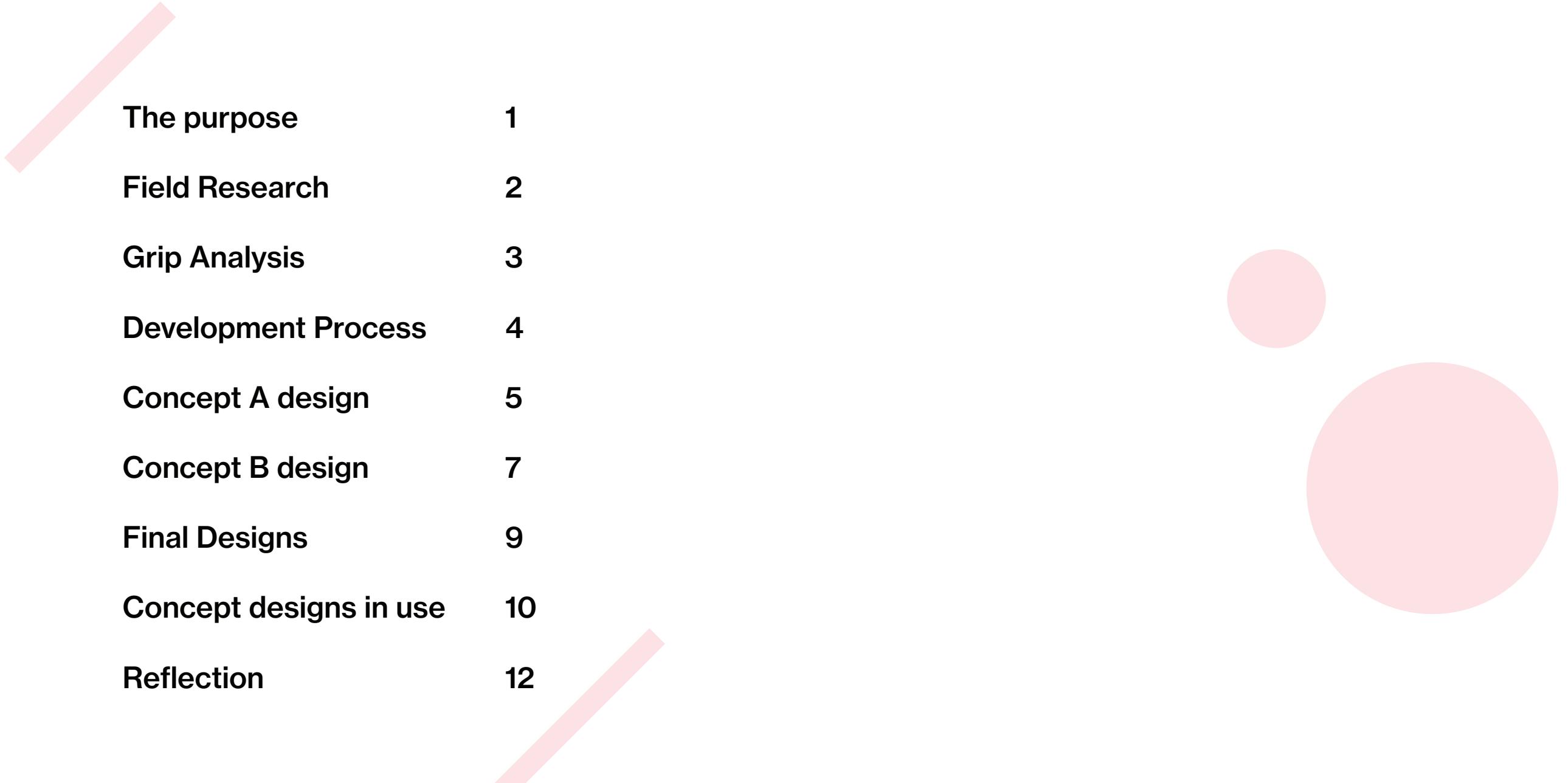


ERGONOMIC WORKSHOP TOOLS REDESIGN

WRENCH

ID 1011 *Design Fundamentals*
Sharanya Pillalamarri
Section 2B





The purpose	1
Field Research	2
Grip Analysis	3
Development Process	4
Concept A design	5
Concept B design	7
Final Designs	9
Concept designs in use	10
Reflection	12

Content.

The Purpose

In this project, we identified the limitations of a popular product in the workshop tools category. With careful reconsiderations, we proposed different designs that could overcome these limitations and create a better user experience. For workshop tools, I focused on precision and strength of the tool and how its design could improve the quality of the work being done by the tool.

