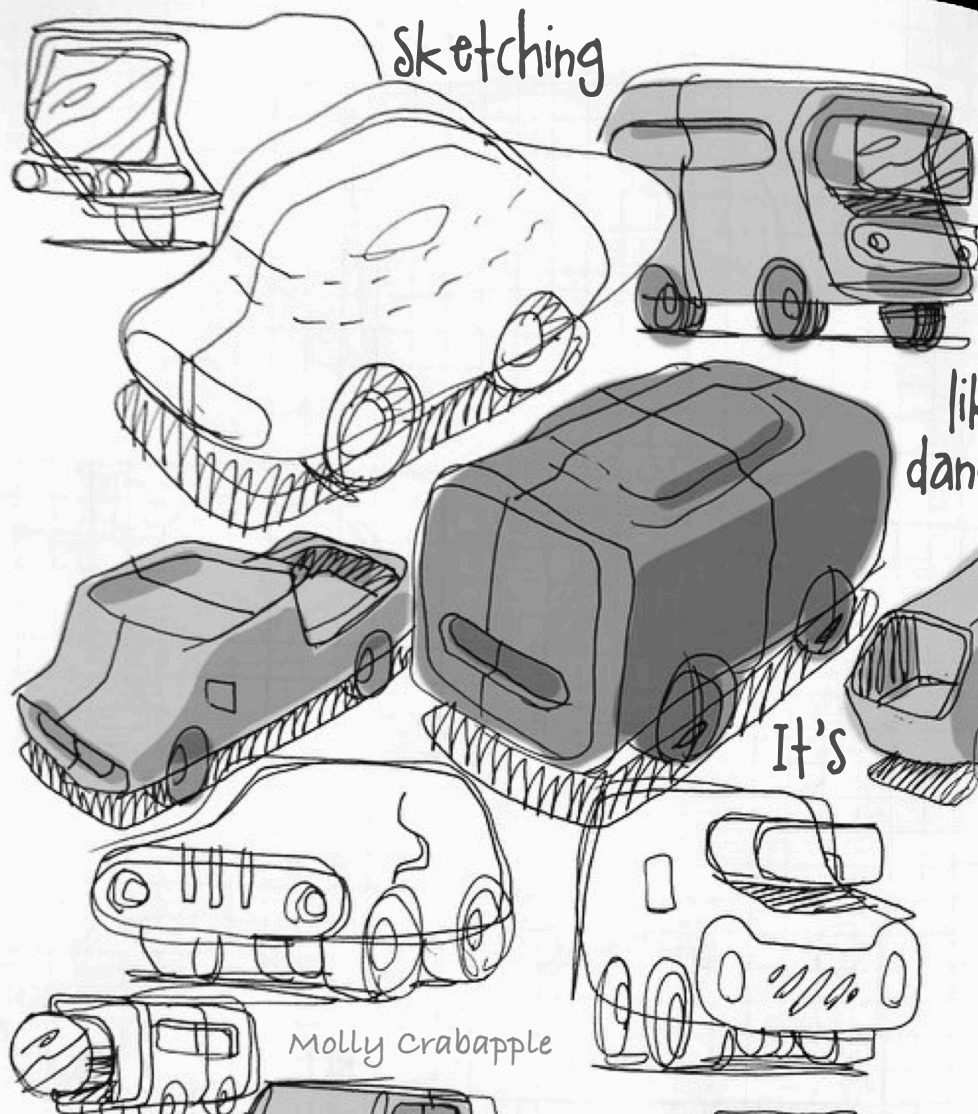


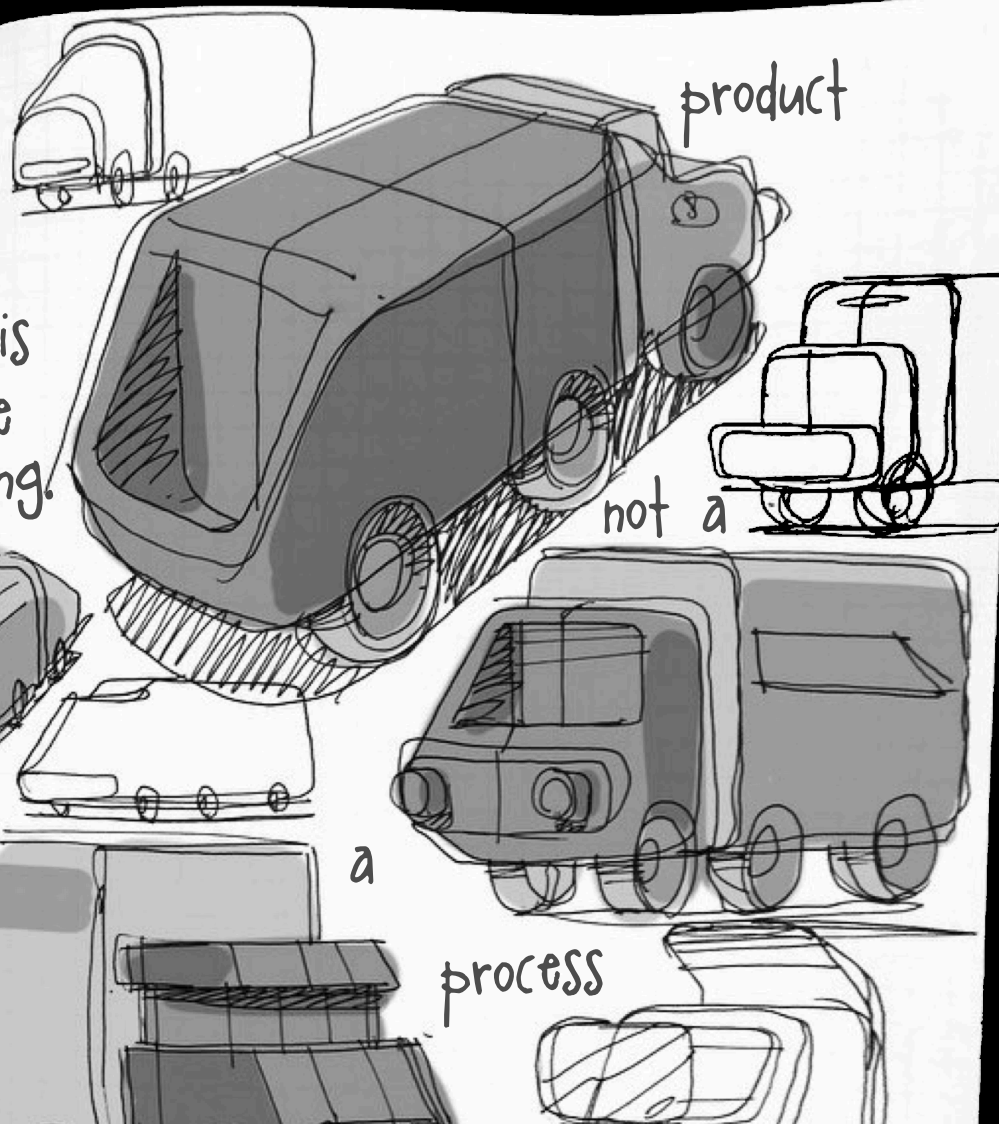


sketching

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dancing.

It's

Molly Crabapple

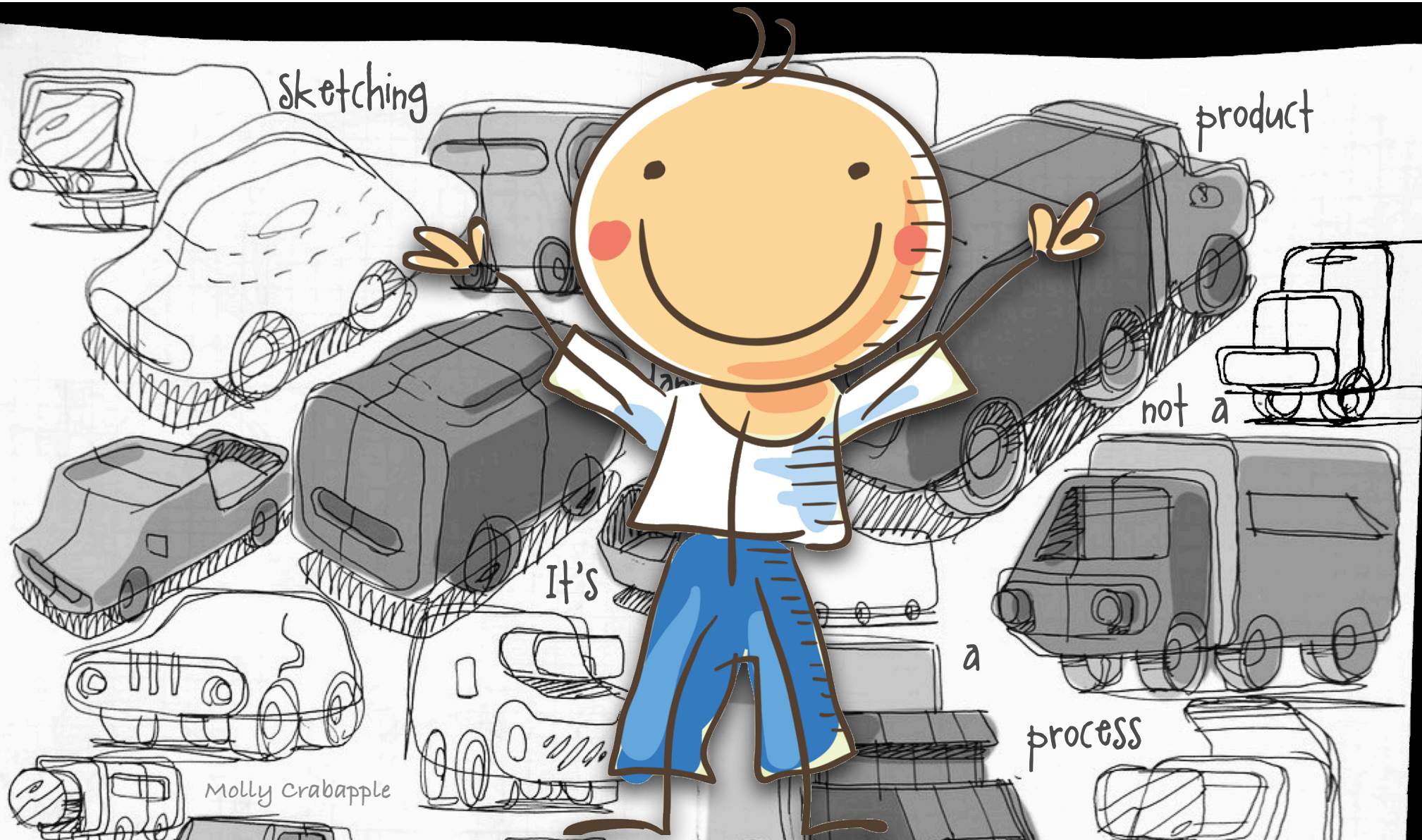


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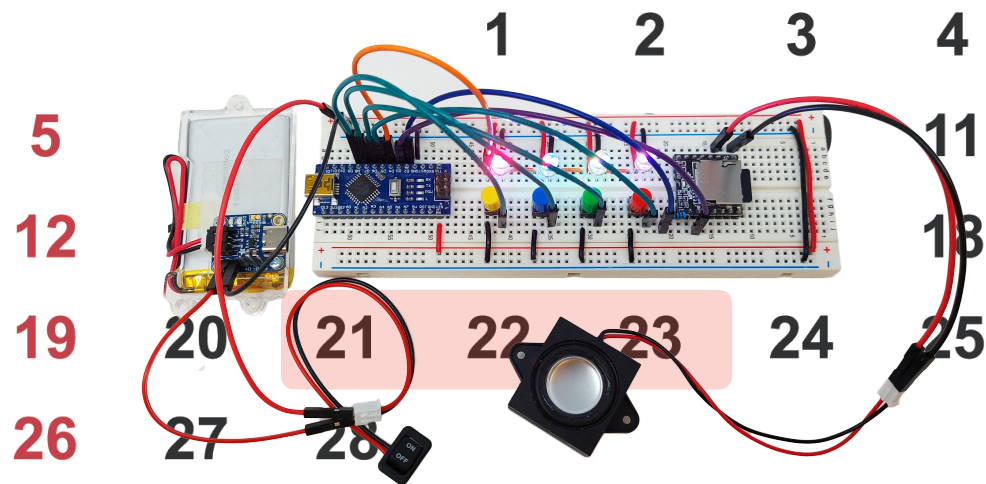
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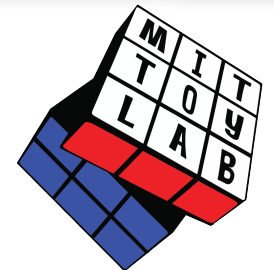
February

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March

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12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	



February



home



toobers!



electronics
library



2.00b Resources Website!

Hello! This is the companion website to [2.00b's Homepage](#)
containing some helpful toy design tips!



Toobers!



