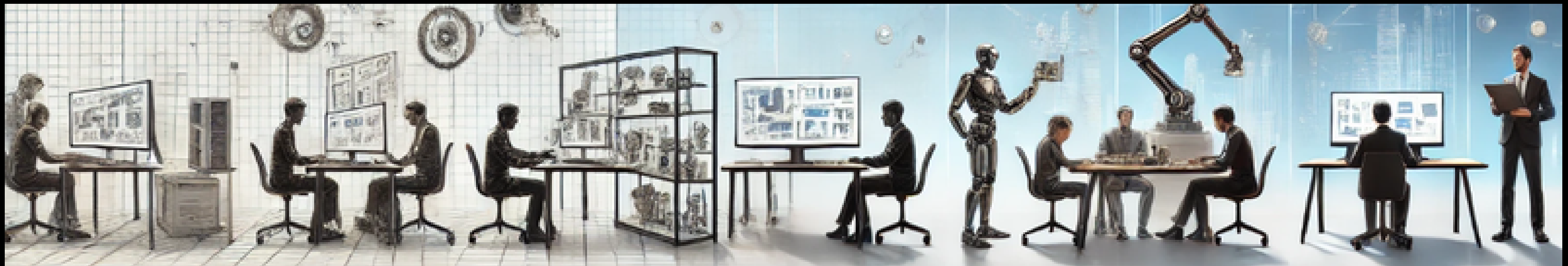


ENGINEERING PROJECTS

From ideation to execution



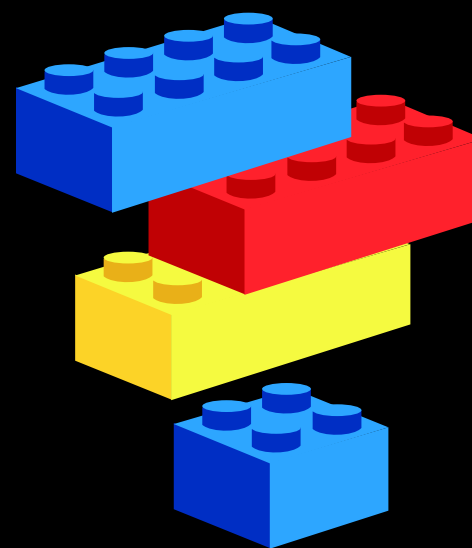
STEP BY STEP: TURNING IDEAS INTO REALITY



WHY IS THIS IMPORTANT?

Engineers tackle complex problems by starting small and scaling up

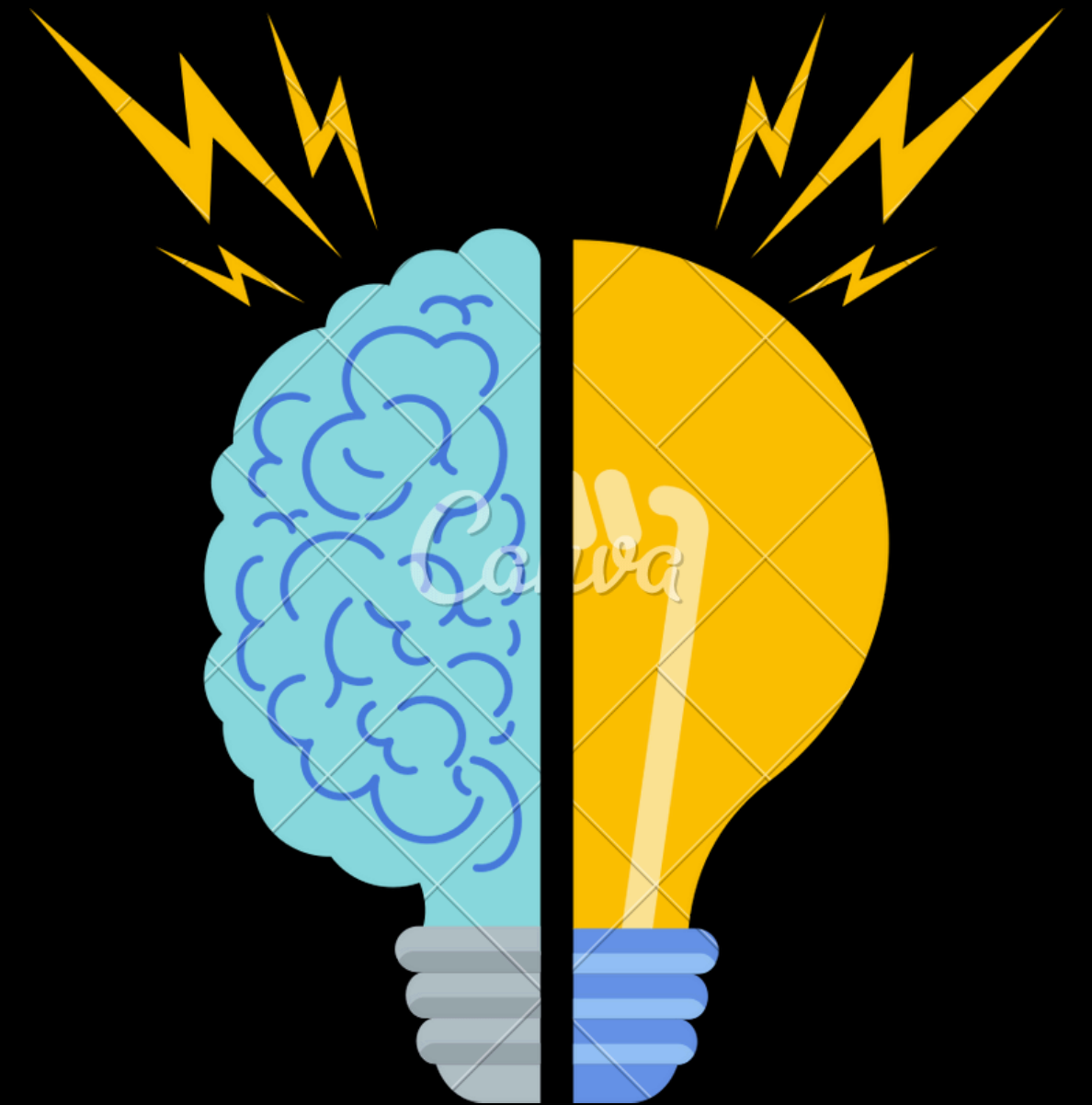
Understanding this process ensures efficiency, reduces risk and leads to real-world impact