Field Research

Tool: Wrench



Why is it designed this way?

Wrenches are used for gripping, fastening, turning, tightening and loosening things like pipes, pipe fittings, nuts and bolts.

How is it intended to be used?

The wrench is intended to be used with one hand. The user could grip it closer to the head for a precision grip or far down the handle to apply more pressure.

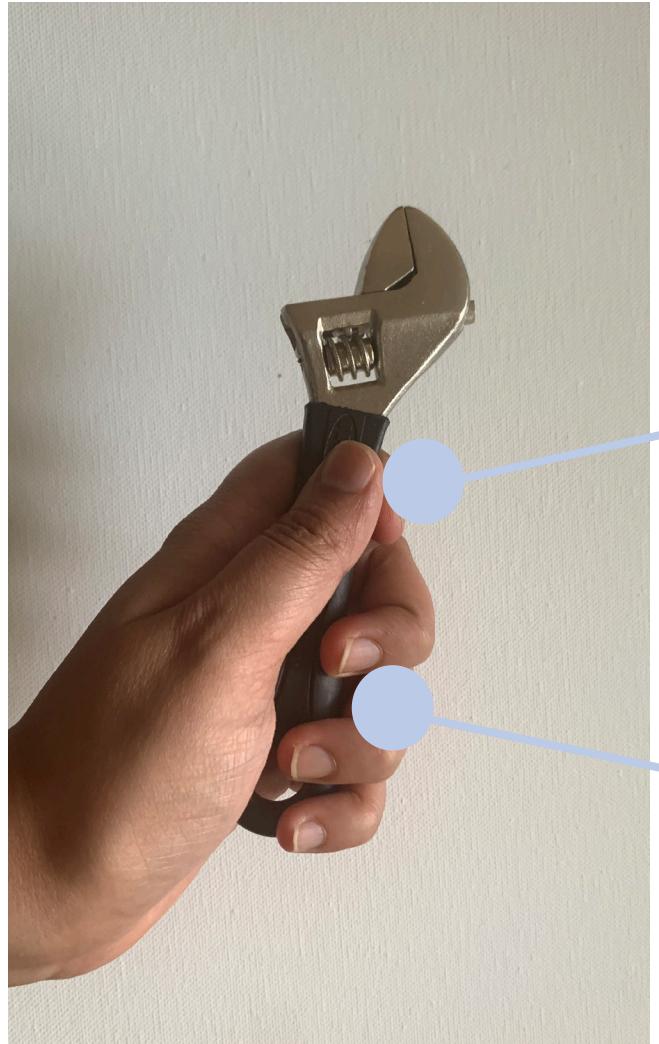
What are the limitations inherent in the handle design?

Two hands cannot be used to apply pressure. Moreover, since the handle is so small, the user needs to keep adjusting their grip so that the handle doesn't slip. This limits the amount of pressure that the user can apply. It also hurts the user's wrist.