Electronics Library

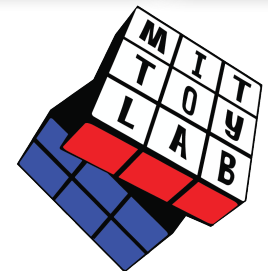


2.00b Main Site

March

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2	3	4
9	10	11
16	17	18
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30		



February



1. INTRODUCTION

Overview
The Components Inside

2. ENCLOSURE CAD

CAD Intro
Getting the Base Model
Designing your own Case

3. SUGAR CUBE

Hello Sugar Cube!
Sugar Cube Assembly

4. BATTERY & CHARGER

The Power Circuit
Battery & Charger Assembly

5. BREADBOARDING

Installing the IDE
Test the Microcontroller
The First Circuit
Breadboard Prototype

6. PCB ASSEMBLY

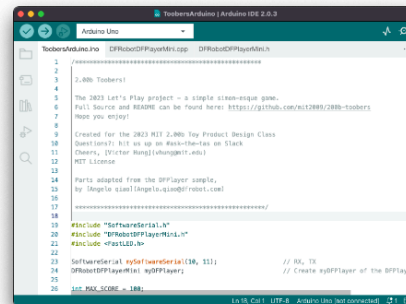
PCB Overview
Solder & Safety
Preparing the Parts
Actually Soldering!
Connect it Together

5. Breadboarding > Installing the IDE

Installing the Arduino IDE

Set Up your Computer for Programming

We'll be using an Arduino "Integrated Development Environment" (IDE). An IDE is a program made for editing code files. Although code files are text files and could be edited in a text-editing program, an IDE usually includes many features that help make programming easier. The Arduino IDE not only lets us write and edit programs for the Arduino microcontrollers, it also helps us to upload the programs to the Arduino microcontrollers.

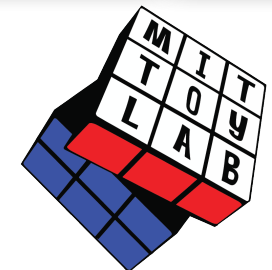


There are two versions of the Arduino IDE: a web-based Arduino Web Editor and a desktop version of the Arduino IDE for Windows or Mac OS. We strongly recommend that

March

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February

Course Info
Syllabus
Course Staff
Teams
Toy Museum



designy

Accessibility

Fri, Feb 24: The theme

Please bring your sketch kit, name tag and design notebook.

Lecture 5: Getting shady, Toober breadboard toolkit

Lecture 4: Get the points, Toober electronics overview [slides](#)

Labs Week of Feb 20

Lab 2: **Toobers, get ready to play!** MaBreaking bread(boards) together
Toobers electronics breadboarding

Please bring your laptop with the Arduino IDE installed (see the [to-do section](#)).

We will be taking your picture for your portfolio page in lab.

In lab: [Toober breadboarding instructions](#)

Things to-do

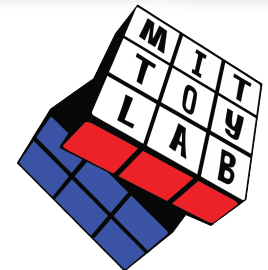
before lab 2 Please [install and configure your Arduino IDE](#) (click on "Toobers").
Ask for help on the #ask-the-TAs channel in Slack

before lab 2 Please check the [Lab 2 makeup schedule](#) for your room and time
assignment, if you are doing a Lab 2 makeup.

later this week Sign up and attend extra lab hours to finish your pull toy or
toobers breadboarding. (Thursdays 9AM-12PM, 2-5PM, 7-10PM, and
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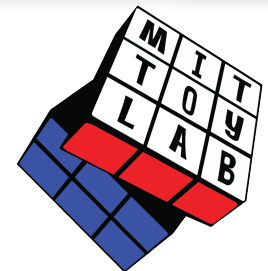
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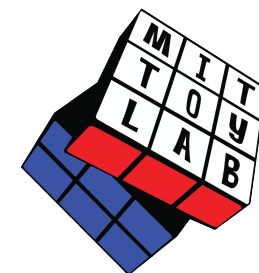
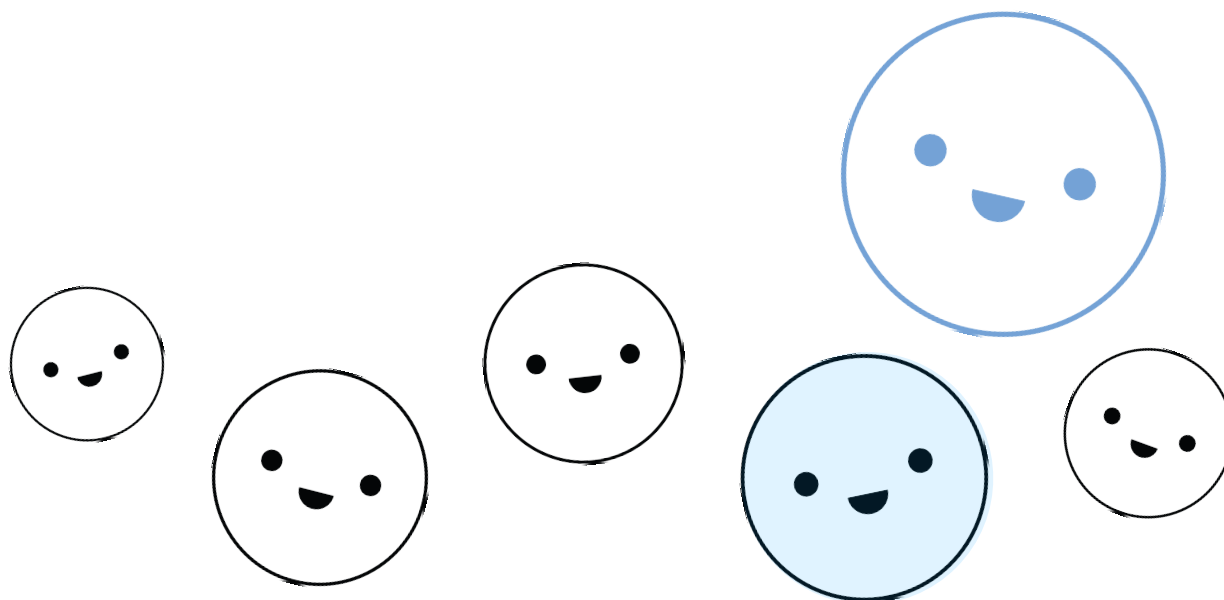
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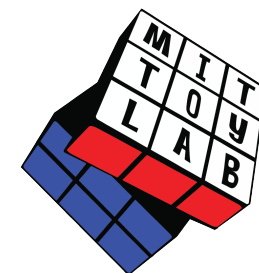
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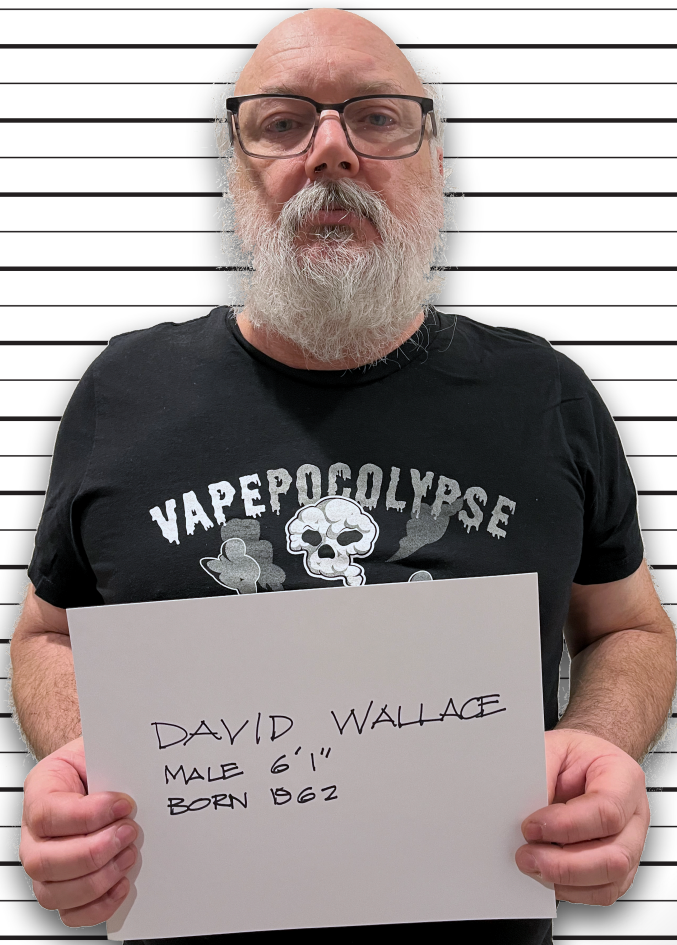
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6'4"

6'2"

6'

5'8"

5'6"

5'4"

5'2"

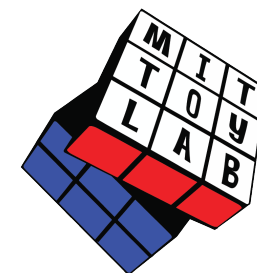
5'

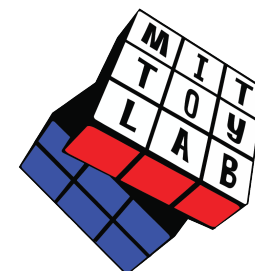
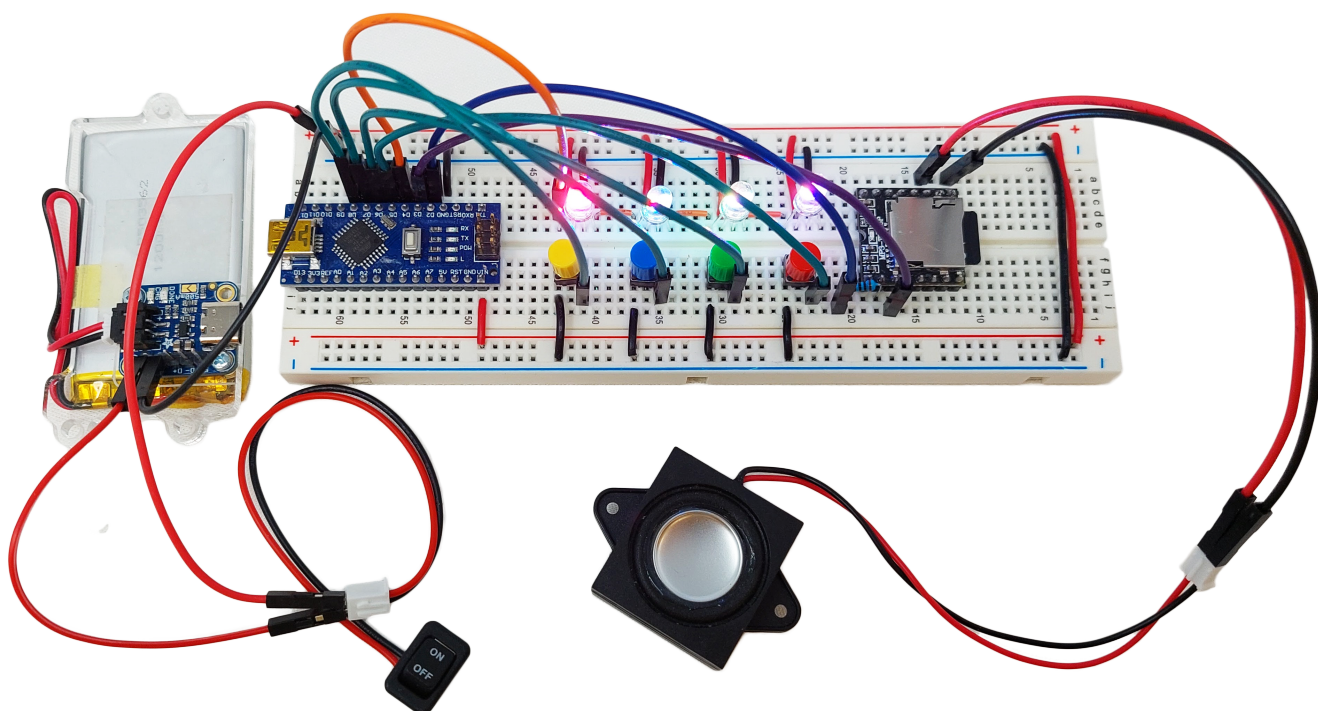
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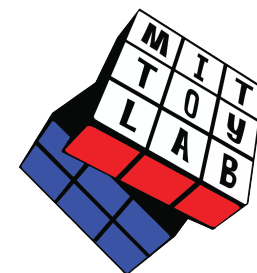
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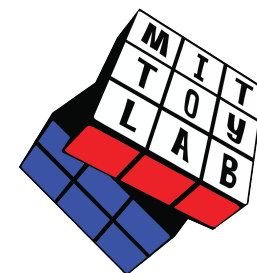
4'4"

4'2"