ATTENDANCE
TIME!

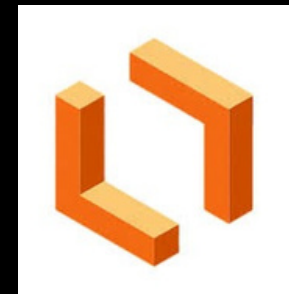
STEP 1 - BRAINSTORM IDEAS

- identify a problem or need (e.g. your own or those around you)
- think about the constraints (time, resources, skills)
-



BRAINSTORMING TOOLS

“Back to the drawing board”



Canva

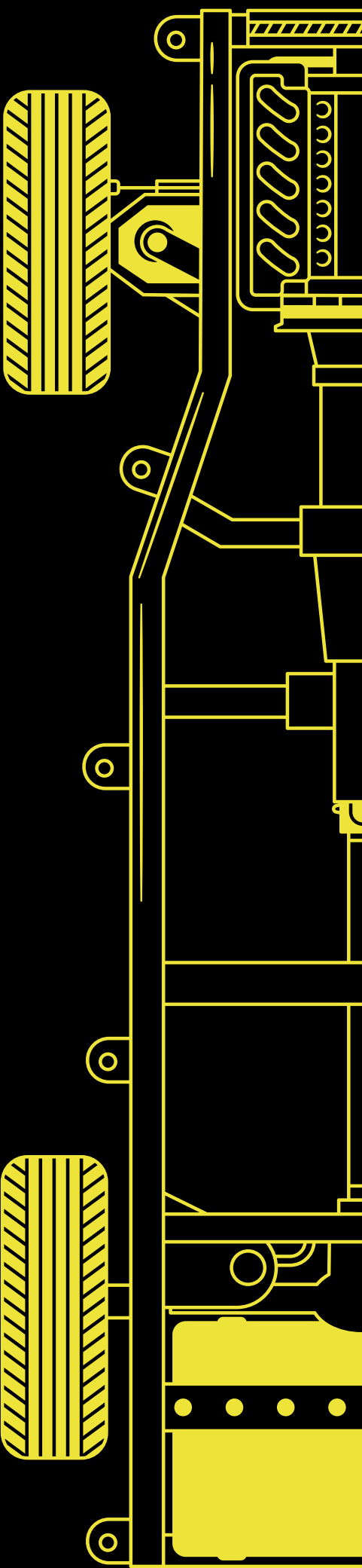
Lucidchart

Canva

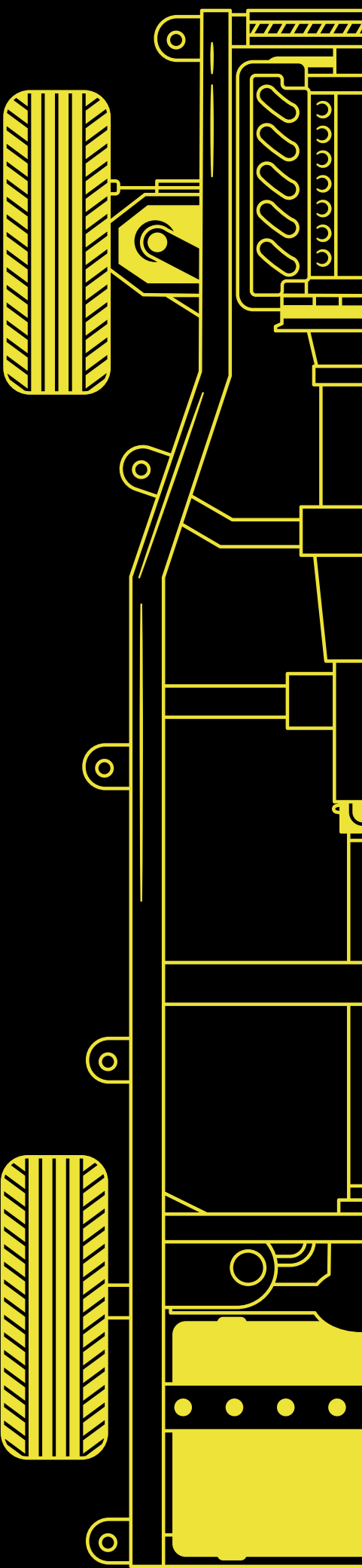
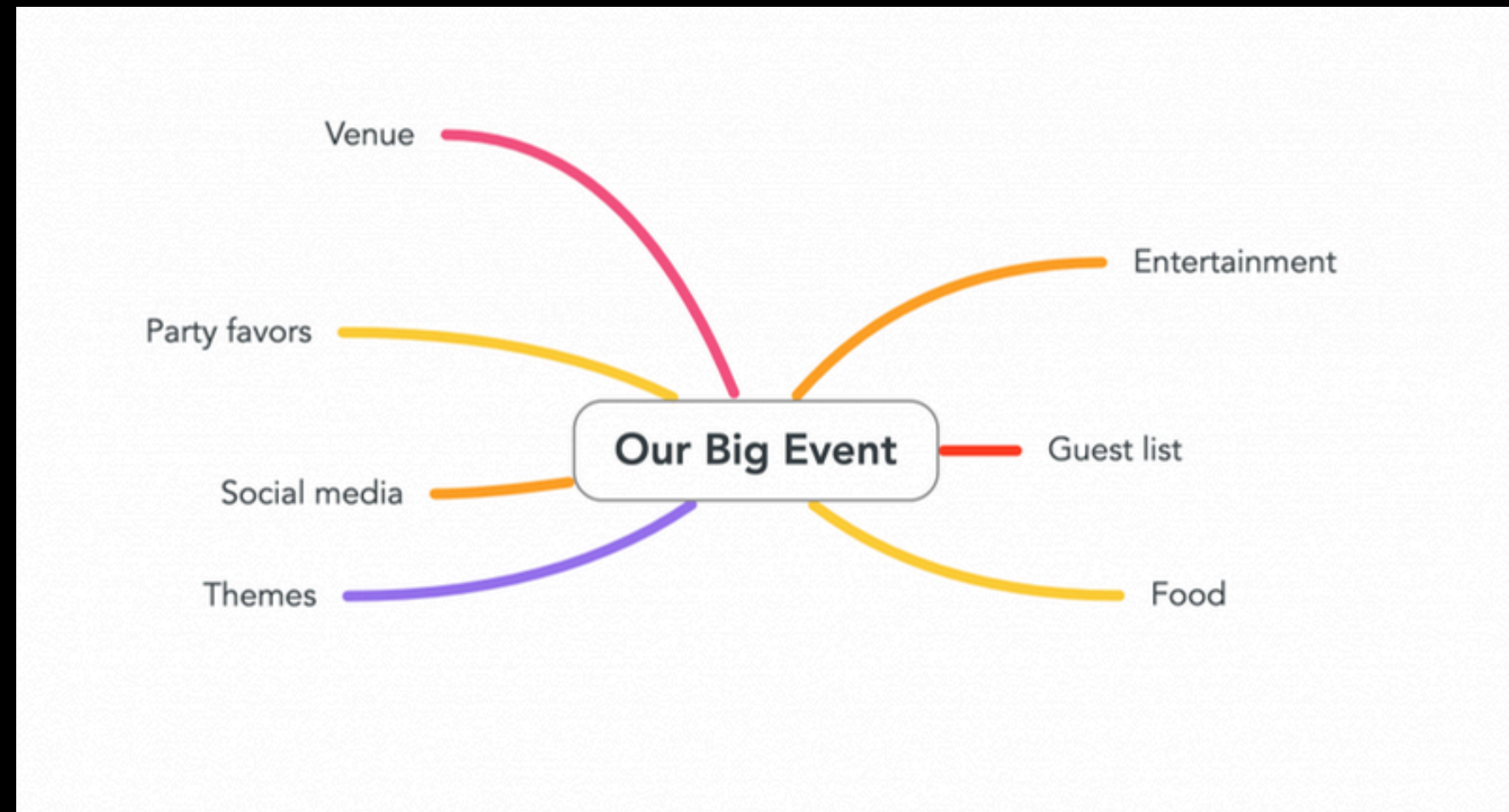
Google Docs/Slides