Colors: black and metallic silver

Materials: steel and thick rubber outer covering

Finishes: metallic finish for the head and
smooth finish for the rubber handle

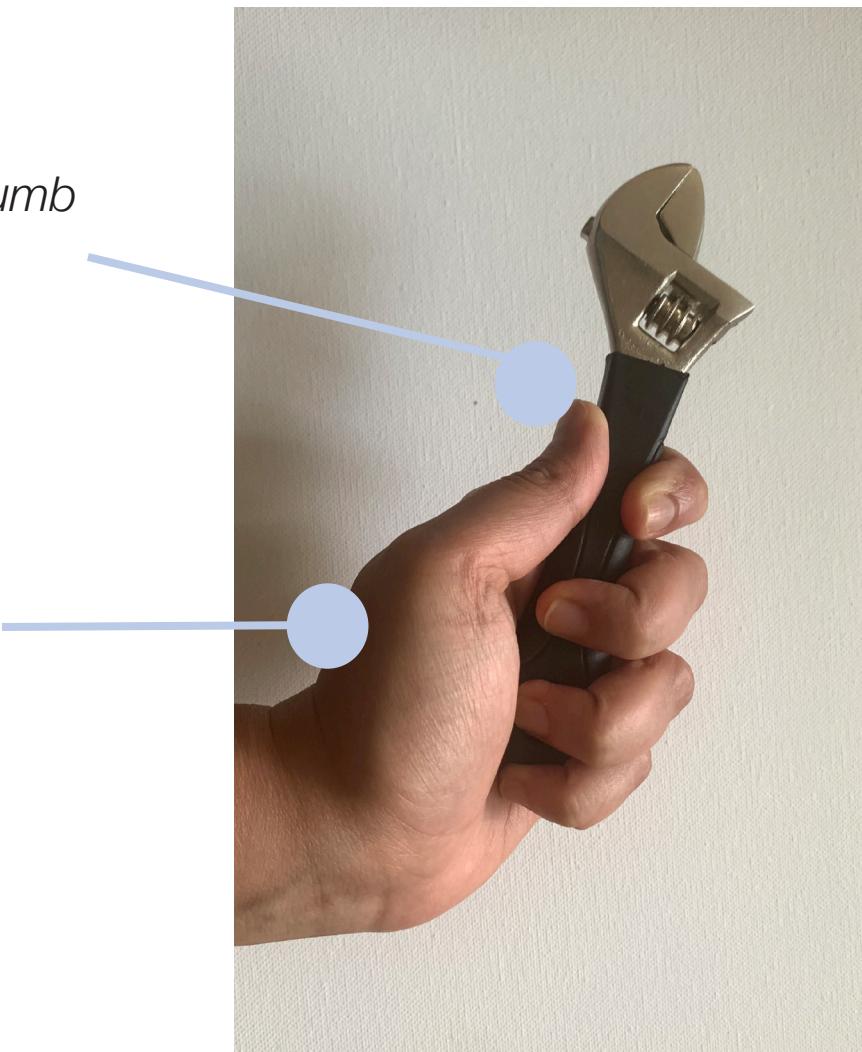


The handle is too small and keeps slipping from the hand when the user applies pressure

A rounder handle will fit better in the palm

The hard edge of the handle digs into the thumb that causes pain

Rather than a straight handle, a circular handle (like a steering wheel) will put less pressure on the wrist

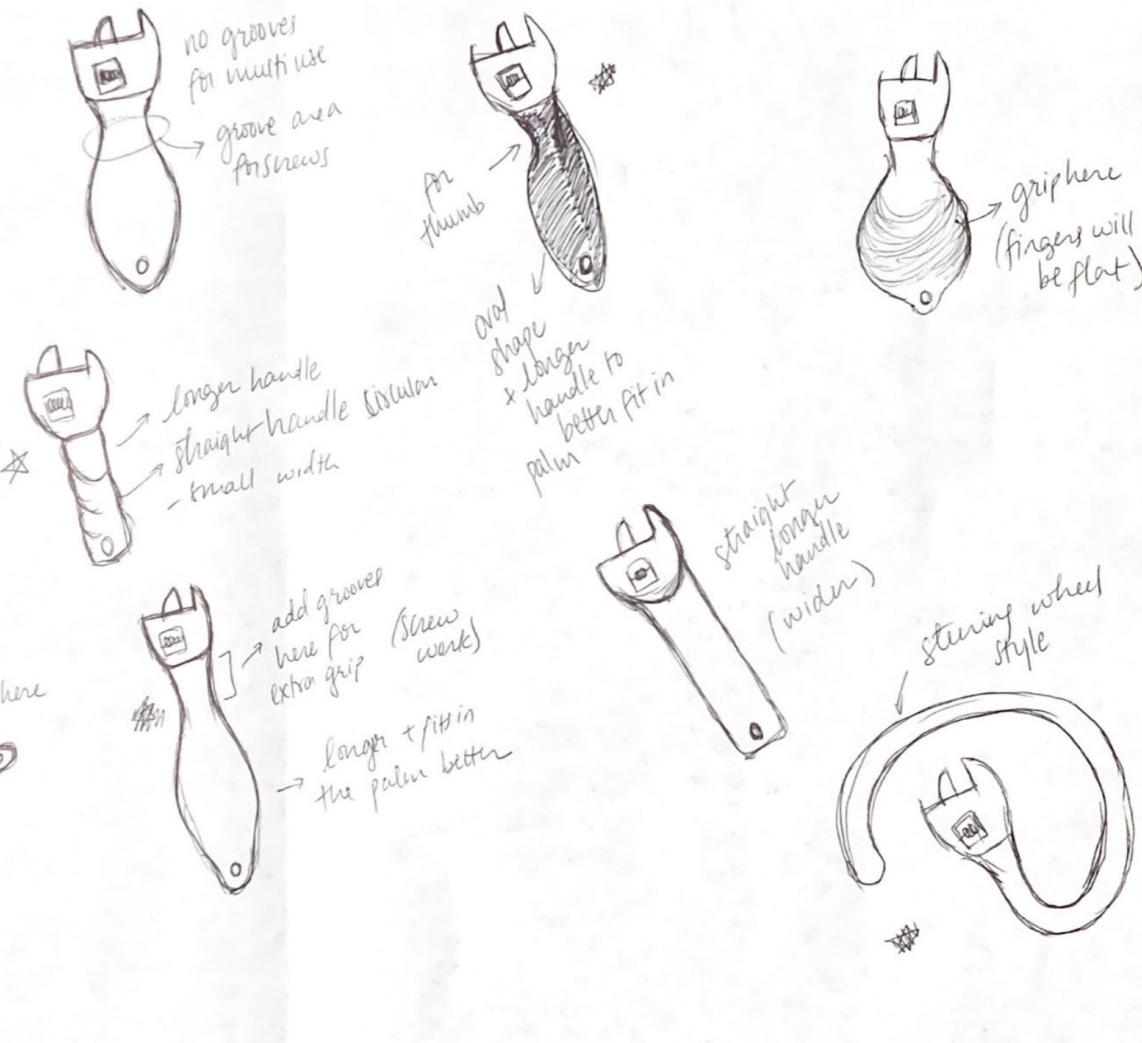
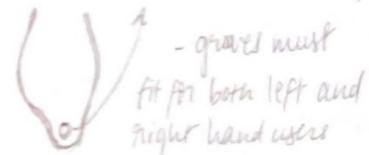