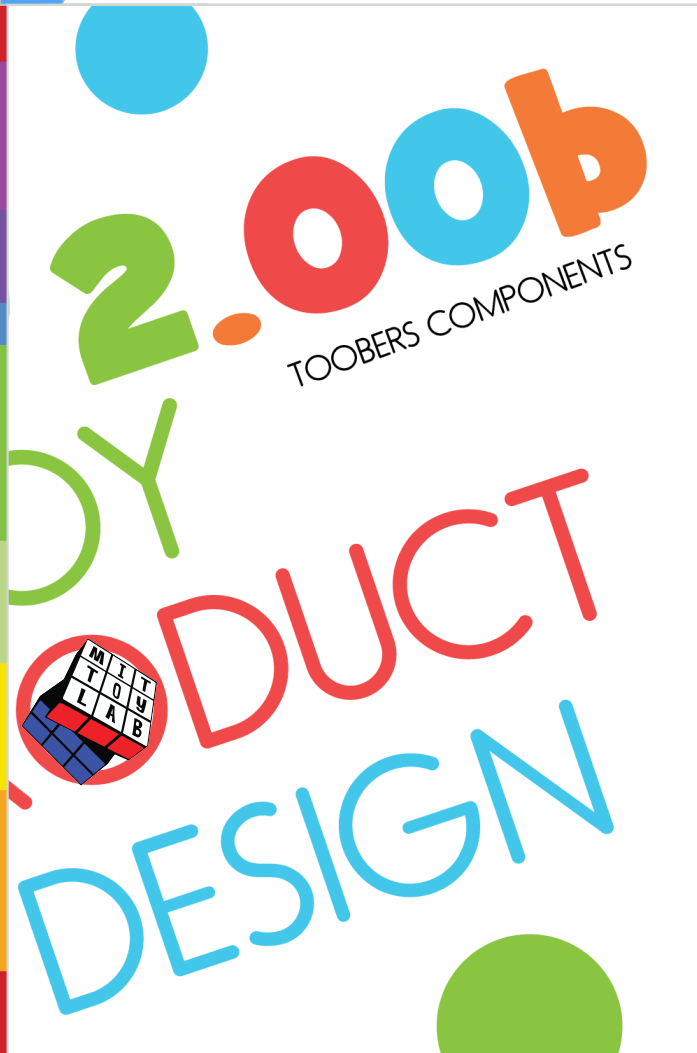


2.00b

TOOBERS COMPONENTS

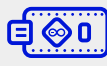
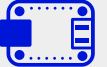
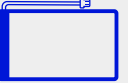
PRODUCT DESIGN





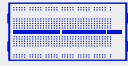
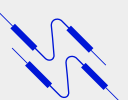
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01. Arduino Nano Microcontroller	Qty. 01	08. On/Off Switch	Qty. 01
02. DFPlayer MP3	Qty. 01	09. Li-ion Battery Charger	Qty. 01
03. Speaker	Qty. 01	10. Li-ion Battery	Qty. 01
04. WS2821B LEDs	Qty. 04	11. 2.54mm Power/Switch Cable	Qty. 02
05. Tactile Buttons	Qty. 04	12. 1.25mm Speaker Cable	Qty. 01
06. SD MemoryCard	Qty. 01		
07. 1k Ohm Resistor	Qty. 01		

01 	02 	03 
04 	05 	06 
07 	08 	09 
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Hardware and Tools

13. Breadboard	Qty. 01	20. Battery Module Plate	Qty. 01
14. Wire Cutter & Stripper	Qty. 01	21. Multimeter	Qty. 01
15. Arduino USB Cable	Qty. 01	22. Tiny Screwdriver	Qty. 01
16. Hookup Wire Roll	Qty. 01		
17. M-M Jumper Wire Assortment	Qty. 01		
18. M2 5mm Philips Head Screw	Qty. 10		
19. M2 Threaded Insert	Qty. 10		

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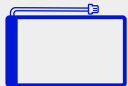
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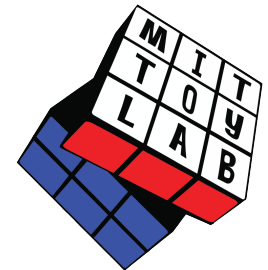
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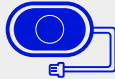
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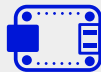
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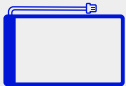
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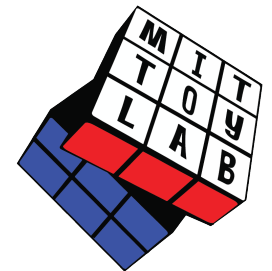
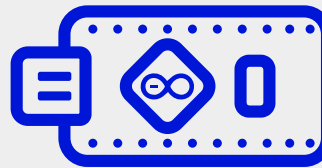
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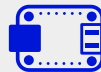
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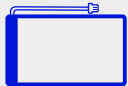
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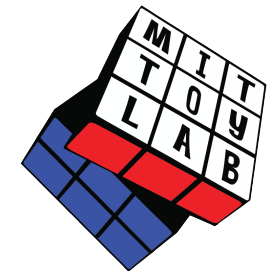
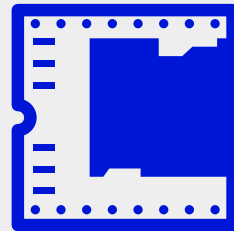
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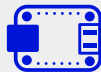
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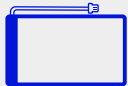
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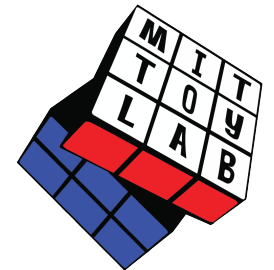
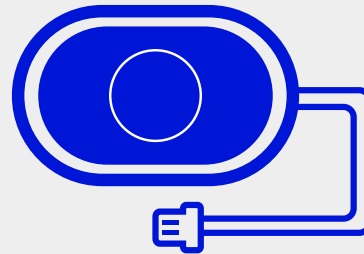
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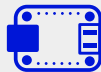
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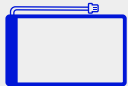
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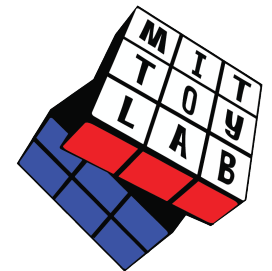
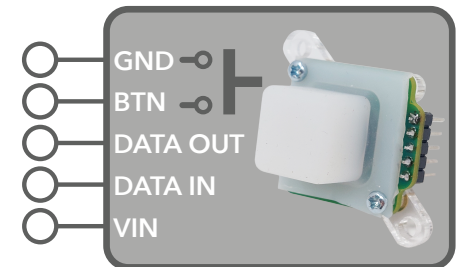
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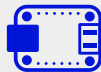
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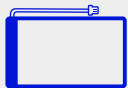
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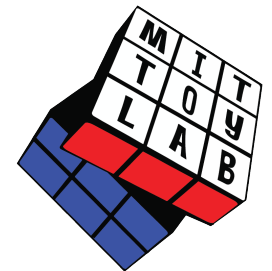
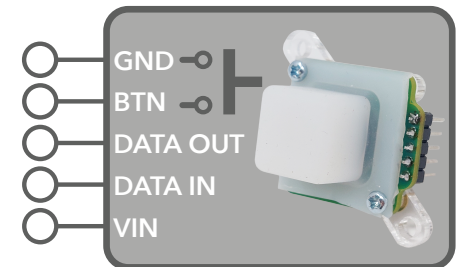
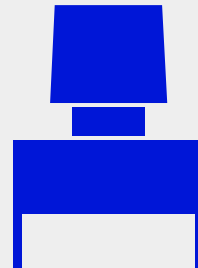
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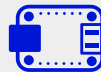
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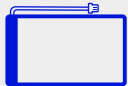
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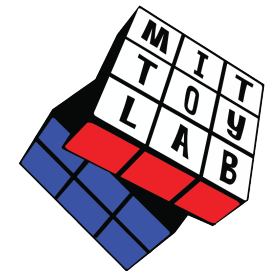
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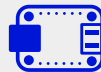
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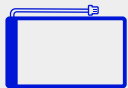
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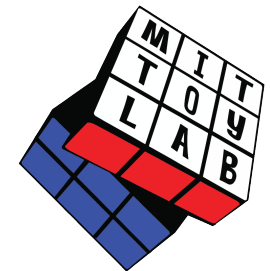
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Electronic Components

01. Arduino Nano Microcontroller	Qty. 01	08. On/Off Switch	Qty 01
02. DFPlayer MP3	Qty. 01	09. Li-ion Battery Charger	Qty 01
03. Speaker	Qty. 01	10. Li-ion Battery	Qty 01
04. WS2821B LEDs	Qty. 04	11. 2.54mm Power/Switch Cable	Qty 02
05. Tactile Buttons	Qty. 04	12. 1.25mm Speaker Cable	Qty 01
06. SD MemoryCard	Qty. 01		
07. 1k Ohm Resistor	Qty. 01		

01



02



03



04



05



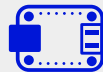
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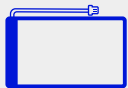
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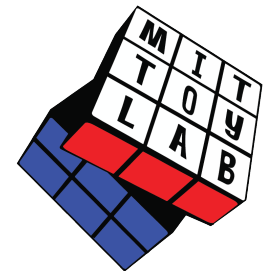
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08



Electronic Components

01. Arduino Nano Microcontroller	Qty. 01	08. On/Off Switch	Qty 01
02. DFPlayer MP3	Qty. 01	09. Li-ion Battery Charger	Qty 01
03. Speaker	Qty. 01	10. Li-ion Battery	Qty 01
04. WS2821B LEDs	Qty. 04	11. 2.54mm Power/Switch Cable	Qty 02
05. Tactile Buttons	Qty. 04	12. 1.25mm Speaker Cable	Qty 01
06. SD MemoryCard	Qty. 01		
07. 1k Ohm Resistor	Qty. 01		

01



02



03



04



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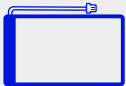
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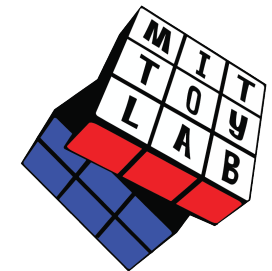
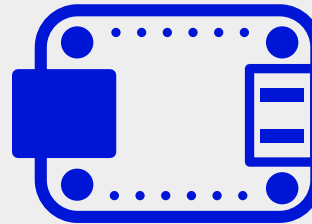
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Electronic Components

01. Arduino Nano Microcontroller	Qty. 01	08. On/Off Switch	Qty 01
02. DFPlayer MP3	Qty. 01	09. Li-ion Battery Charger	Qty 01
03. Speaker	Qty. 01	10. Li-ion Battery	Qty 01
04. WS2821B LEDs	Qty. 04	11. 2.54mm Power/Switch Cable	Qty 02
05. Tactile Buttons	Qty. 04	12. 1.25mm Speaker Cable	Qty 01
06. SD MemoryCard	Qty. 01		
07. 1k Ohm Resistor	Qty. 01		

01



02



03



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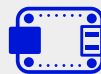
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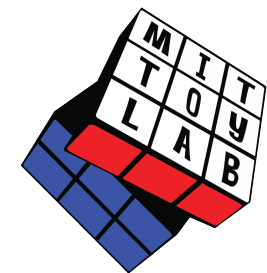
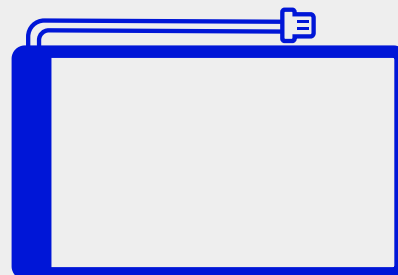
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Electronic Components

01. Arduino Nano Microcontroller	Qty. 01	08. On/Off Switch	Qty 01
02. DFPlayer MP3	Qty. 01	09. Li-ion Battery Charger	Qty 01
03. Speaker	Qty. 01	10. Li-ion Battery	Qty 01
04. WS2821B LEDs	Qty. 04	11. 2.54mm Power/Switch Cable	Qty 02
05. Tactile Buttons	Qty. 04	12. 1.25mm Speaker Cable	Qty 01
06. SD MemoryCard	Qty. 01		
07. 1k Ohm Resistor	Qty. 01		

01



02



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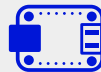
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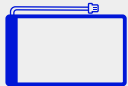
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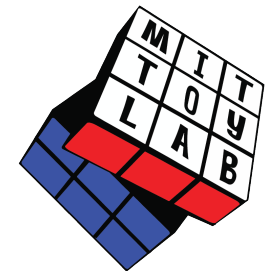
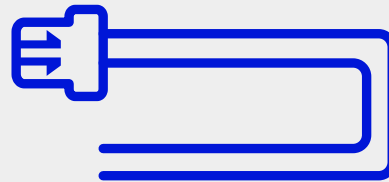
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Electronic Components

01. Arduino Nano Microcontroller	Qty. 01	08. On/Off Switch	Qty 01
02. DFPlayer MP3	Qty. 01	09. Li-ion Battery Charger	Qty 01
03. Speaker	Qty. 01	10. Li-ion Battery	Qty 01
04. WS2821B LEDs	Qty. 04	11. 2.54mm Power/Switch Cable	Qty 02
05. Tactile Buttons	Qty. 04	12. 1.25mm Speaker Cable	Qty 01
06. SD MemoryCard	Qty. 01		
07. 1k Ohm Resistor	Qty. 01		