Microsoft Word/Powerpoint

or even a physical whiteboard



EXAMPLE: BRAINSTORMING



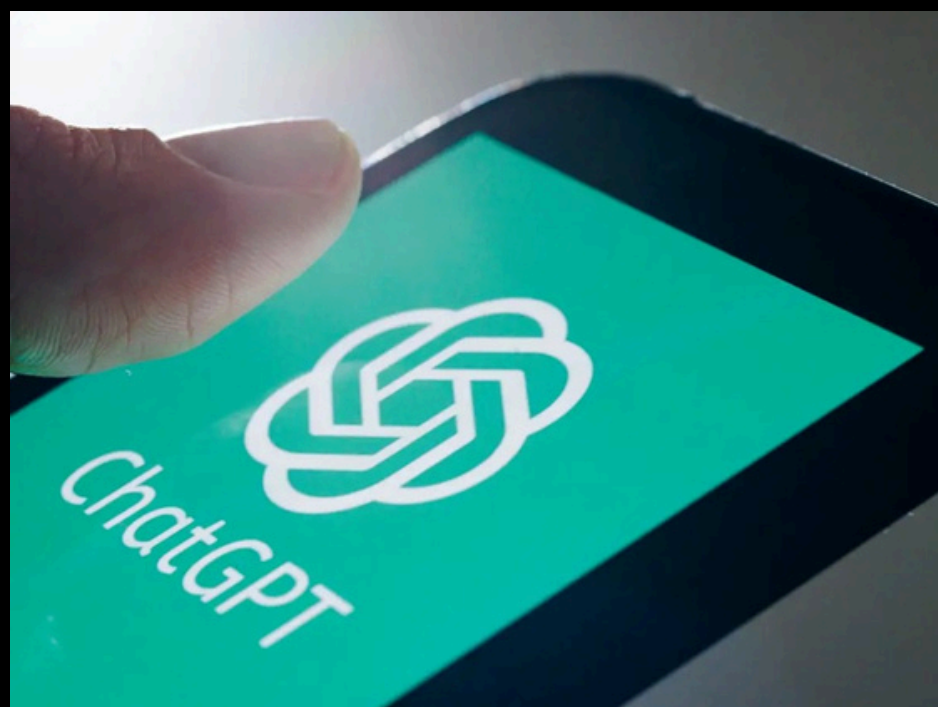
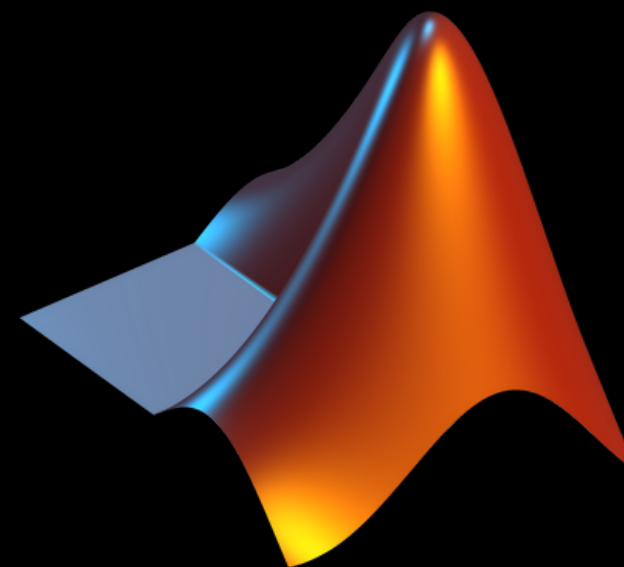
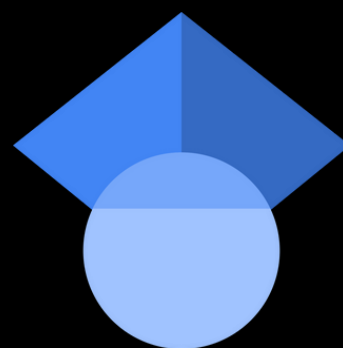
STEP 2 - RESEARCH

