paperweights. As decorative elements.

D. PROTOTYPES

D.1. Structure



Because of typing mechanics, key placement and keyboard width or breadth, there would have to be 2 symmetrical items.

Since they're based on actual triangles, I named them "trigons".

Why 2 pieces?

1. Structurally, having one thick piece would make the keyboard wobble while typing.
2. Not all keyboards are the same width, so having 2 pieces covers that.

Since there will be more than one printed piece in this project, I adopted the name "Trigona" for the entire project.

Felt mats would have to be added to the final product for more friction and to protect the desk surface.

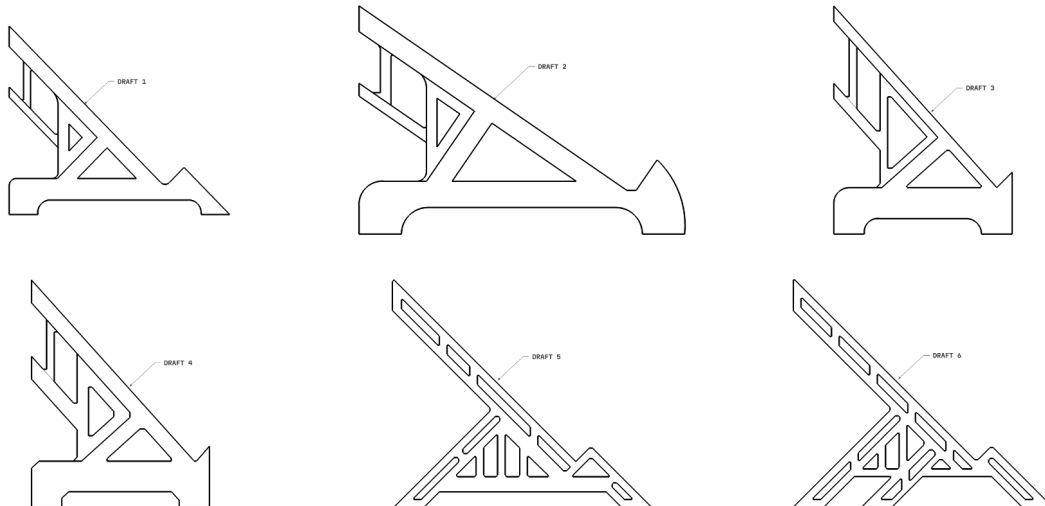
D.2. Naming Conventions

Project Name (Explained)			
Trigona	KR	2512	-1
Name of both triangular pieces (in plural).	Keyboard Riser/Keyboard Rest.	When the project began. December 2025.	Product iteration number.

D.3. Paper Prototypes

Used an A4 sketchbook, drafting set, mechanical and 2H/HB pencils, black ballpoint pen, crafting knife and cutting mat. Also used some (other) wafer boxes to offer support thickness in cardboard because paper is too thin to hold the weight of a 600gram keyboard.

Created profile drafts to serve as prototypes for the solution.



More sketches were done while developing the prototypes.

The “handle” at the back of the prototypes disappeared served no actual purpose, other than a “nice-to-have” feature which would not really be used. The “handle” existed to move the trigons back and forth: an action that could be performed using the legs at the base. So it disappeared.

The “cable hole” close to the “handle” also disappeared. Wires are better hidden under the laptop stand.

Later prototypes added a third “leg” to the base of the structure and adjusted the resting angle from the steeper 48° to 45°.

Each viable paper prototype was refined in SketchUp.

D.4. Material Choice

Considered what the trigons would be made of, and why. The manufacturing process was considered from the beginning of the project, but the table made the final choice more decisive.

3D Printing

Filament	Comments
ABS Acrylonitrile Butadiene Styrene	Durable, heat-resistant and impact-resistant. Ideal choice, depending on price.
PLA Polylactic Acid	Stiff, dense and affordable. Second choice, if ABS is unavailable or too expensive.
PET-G Polyethylene Terephthalate Glycol	Durable, water resistant, chemical and fatigue resistant. Expensive. Third choice, if ABS and PLA are unavailable.