01



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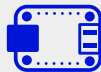
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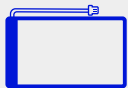
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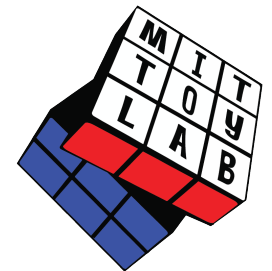
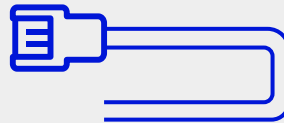
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Qty 01
Qty 01
Qty 01
Qty 02
Qty 01

Hardware and Tools

13. Breadboard	Qty.01	20. Battery Module Plate	Qty.01
14. Wire Cutter & Stripper	Qty.01	21. Multimeter	Qty.01
15. Arduino USB Cable	Qty.01	22. Tiny Screwdriver	Qty.01
16. Hookup Wire Roll	Qty.01		
17. M-M Jumper Wire Assortment	Qty.01		
18. M2 5mm Philips Head Screw	Qty.10		
19. M2 Threaded Insert	Qty.10		

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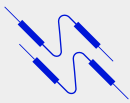
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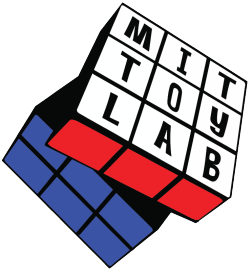
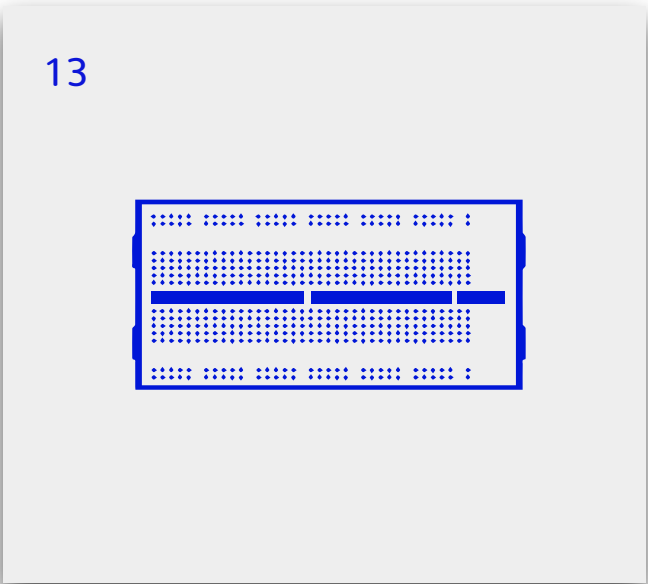


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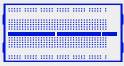




Hardware and Tools

13. Breadboard	Qty.01	20. Battery Module Plate	Qty.01
14. Wire Cutter & Stripper	Qty.01	21. Multimeter	Qty.01
15. Arduino USB Cable	Qty.01	22. Tiny Screwdriver	Qty.01
16. Hookup Wire Roll	Qty.01		
17. M-M Jumper Wire Assortment	Qty.01		
18. M2 5mm Philips Head Screw	Qty.10		
19. M2 Threaded Insert	Qty.10		

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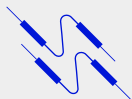
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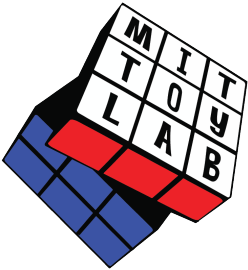
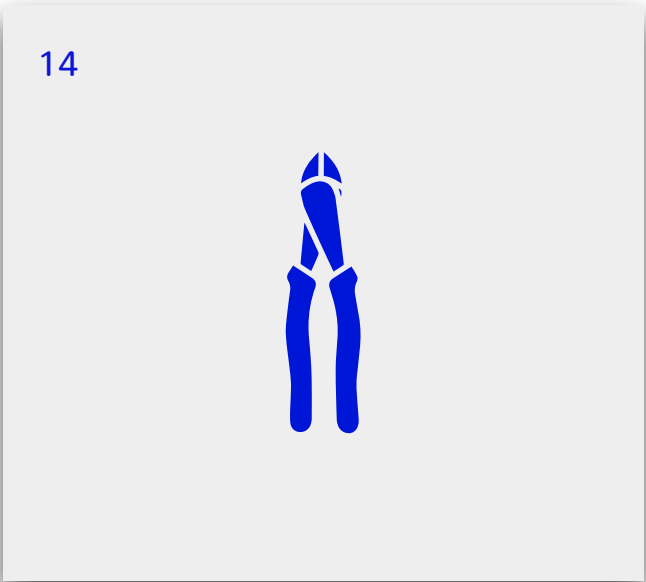


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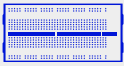




Hardware and Tools

13. Breadboard	Qty.01	20. Battery Module Plate	Qty.01
14. Wire Cutter & Stripper	Qty.01	21. Multimeter	Qty.01
15. Arduino USB Cable	Qty.01	22. Tiny Screwdriver	Qty.01
16. Hookup Wire Roll	Qty.01		
17. M-M Jumper Wire Assortment	Qty.01		
18. M2 5mm Philips Head Screw	Qty.10		
19. M2 Threaded Insert	Qty.10		

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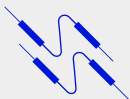
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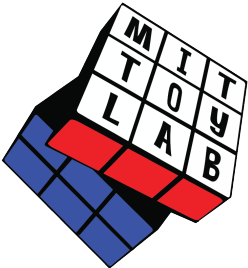
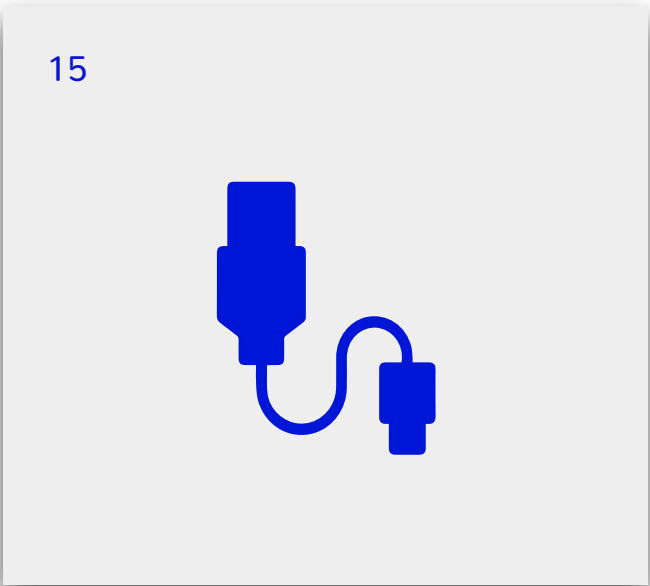


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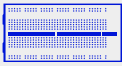




Hardware and Tools

13. Breadboard	Qty.01	20. Battery Module Plate	Qty.01
14. Wire Cutter & Stripper	Qty.01	21. Multimeter	Qty.01
15. Arduino USB Cable	Qty.01	22. Tiny Screwdriver	Qty.01
16. Hookup Wire Roll	Qty.01		
17. M-M Jumper Wire Assortment	Qty.01		
18. M2 5mm Philips Head Screw	Qty.10		
19. M2 Threaded Insert	Qty.10		

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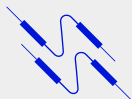
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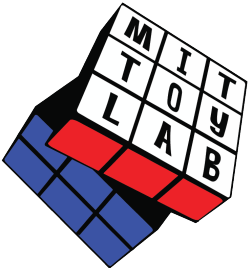
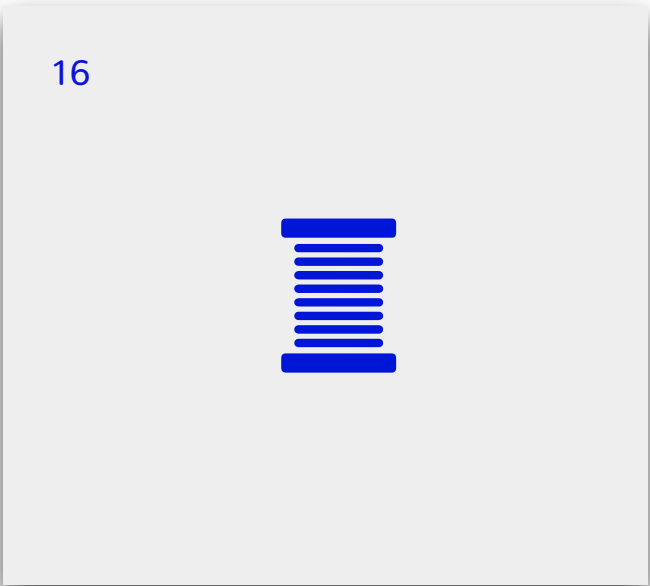


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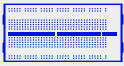




Hardware and Tools

13. Breadboard	Qty.01	20. Battery Module Plate	Qty.01
14. Wire Cutter & Stripper	Qty.01	21. Multimeter	Qty.01
15. Arduino USB Cable	Qty.01	22. Tiny Screwdriver	Qty.01
16. Hookup Wire Roll	Qty.01		
17. M-M Jumper Wire Assortment	Qty.01		
18. M2 5mm Philips Head Screw	Qty.10		
19. M2 Threaded Insert	Qty.10		

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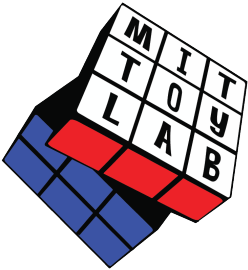
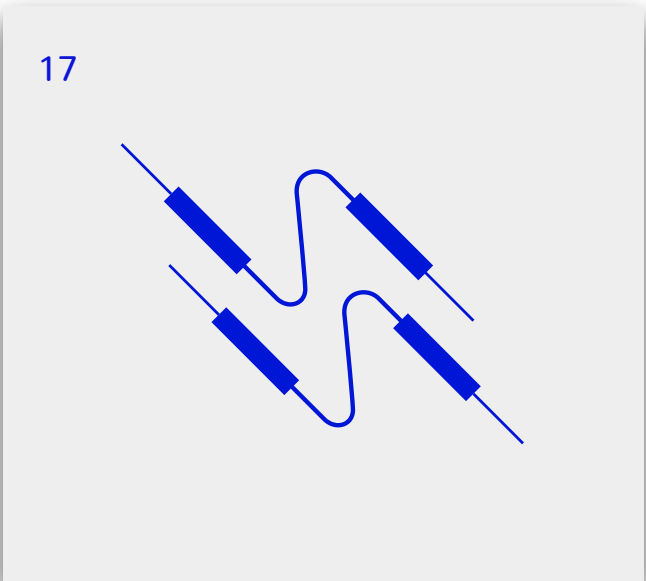


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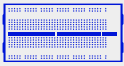




Hardware and Tools

13. Breadboard	Qty.01	20. Battery Module Plate	Qty.01
14. Wire Cutter & Stripper	Qty.01	21. Multimeter	Qty.01
15. Arduino USB Cable	Qty.01	22. Tiny Screwdriver	Qty.01
16. Hookup Wire Roll	Qty.01		
17. M-M Jumper Wire Assortment	Qty.01		
18. M2 5mm Philips Head Screw	Qty.10		
19. M2 Threaded Insert	Qty.10		

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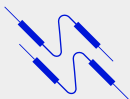
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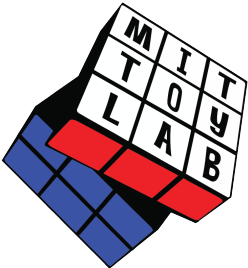


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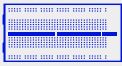




Hardware and Tools

13. Breadboard	Qty.01	20. Battery Module Plate	Qty.01
14. Wire Cutter & Stripper	Qty.01	21. Multimeter	Qty.01
15. Arduino USB Cable	Qty.01	22. Tiny Screwdriver	Qty.01
16. Hookup Wire Roll	Qty.01		
17. M-M Jumper Wire Assortment	Qty.01		
18. M2 5mm Philips Head Screw	Qty.10		
19. M2 Threaded Insert	Qty.10		

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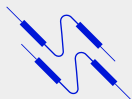
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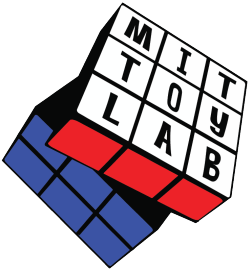
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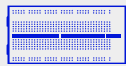
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Hardware and Tools

13. Breadboard	Qty.01	20. Battery Module Plate	Qty.01
14. Wire Cutter & Stripper	Qty.01	21. Multimeter	Qty.01
15. Arduino USB Cable	Qty.01	22. Tiny Screwdriver	Qty.01
16. Hookup Wire Roll	Qty.01		
17. M-M Jumper Wire Assortment	Qty.01		
18. M2 5mm Philips Head Screw	Qty.10		
19. M2 Threaded Insert	Qty.10		