Time to assess your idea

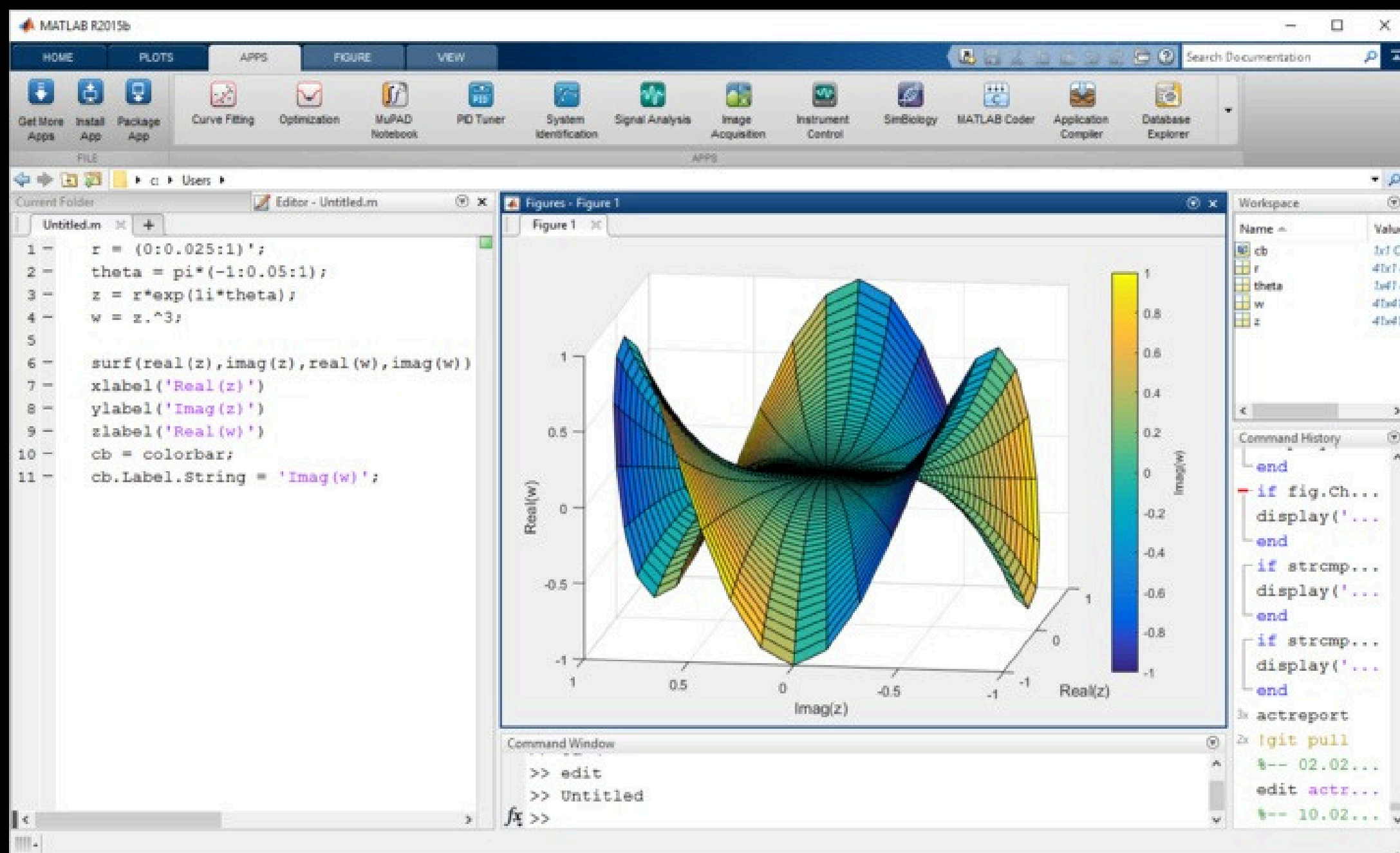