Grip Analysis

Development Process

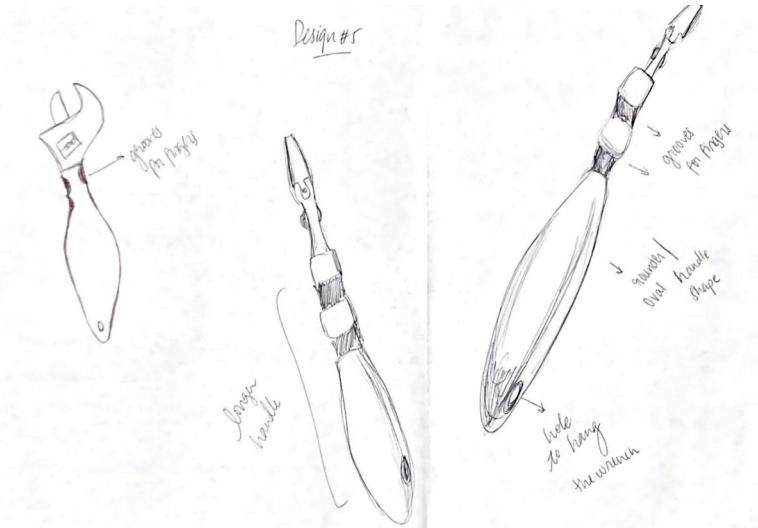
Wrench

- make the handle longer
- Add a groove for thumb
- Make the handle cylindrical to fit in the palm better
- Drill hole the hole to hang it up



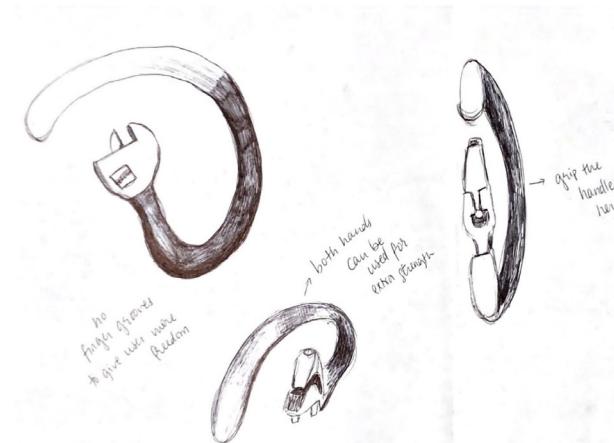
Thumbnail Sketches

Design #5



Concept A: This design has a rounder handle to fit in the palm and two finger grooves for precision work