Others

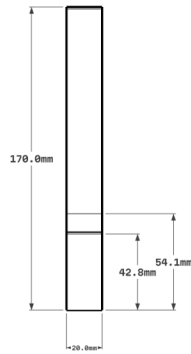
Material	Comments
Al Aluminium	Best alternative if 3D Printing cannot happen.
Wood	Highly aesthetic but not feasible in situations where ethically-sourced wood of good quality is difficult to find. Would have to be redesigned to consider joinery.

I decided to match the material of the keyboard: plastic.
Which means: 3D printing, with black ABS filament.

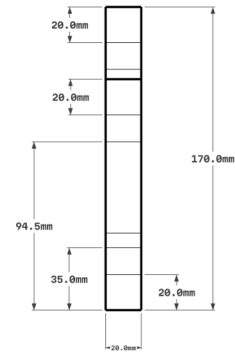
E. CHOSEN DESIGN

Shown using standard orthographic projections: top, bottom, front, back, left and right.

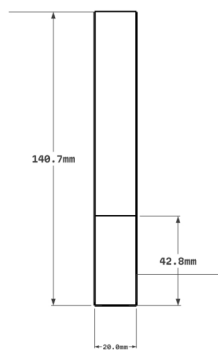
TOP



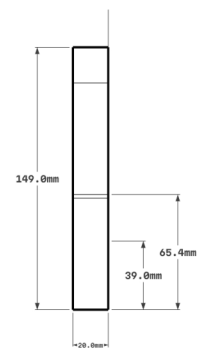
BOTTOM



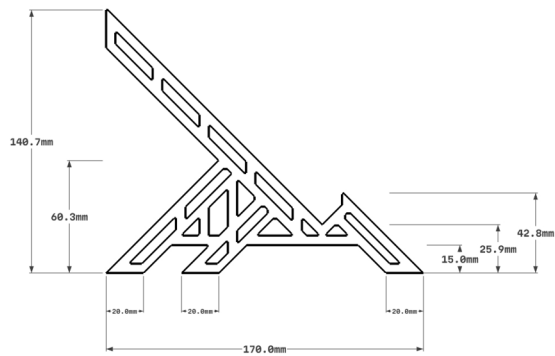
FRONT



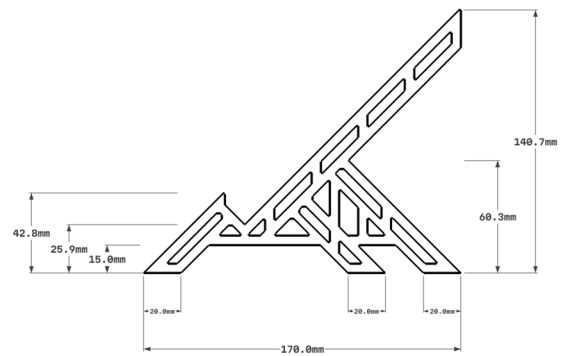
BACK



LEFT



RIGHT



F. CONSULTATION

Exported the STL file from SketchUp to FreeCAD. Added fillets and exported the body as its own file.

Printer consultation and estimation happened. Turns out ABS was cost-effective.

Production commenced on February 2nd 2026.

G. PRODUCTION

The 3D Printing process began on February 2nd 2026.

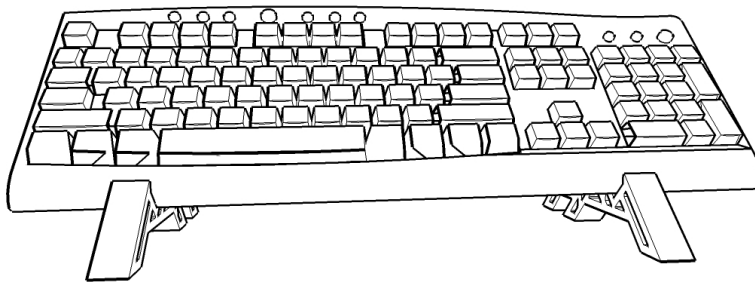
Final prints delivered on February 3rd 2026.