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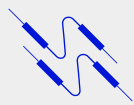
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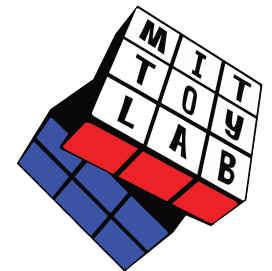
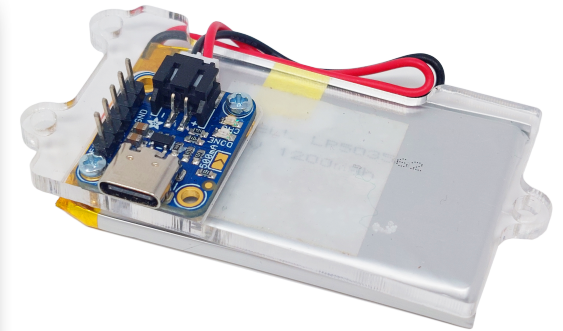
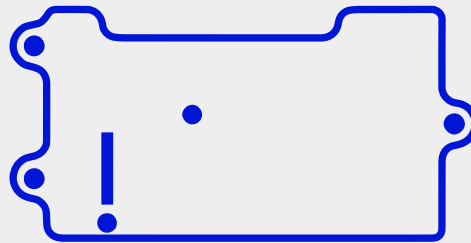
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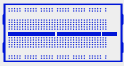
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Hardware and Tools

13. Breadboard	Qty.01	20. Battery Module Plate	Qty.01
14. Wire Cutter & Stripper	Qty.01	21. Multimeter	Qty.01
15. Arduino USB Cable	Qty.01	22. Tiny Screwdriver	Qty.01
16. Hookup Wire Roll	Qty.01		
17. M-M Jumper Wire Assortment	Qty.01		
18. M2 5mm Philips Head Screw	Qty.10		
19. M2 Threaded Insert	Qty.10		

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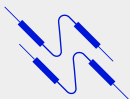
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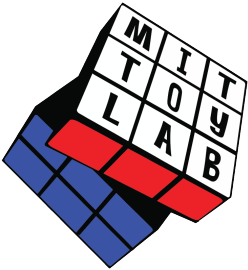


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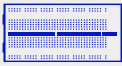




Hardware and Tools

13. Breadboard	Qty.01	20. Battery Module Plate	Qty.01
14. Wire Cutter & Stripper	Qty.01	21. Multimeter	Qty.01
15. Arduino USB Cable	Qty.01	22. Tiny Screwdriver	Qty.01
16. Hookup Wire Roll	Qty.01		
17. M-M Jumper Wire Assortment	Qty.01		
18. M2 5mm Philips Head Screw	Qty.10		
19. M2 Threaded Insert	Qty.10		

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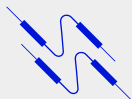
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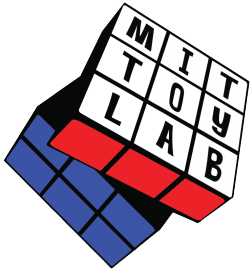
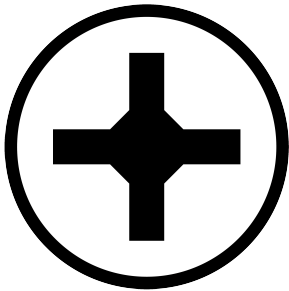
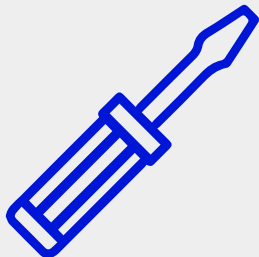
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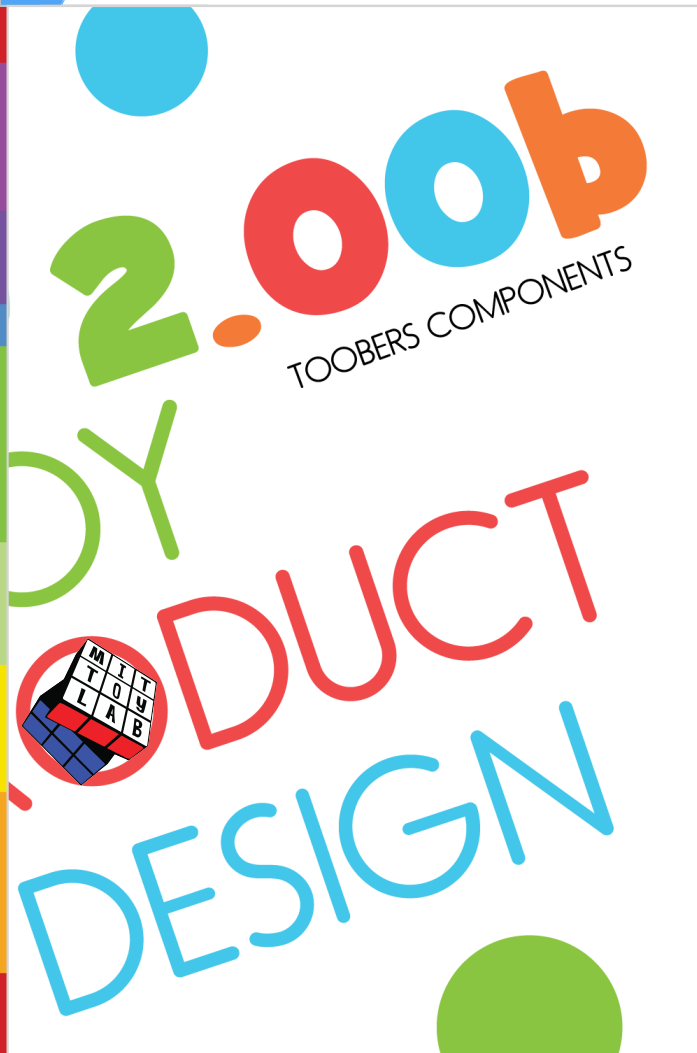


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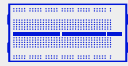
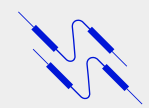
Electronic Components

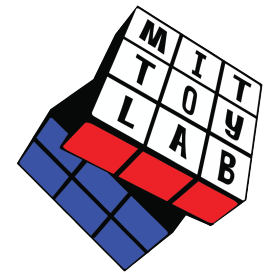
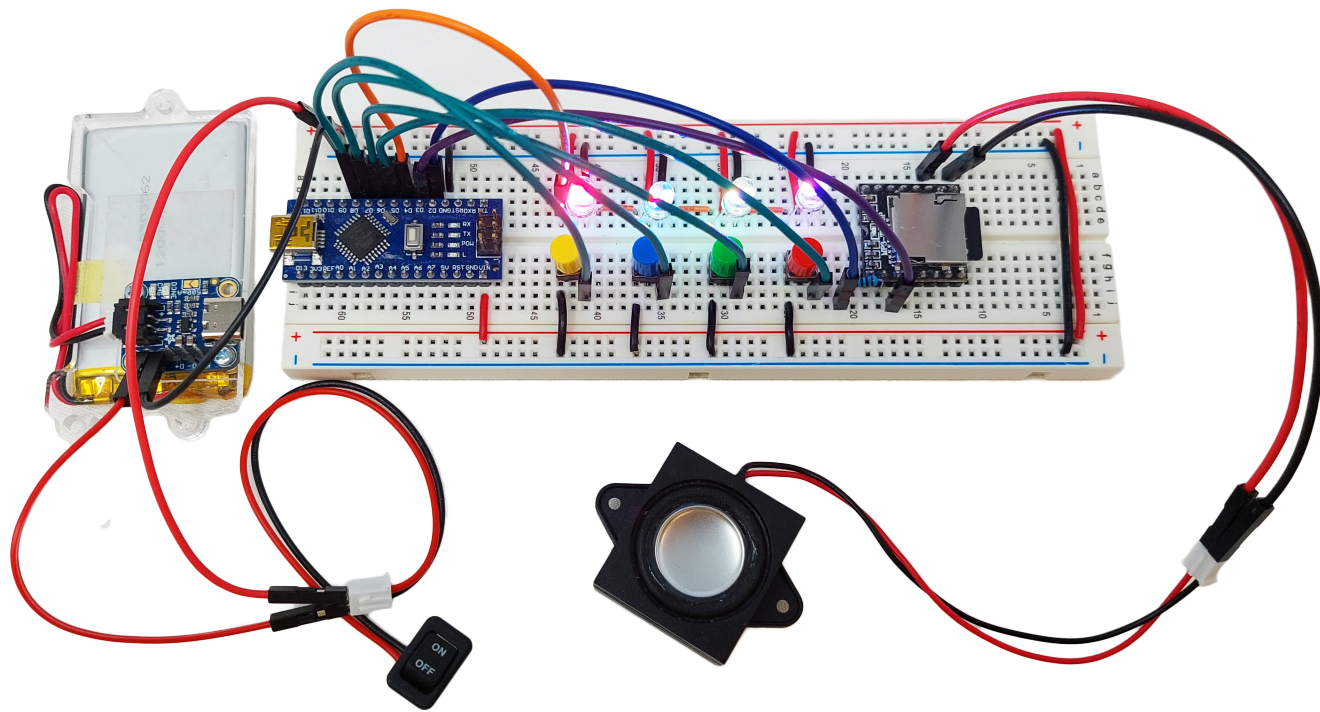
01. Arduino Nano Microcontroller	Qty.01	08. On/Off Switch	Qty.01
02. DFPlayer MP3	Qty.01	09. Li-ion Battery Charger	Qty.01
03. Speaker	Qty.01	10. Li-ion Battery	Qty.01
04. WS2821B LEDs	Qty.04	11. 2.54mm Power/Switch Cable	Qty.02
05. Tactile Buttons	Qty.04	12. 1.25mm Speaker Cable	Qty.01
06. SD MemoryCard	Qty.01		
07. 1k Ohm Resistor	Qty.01		

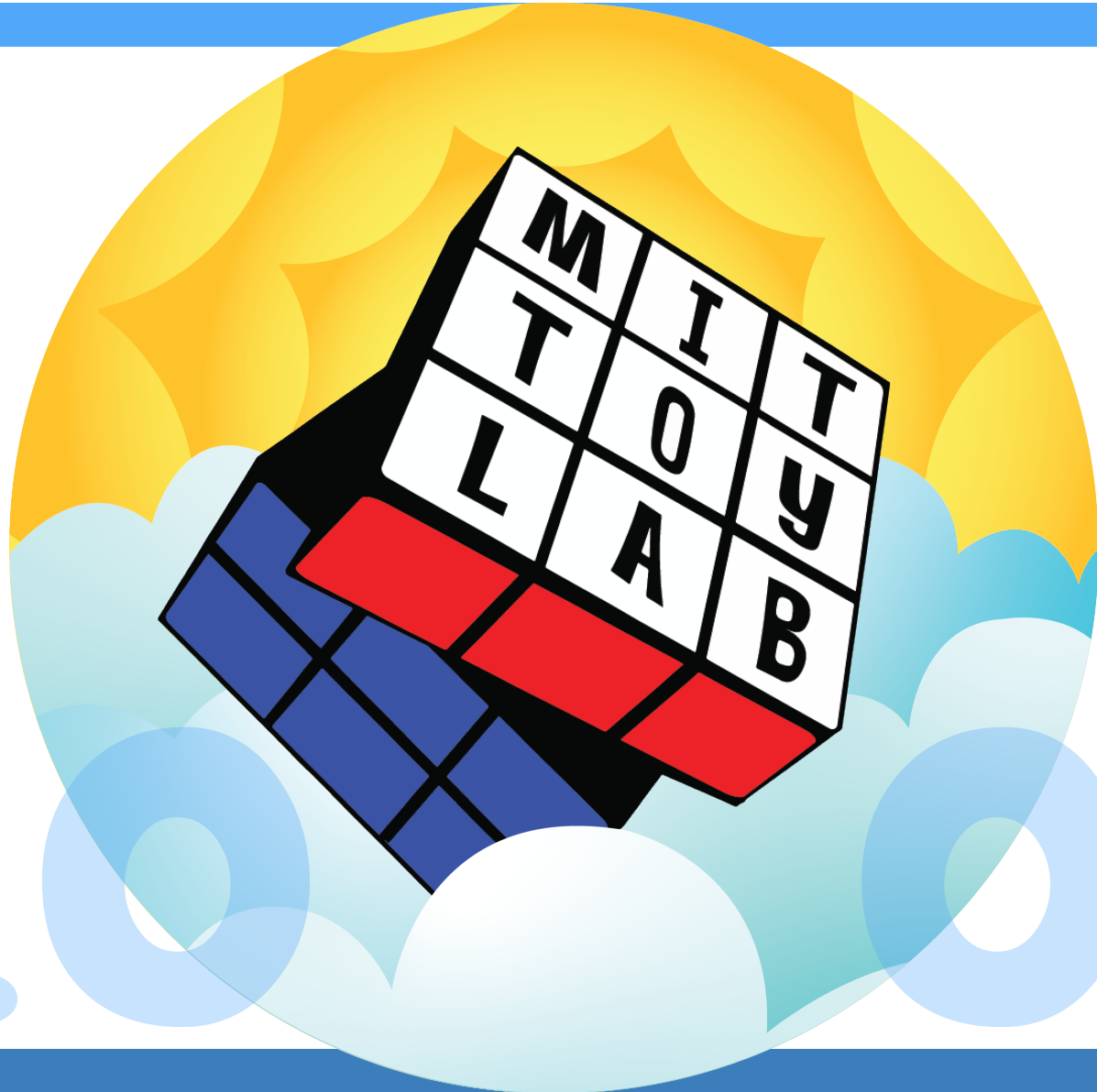
01 	02 	03 
04 	05 	06 
07 	08 	09 
10 	11 	12 