Design #2
Inspiration: Steering u

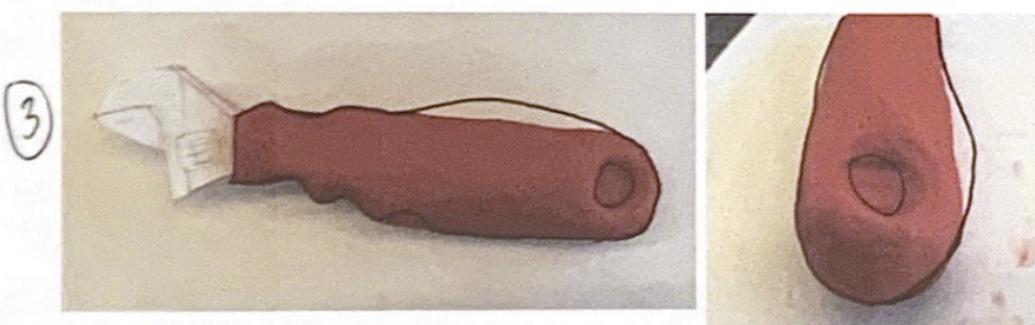
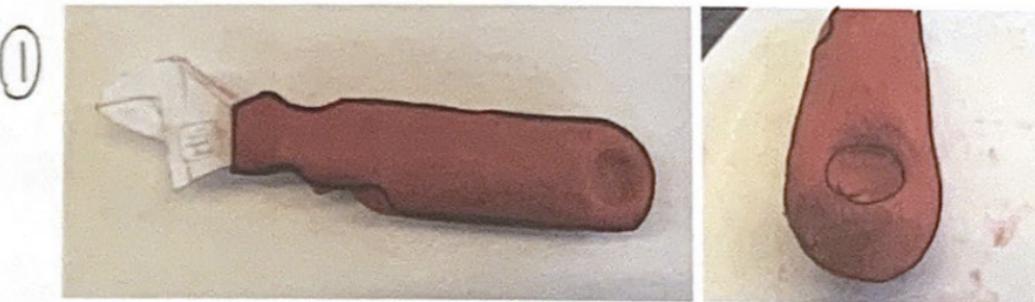


Concept B: This design has a circular handle that can be used with two hands and puts less pressure on the wrist

Concept A

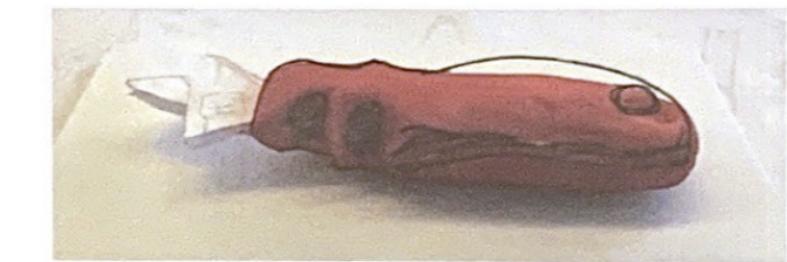


(1) Feedback → make middle finger groove lower
↳ make grooves far apart
Allows → better grip for bigger hands
Limitations → less precision when working with nails



(3) Feedback → add more grooves lower
↳ add curves to handle
Limitations → doesn't give much room to be held in other positions due to the asymmetrical shape + lower groove.
↳ body is visually not symmetric
Allows → more freedom for precision grip
↳ more palm strength can be applied

(2) Feedback → curve the handle to better fit in palm better
↳ make the right side rounder to make it fit
Allows → better grip in palm, able to apply comfortably in palm
Limitations → visually less symmetrical
↳ could be less precise