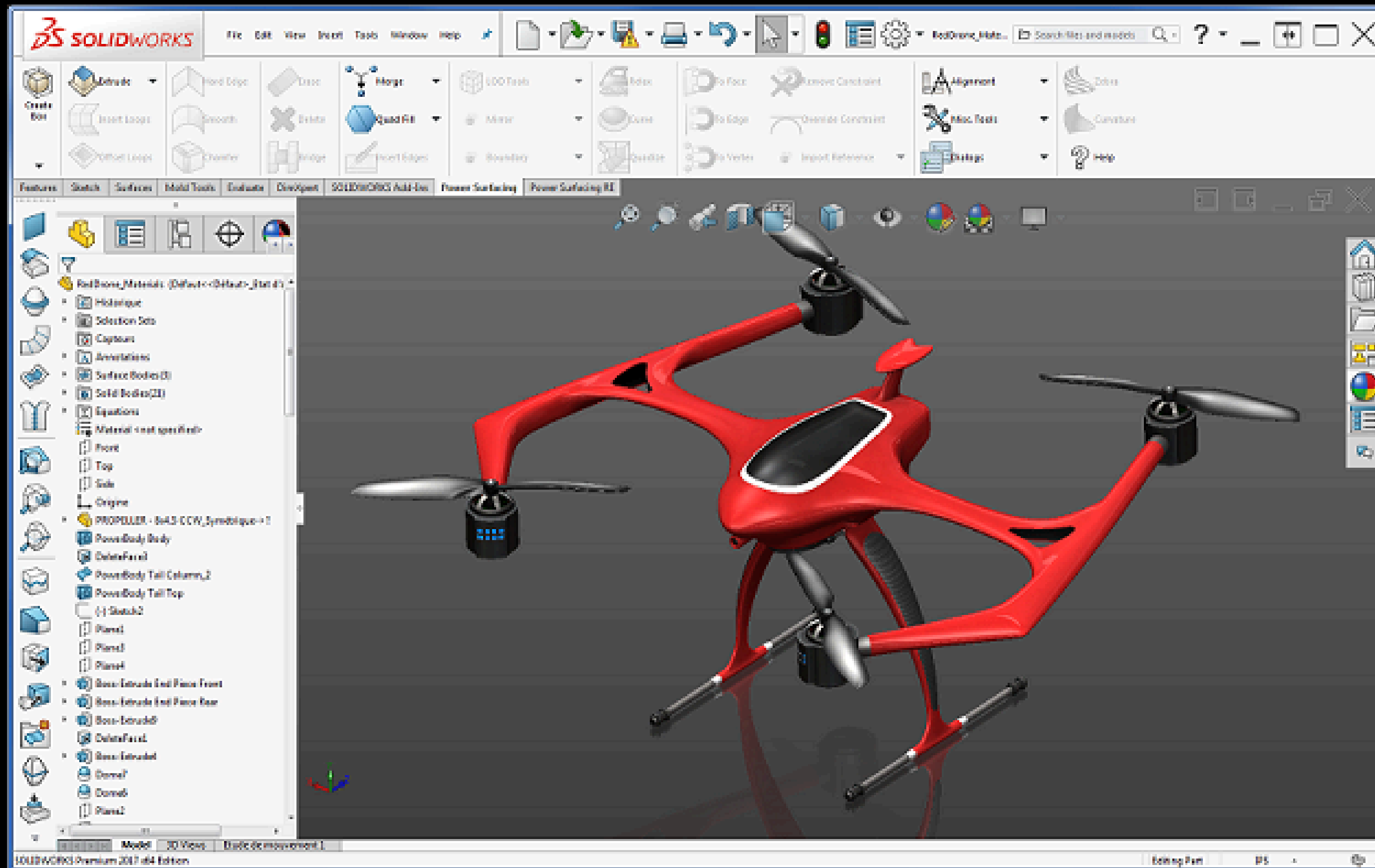
RESEARCH TOOLS

Your gateway to information!