Hardware and Tools

13. Breadboard	Qty.01	20. Battery Module Plate	Qty.01
14. Wire Cutter & Stripper	Qty.01	21. Multimeter	Qty.01
15. Arduino USB Cable	Qty.01	22. Tiny Screwdriver	Qty.01
16. Hookup Wire Roll	Qty.01		
17. M-M Jumper Wire Assortment	Qty.01		
18. M2 5mm Philips Head Screw	Qty.10		
19. M2 Threaded Insert	Qty.10		

13 	14 	15 
16 	17 	18 
19 	20 	21 
22 		





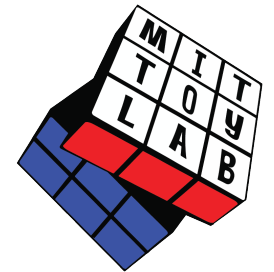
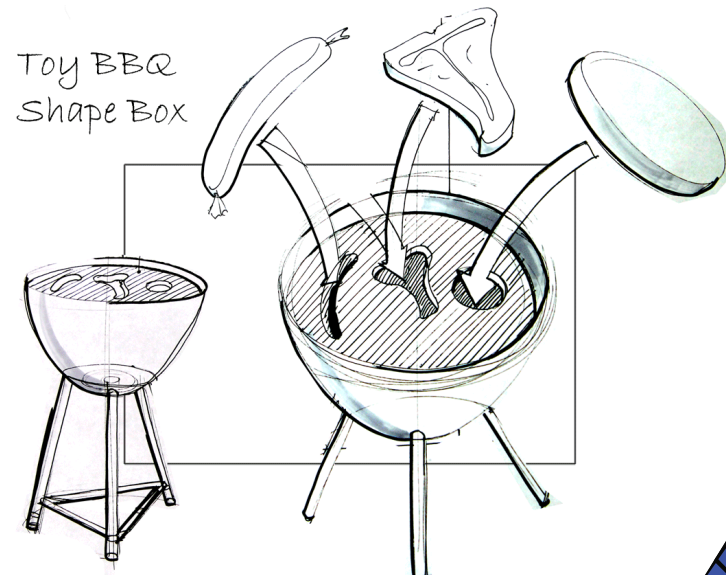
2.000b

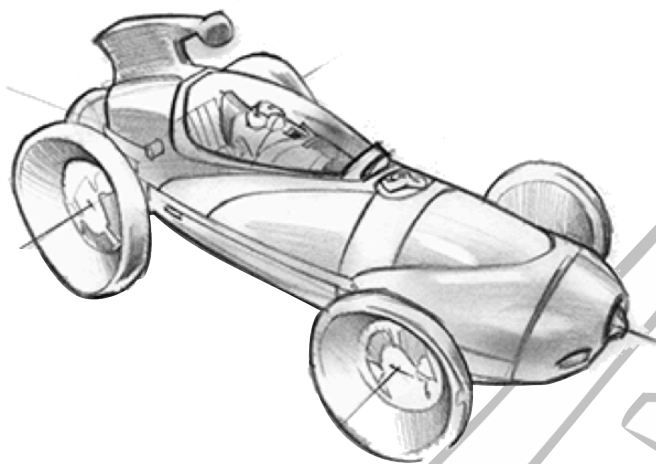
What's the process?

Basic Skills (simple shapes)

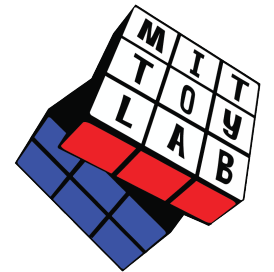
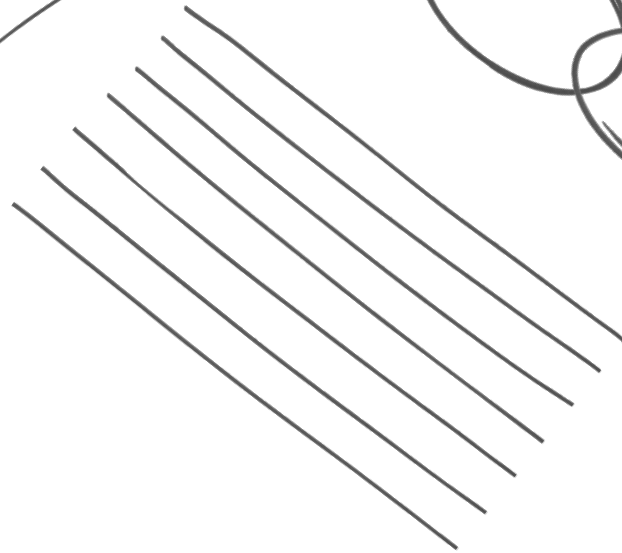
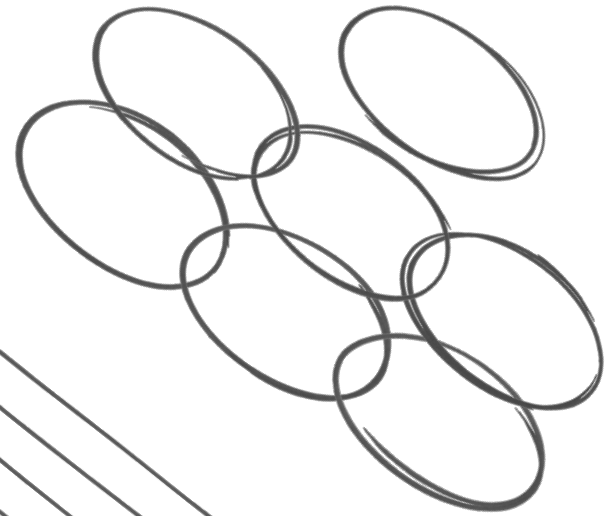
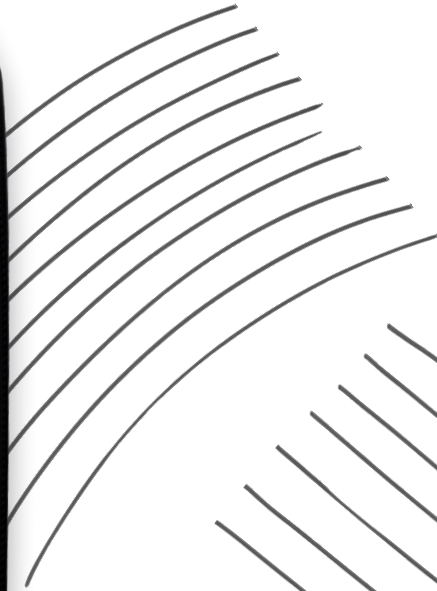
3D Rules

Practice





START

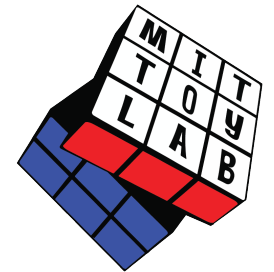
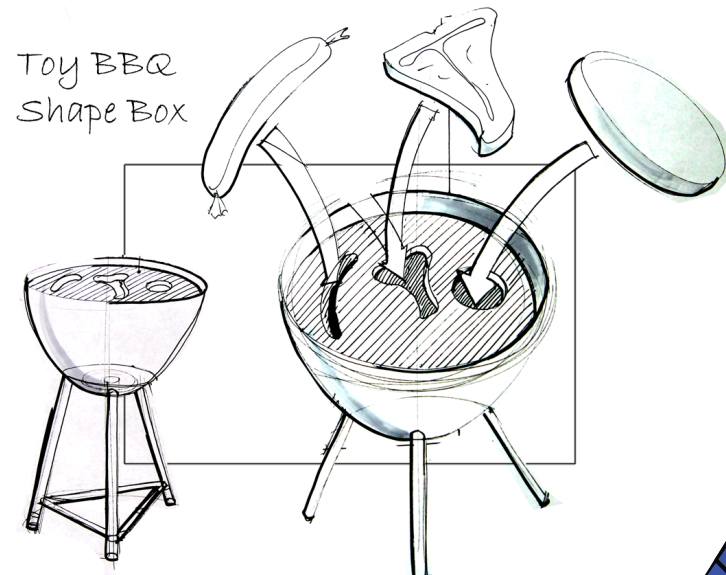


What's the process?

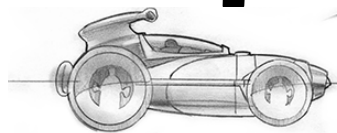
Basic Skills (simple shapes)

3D Rules

Practice

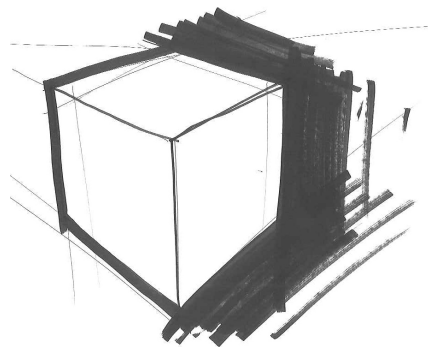


A quiz!



ur name?

2. please draw a 2-point perspective cube, using your markers!



ParSCORE™
TEST FORM
© ECONOMICS RESEARCH, INC. 1989

NAME Last Name, First Name
LAST FIRST MIDDLE

SUBJECT Course, Section, Instructor

DATE Test Number HOUR/ DAY Test Version (A,B)

DIRECTIONS

- MAKE DARK MARKS
- ERASE COMPLETELY TO CHANGE
- EX. (A)(B)(C)(D)(E)

CUID

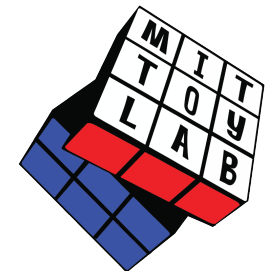
1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9

Mark Test Version

TEST FORM

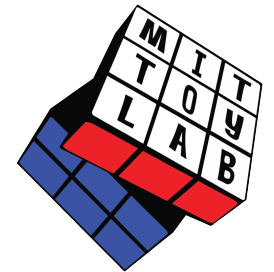
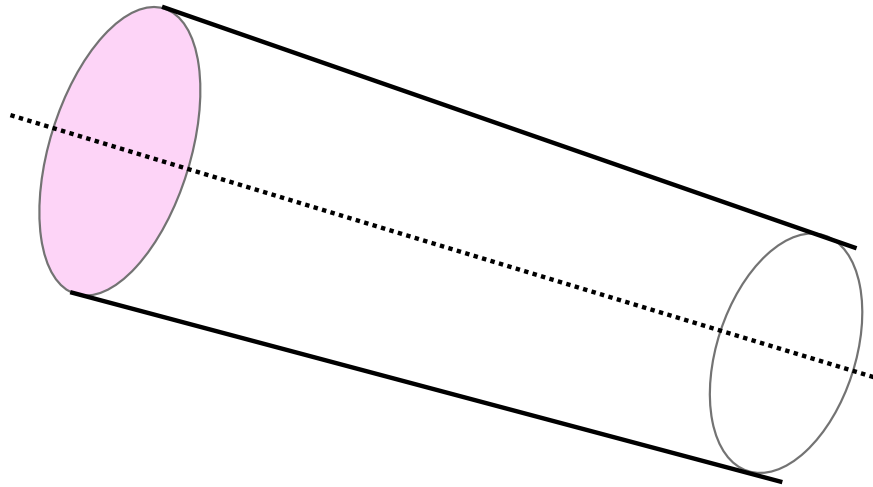
EXAM NUMBER