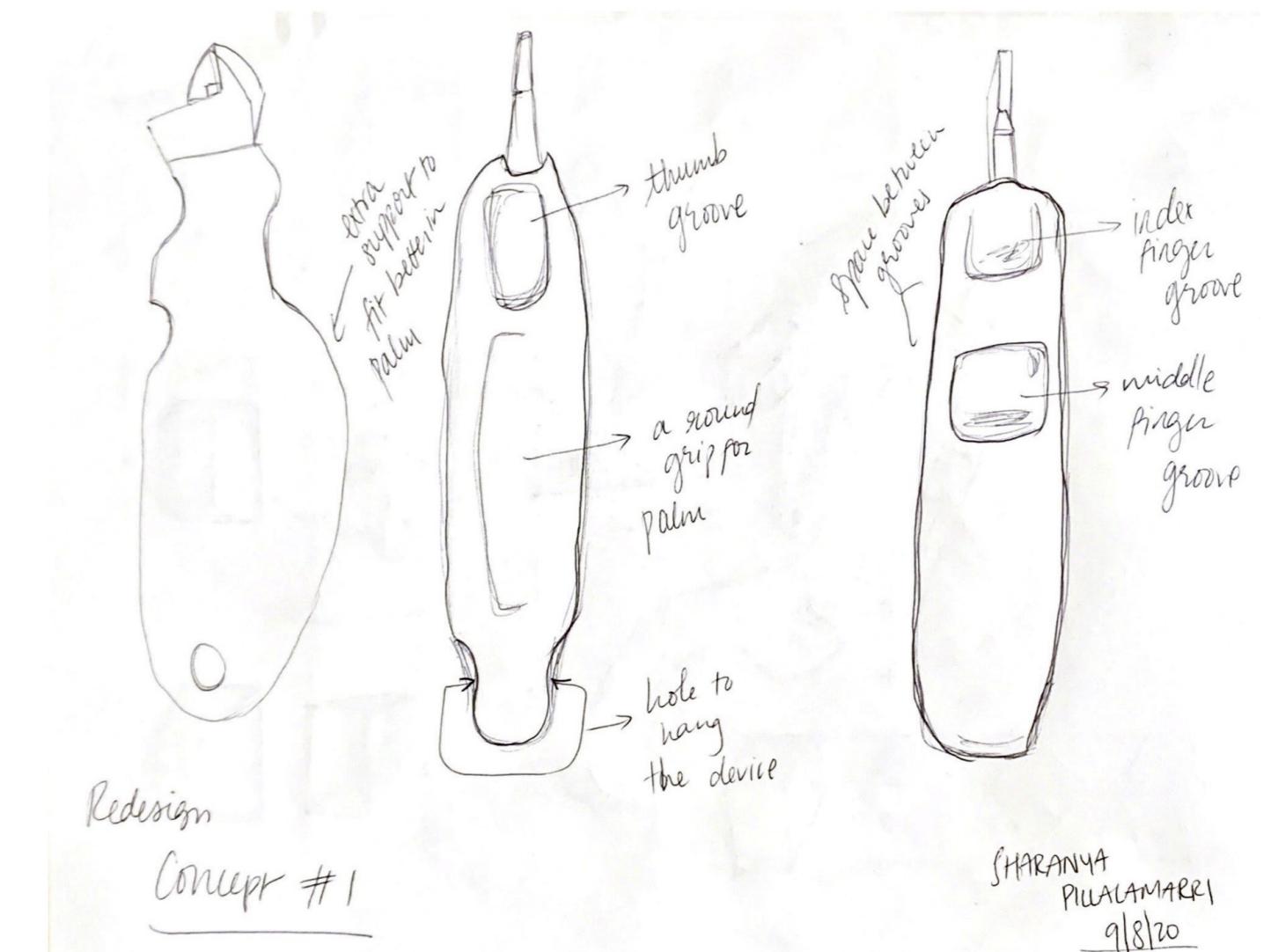
Concept A - Redesign

Feedback:

- a space between the finger grooves will put less pressure on the fingers
- a more curvy handle will fit better in the palm
- limiting the number of grooves to 2 facilitates for many ways to use the handle

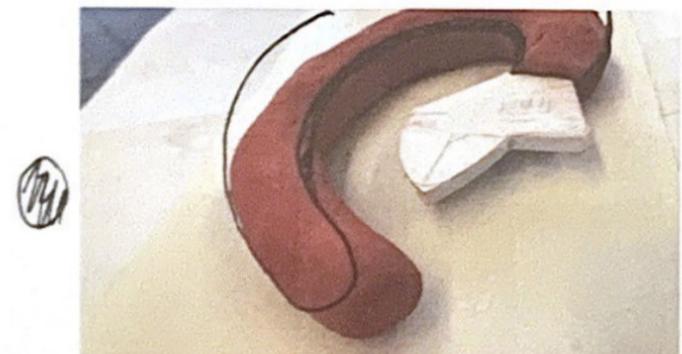
Changes made:

- added a small gap between the grooves for a better grip
- added an asymmetrical curve to the handle so it better fits into the palm