SIMULATION TOOLS





STEP 3 - CONCEPT DESIGN



STEVE JOB'S PHILOSOPHY OF DESIGN

Skills for Innovation and Excellence

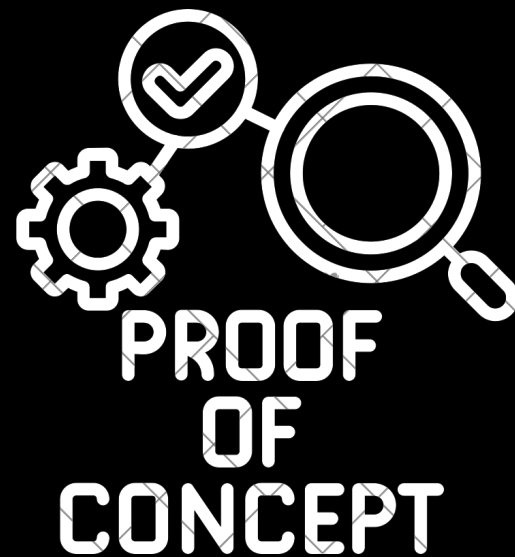


STEP 4 - PROTOTYPE



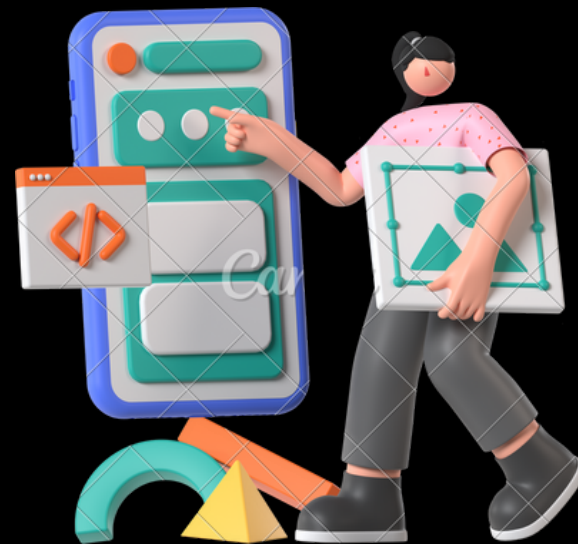
TYPES OF PROTOTYPING

An early model of a product, system, or concept created to test or validate design ideas.



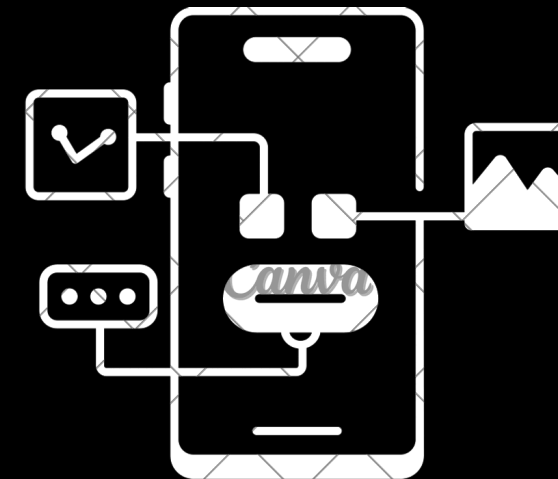
Proof of concept

Basic prototype used to prove that the idea works.



Functional prototype

Prototypes that are built with working functionality.



Visual prototype

Focuses on the look and feel of the product.

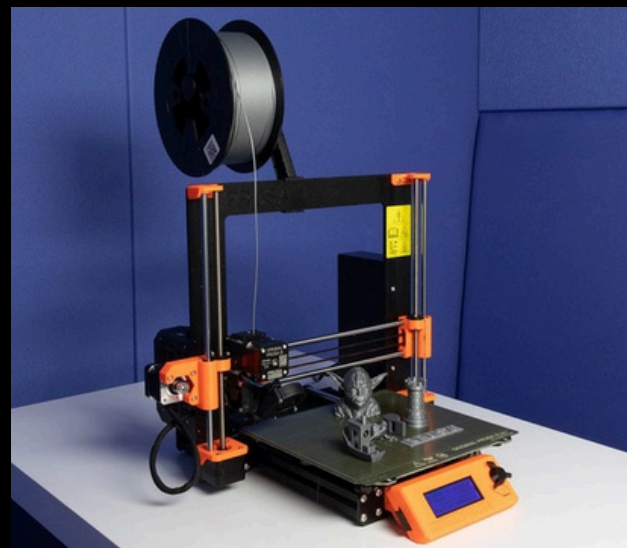


User experience prototype

Tests how users interact with the design.

MATERIALS AND TOOLS

Choose based on the requirements—wood, plastic, metal, cardboard, 3D printing materials, etc.