FEED THIS DIREC



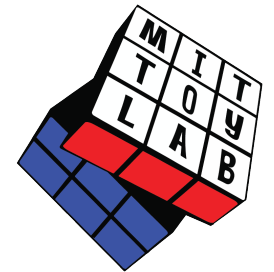
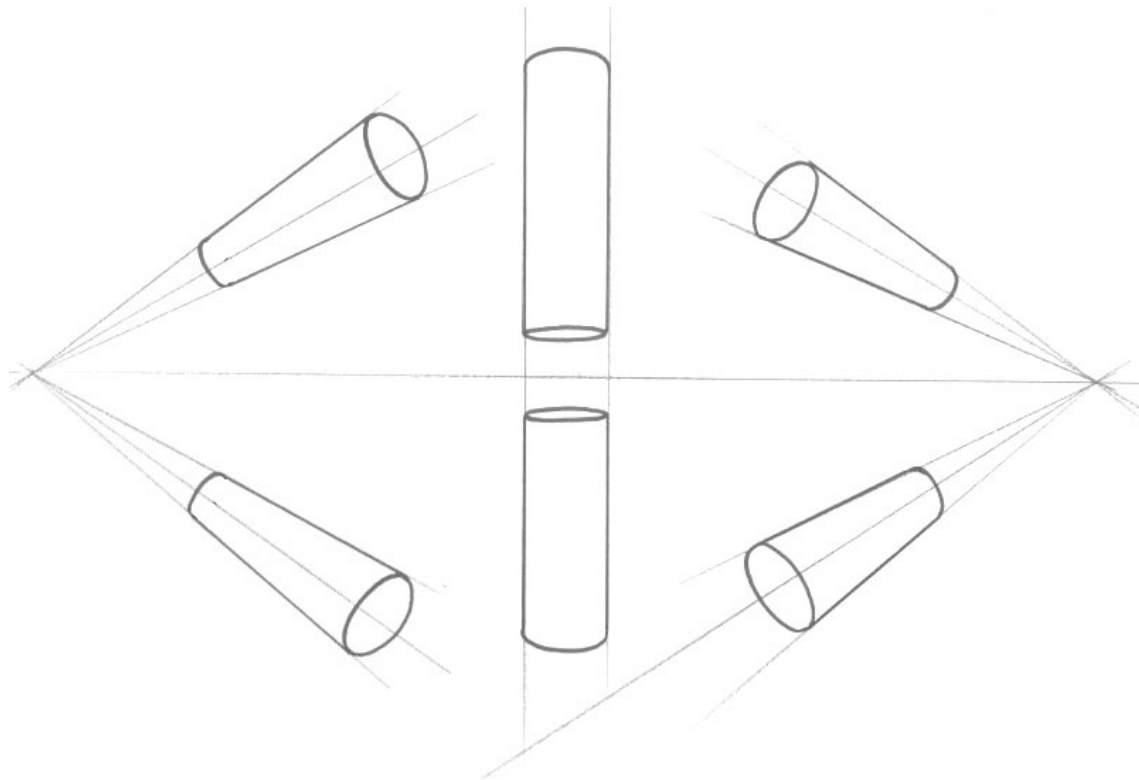
The cylinder

ellipse minor axis
inline with cylinder
center axis

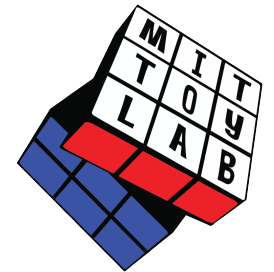
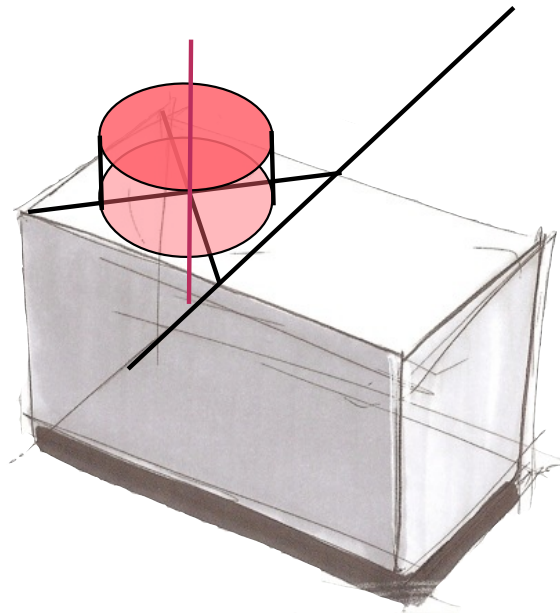


Horizon

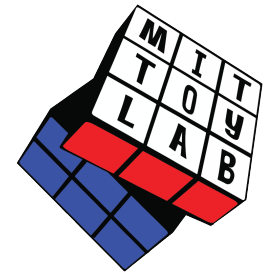
Cylinders in space!



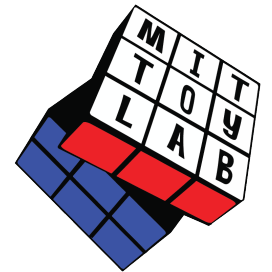
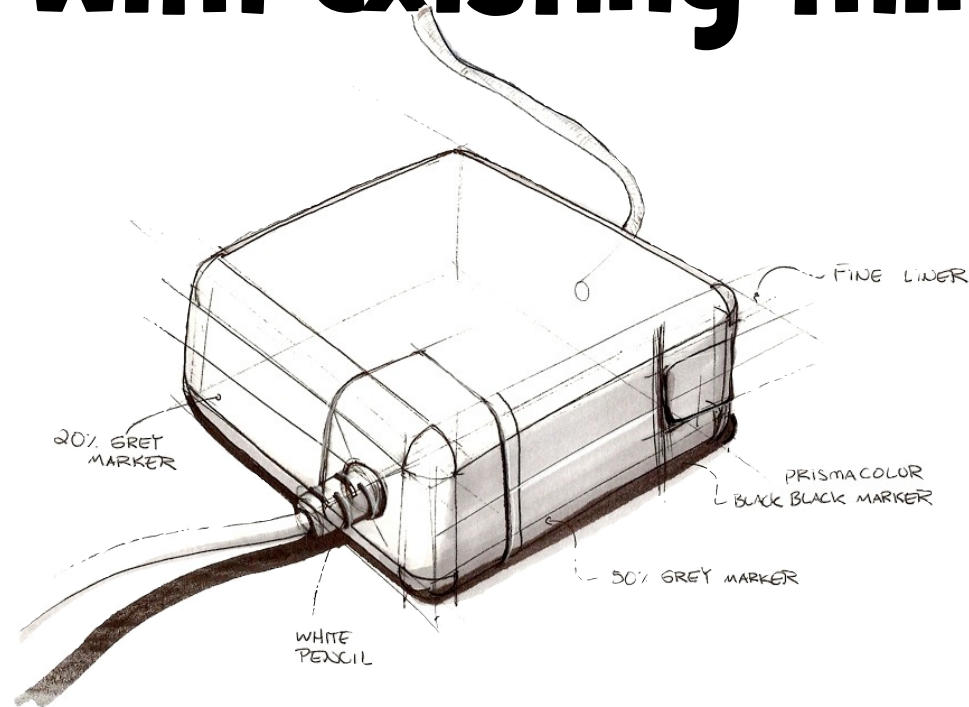
Cylinder on a block



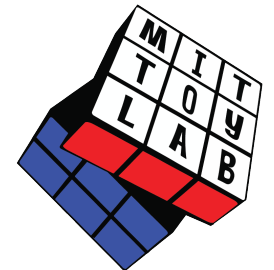
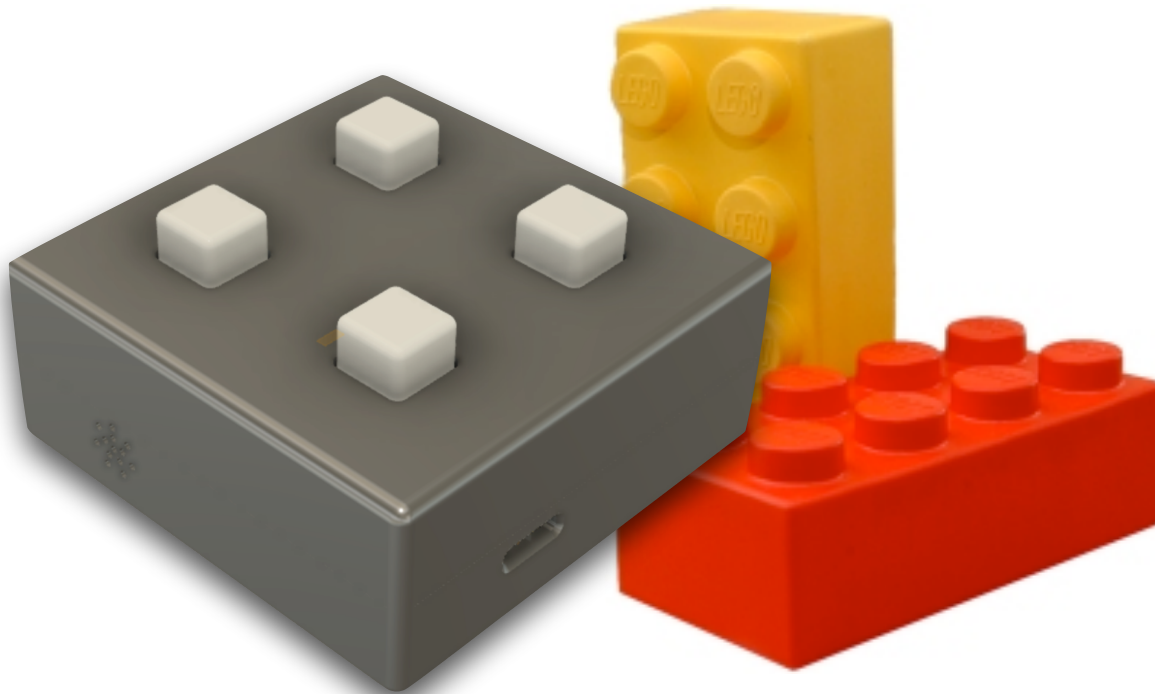
Products are basic shapes!



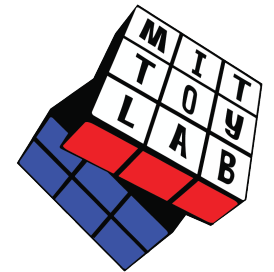
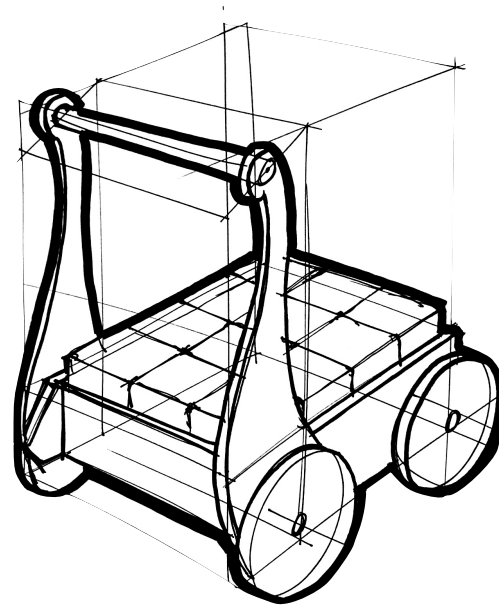
Start with existing things



Let's do that!



Let's do it! Again!

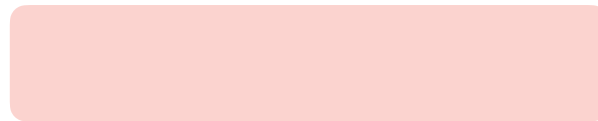
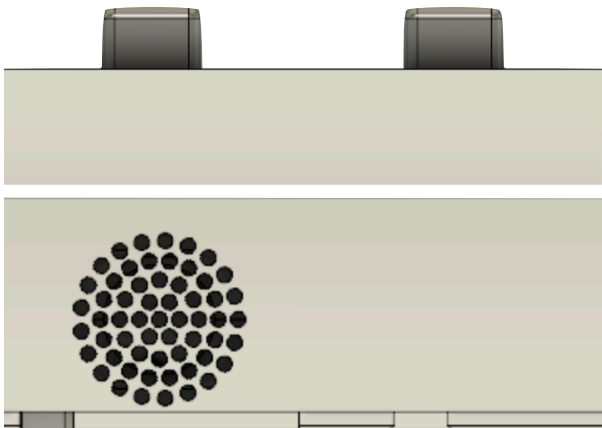


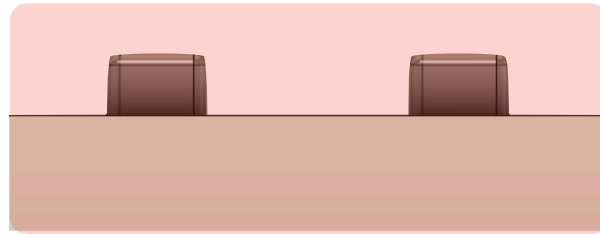
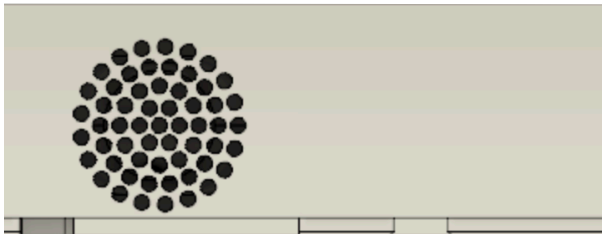
and again. From your mind!