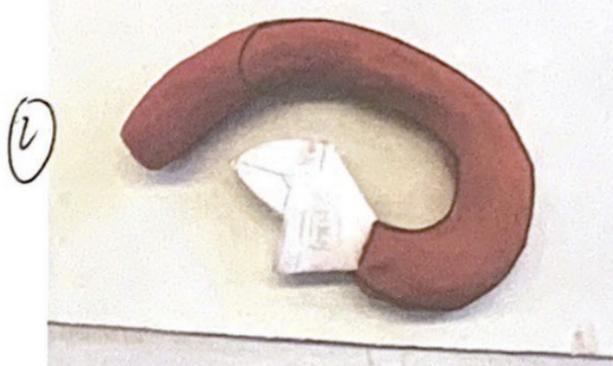


Concept B

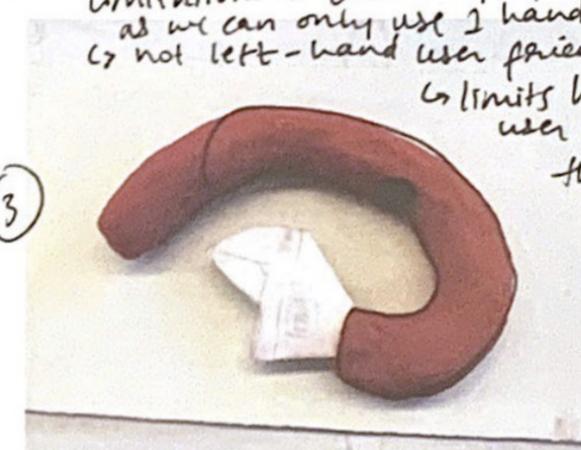
(1) Feedback → more distance between head & handle needed
 Allows → more space for bolts/nails & fingers of users when turning
 Limitations → more pressure required for the circular motion



(2) Feedback → shorter handle to reach corners.
 Allows → corners + small space can be easily reached
 ↳ would be used perpendicular to the wall instead of parallel
 Limitations → hard to use w/ 2 hands
 ↳ less pressure can be applied to nails since only 1 hand can be used



(3) Feedback → shorter handle to reach corners.
 ↳ finger grooves so that the user knows how to use it
 Allows → corners can be reached, can be used perpendicular to the wall, user knows exactly how to hold it.
 Limitations → cannot apply a lot of pressure as we can only use 1 hand
 ↳ not left-hand user friendly
 ↳ limits how the user can use the device