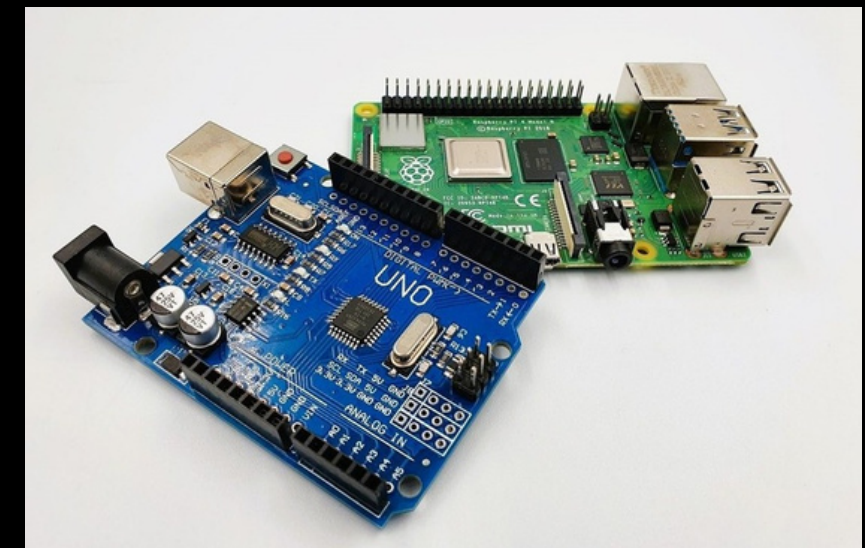
3D Printers



Hand tools



Blueprints



Arduino and
Raspberry Pi

and many more...

BEST PRACTICES

Fail Fast, Fail Cheap: Early prototypes help identify issues quickly, which saves time and money in the long run.

Iterative Approach: Prototyping is an iterative process, so always improve your design based on testing results.

Collaborate: Work with team members to gather different perspectives and ideas.

Keep It Simple: Early prototypes should focus on testing core functionalities. You can add aesthetics and more complex features later.

STEP 5 - TEST & ITERATE



REAL WORLD EXAMPLES

Apple's iPhone

tested extensively through different phases and received constant feedback. Features like Face ID and camera quality were added over multiple iterations

Tesla's Autopilot

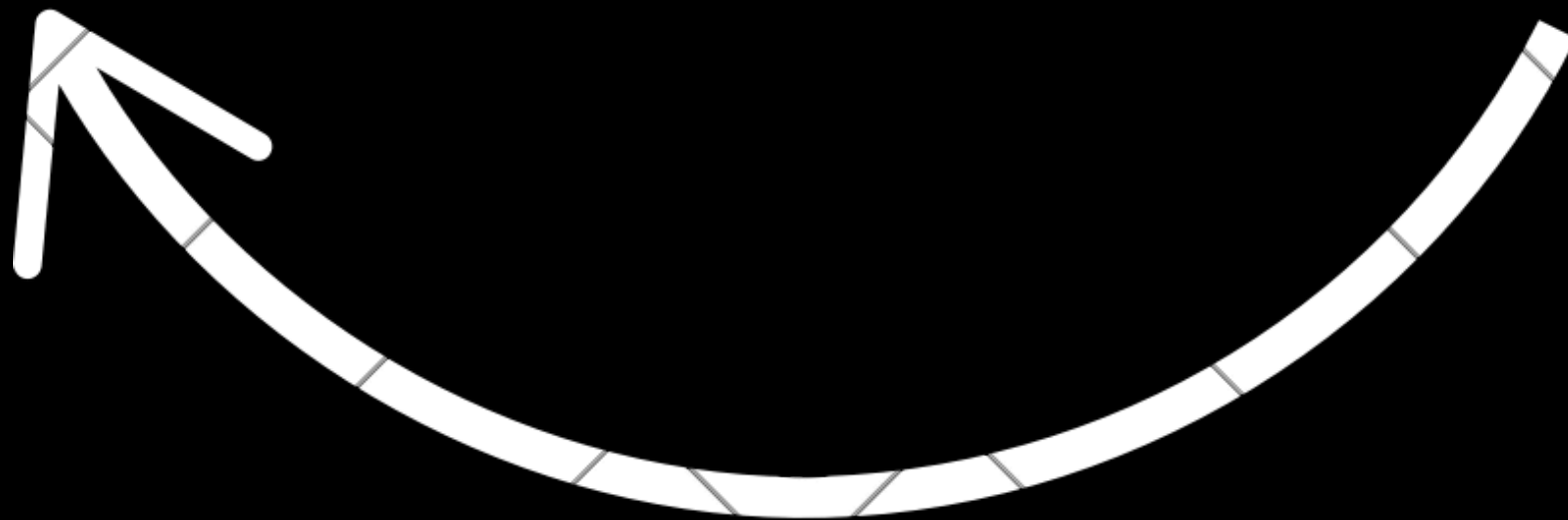
continuously improved through real-world testing

Google's Gmail

launched as an invite-only beta version before being released to the public

ITERATION LOOP

Test —————> **Analyze** —————> **Refine**



Learn from mistakes...

You did not FAIL, you
LEARNED

STEP 6 - SCALE



WHAT HAPPENS IF WE DON'T FOLLOW THE STEPS?

Skipping the research phase —————> unrealistic expectations

Ignoring feedback —————> unusable products

Scaling too fast —————> resource bottlenecks