H. ASSEMBLY

Added felt mats to the trigons.

Each mat was not 20mm by 20mm. They had to be cut to fit the base. Exactly 6 were needed (3 per Trigon). After testing the grip on the desk before and after adding the mats, they prove to be a good choice.

I. INSTALLATION



Placed the trigons on the desk, added the keyboard and test-typed.

No wobble.

Stayed in place. Freed up enough space on the desk to hide cables, allow more space for writing.

J. REVIEW

J.1. Costing

Had to buy most materials and equipment, so the cost was high.

Also: hobbyist 3D printing in Kenya is expensive. Making anything tangible on this planet is expensive.

J.2. Service Provider

Service was good. Prints were delivered on time. Went with them because none of the other providers responded to my messages.

J.3. Time

Development time was constrained by budgets. Since I didn't have most of the materials, had to wait to afford them before proceeding.

J.4. Textured Prints?

For future versions, friction between keyboard and trigon main hypotenuse would be improved with textured faces.

J.5. Thingiverse

Uploaded the final STL file to Thingiverse.

[thingiverse.com/thing:7287661](https://www.thingiverse.com/thing:7287661)

J.6. Improvements

Must learn product photography.

Future versions will be height-and-slant-adjustable.

3.7. Challenge Checklist

Challenge # 1:

- 1. Eye Strain:** new screen and keyboard placement mean less squinting. **(FIXED)**
- 2. Bad Posture:** typing, writing may now happen with back straight. **(FIXED)**
- 3. Desk Clutter:** there is more space, and cables are hidden while also being easy to reach if needed (for charging, etc). **(FIXED)**

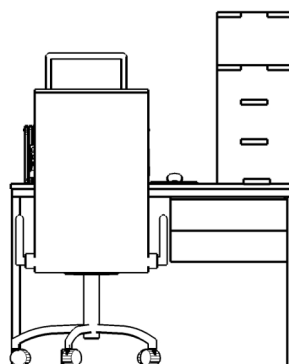
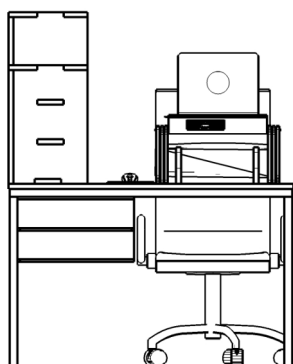
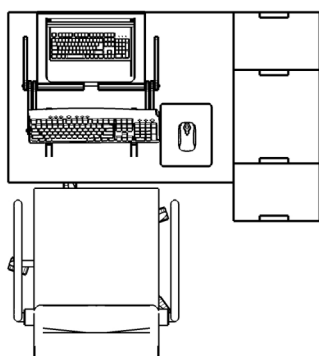
Verdict: WIN.

Challenge #2:

1ST	Is Innovative	Keyboard rests/risers/stands already exist. But most of them are not this steep.	NEUTRAL
2ND	Makes a Product Useful	Typing, writing, drawing and sketching are easier now.	PASS
3RD	Is Aesthetic	Appearance stayed true to the theme of triangles.	PASS
4TH	Makes A Product Understandable	Most people did not have any idea what it was...probably until/unless they read this article.	FAIL
5TH	Is Unobtrusive	Most parts of the trigon structure will be under the keyboard, and invisible.	PASS
6TH	Is Honest	It does what it says.	PASS
7TH	Is Long-Lasting	We shall see after months of use.	NEUTRAL
8TH	Is Thorough Down To The Last Detail	Each 45-degree slant has a matching perpendicular. And every corner is beveled to make it easy to clean.	PASS
9TH	Is Environmentally Friendly	It's made of plastic. Not sure if that's a good or bad thing.	NEUTRAL
10TH	Is As Little Design As Possible	The support structure is elaborate.	FAIL

Tally: NEUTRAL: 3. | FAIL:2 | 3. PASS:5

Verdict: WIN (PASS = 5 out of 10).



END.

www.aminakombo.work