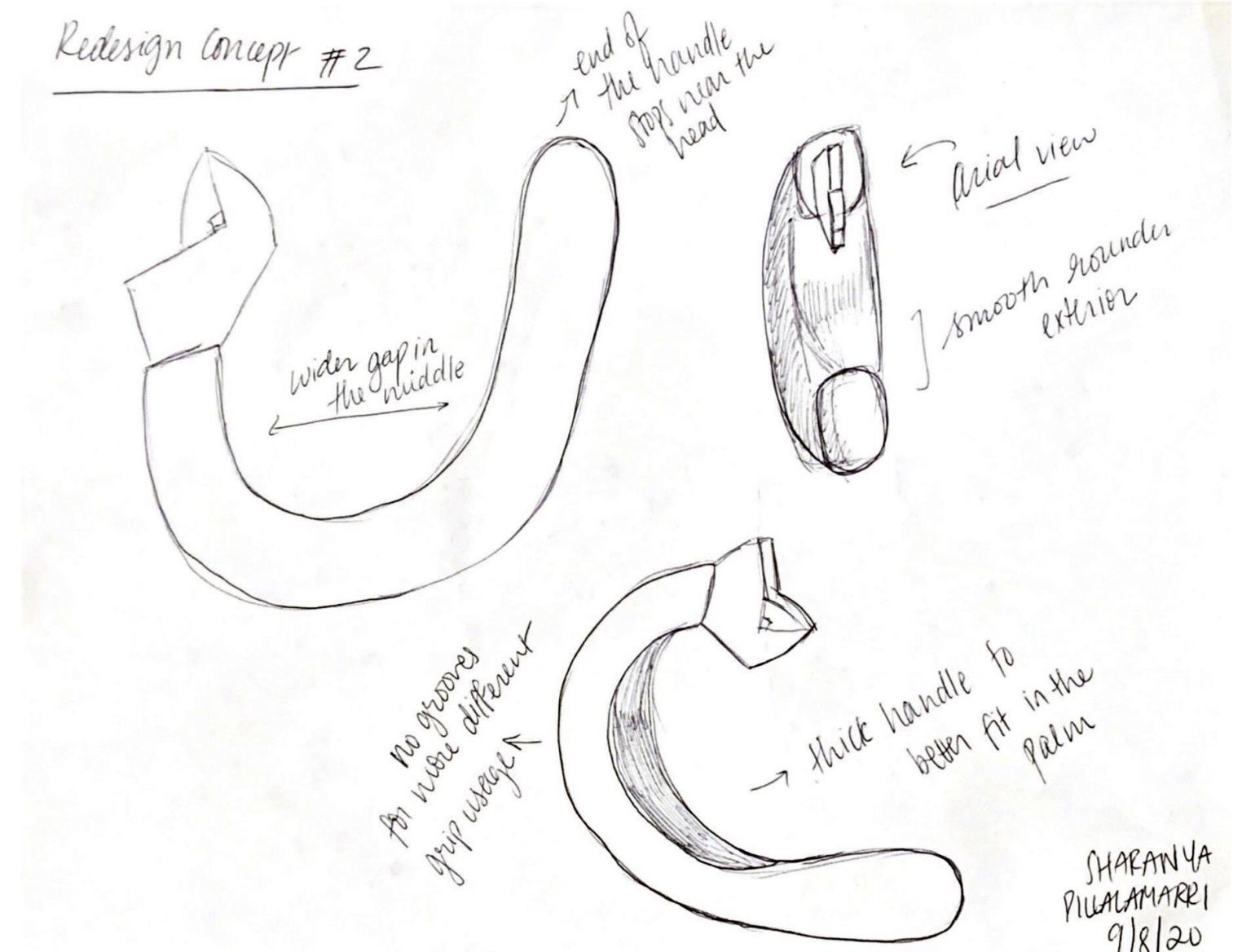
Concept B - Redesign

Feedback:

- The handle is too long and blocks the head from reaching corners
- There is very little space between the head and the handle where large pipes or screws cannot fit
- grooves or other indication on how to use the handle can be helpful

Changes made:

- added a wider gap between the head and the handle
- shortened the handle for a wider range of uses
- did not add grooves to the handle to facilitate for a wider range of grips





Concept A



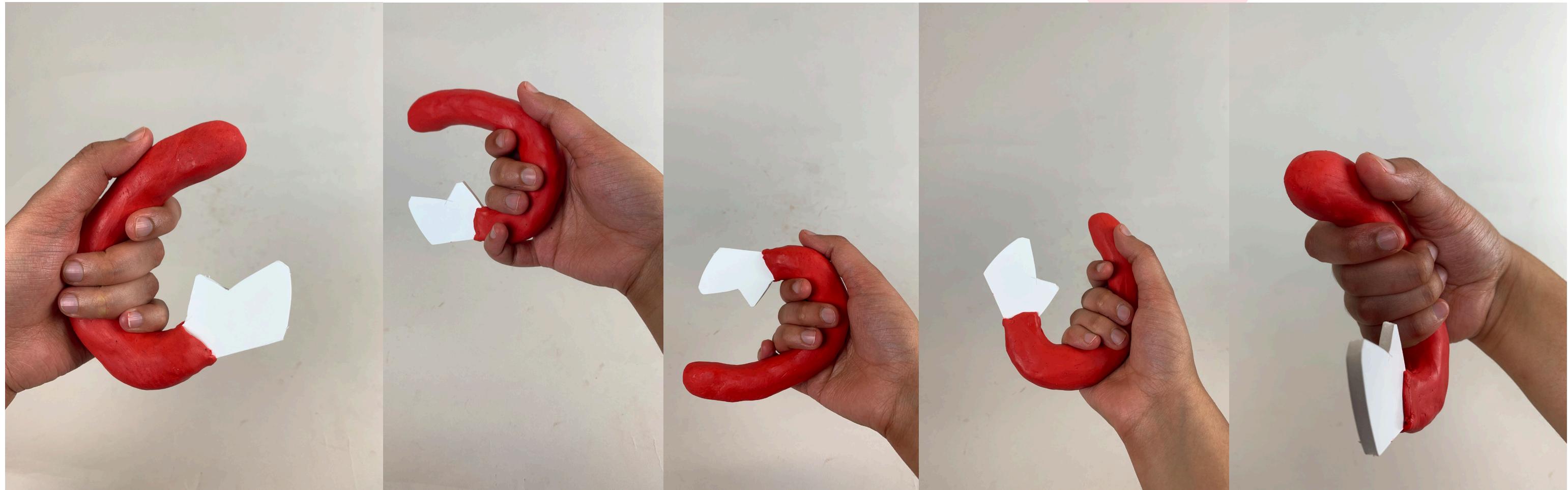
Concept B

*The prototypes were
made with clay.*

Final Designs .



Concept A in use ...



Concept B in use ...

Reflection

The final designs of the wrench provide more comfort to the user as there is less pressure on the wrist, thumb and the middle finger. The circular shape of the handles eliminate the need for hard edges (which dig into the user's skin and cause discomfort). Moreover, both of the handle designs allow the user to hold the tool in multiple ways, fit into both small and big hands and can be used by those who primarily use their left hand. Concept A's design with finger grooves lets the user have more precision while Concept B's design allows the user to use more strength without straining their wrist.

Before



After