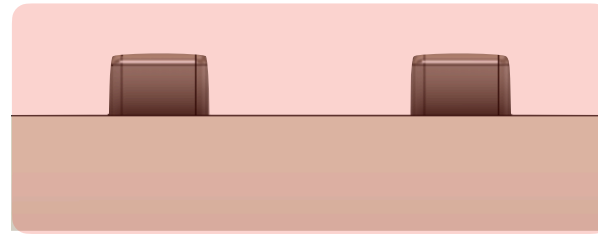
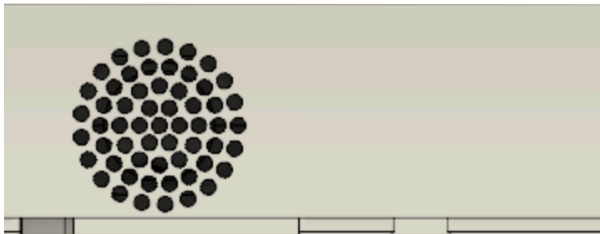
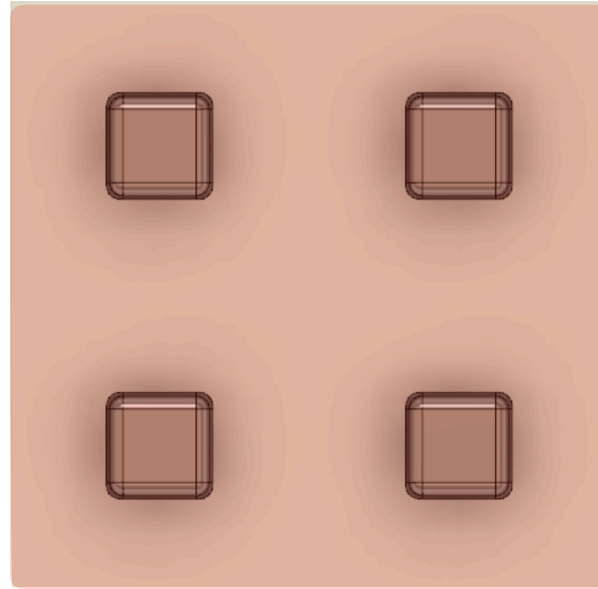


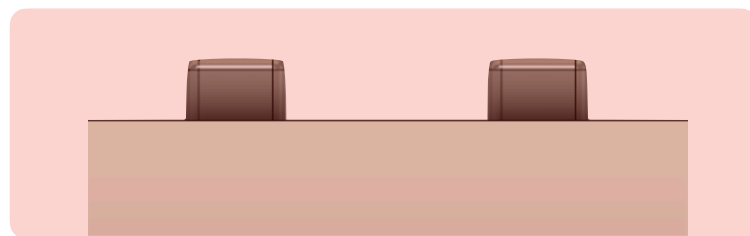
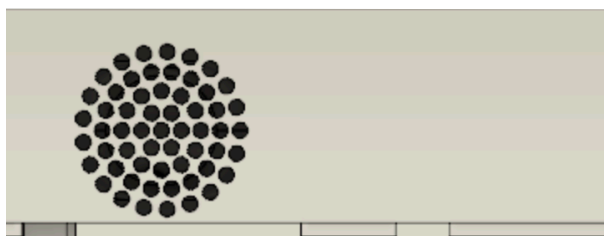
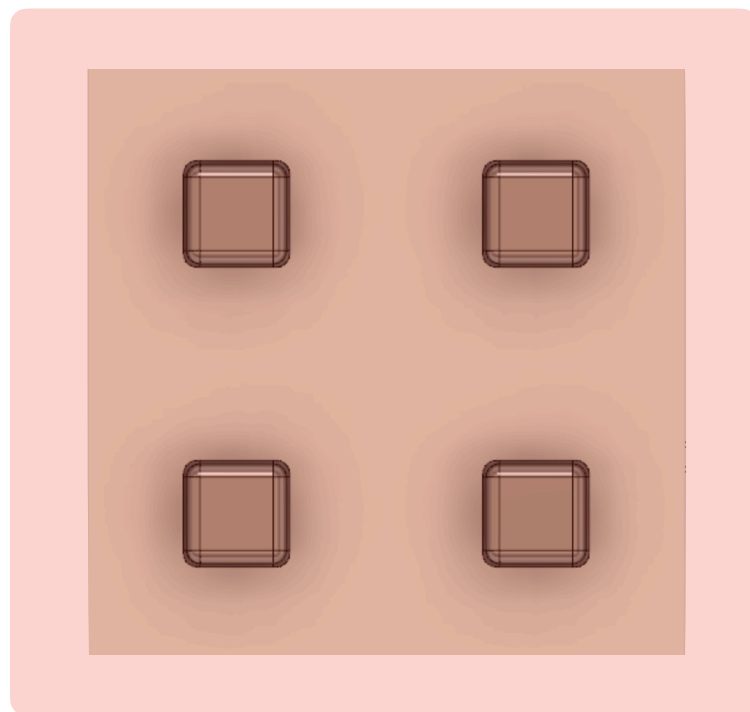


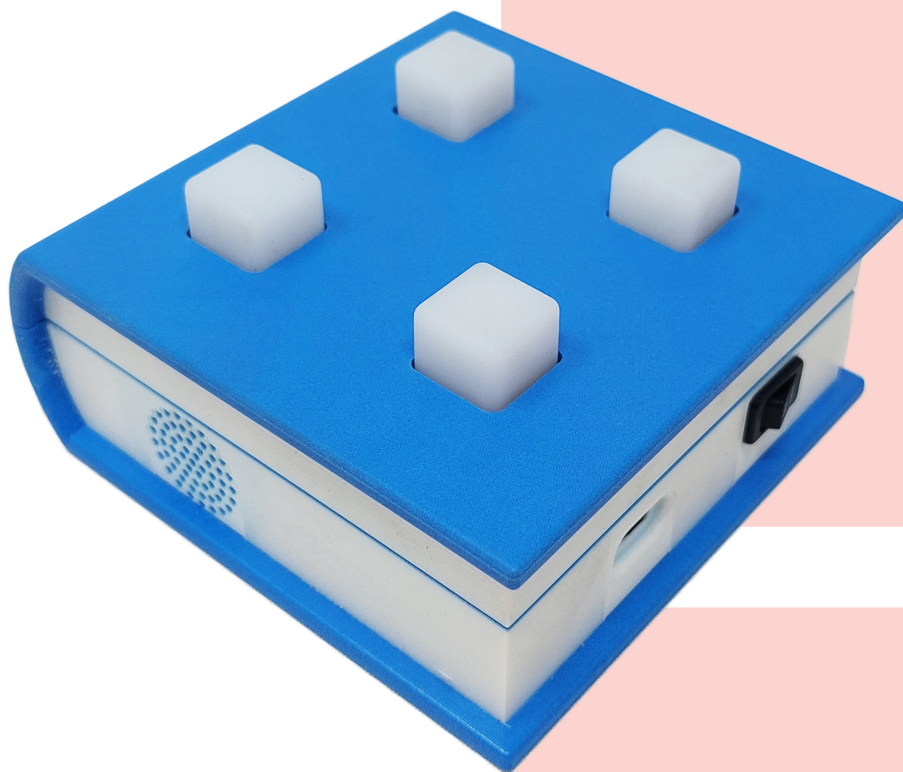


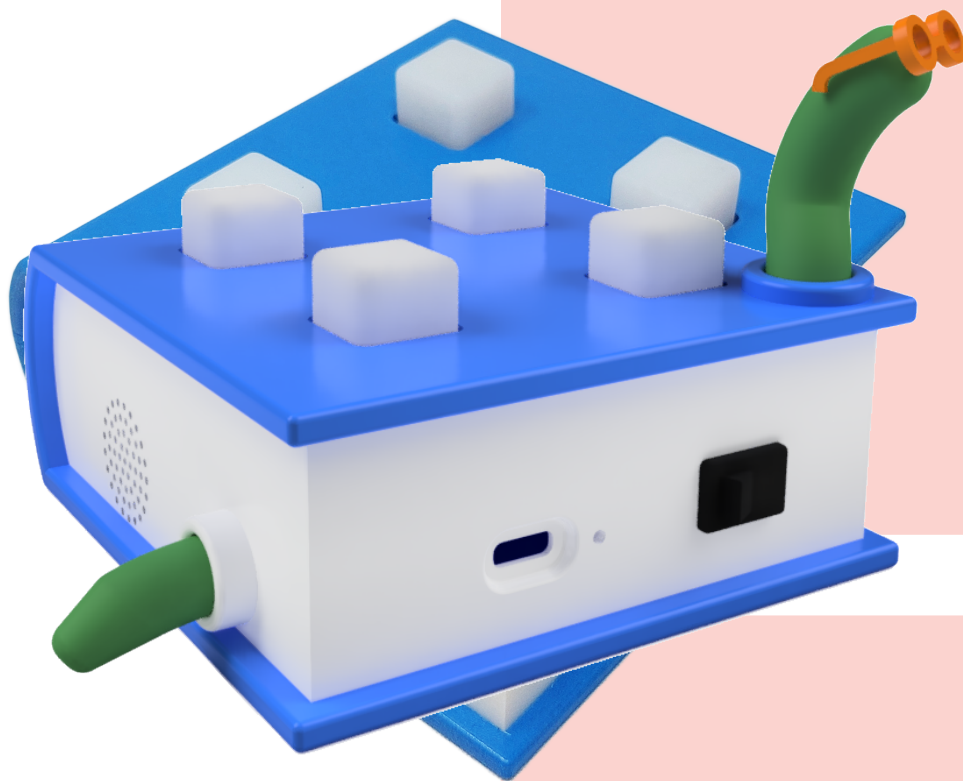


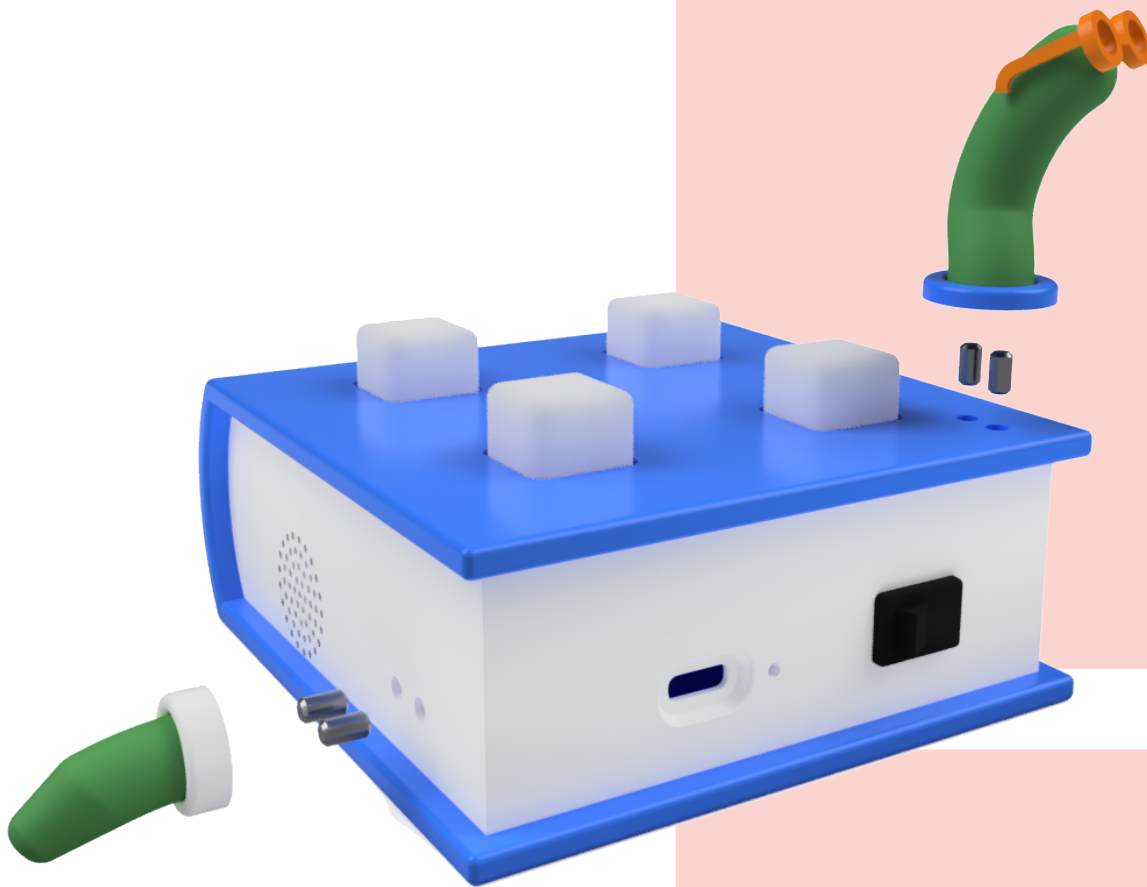








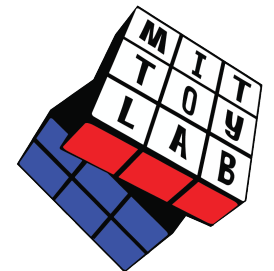




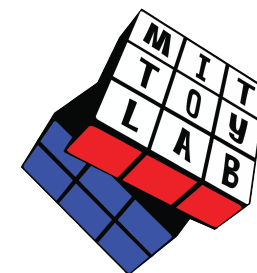


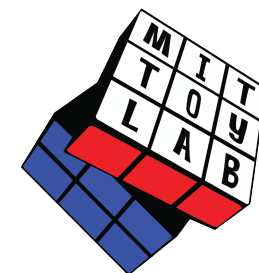
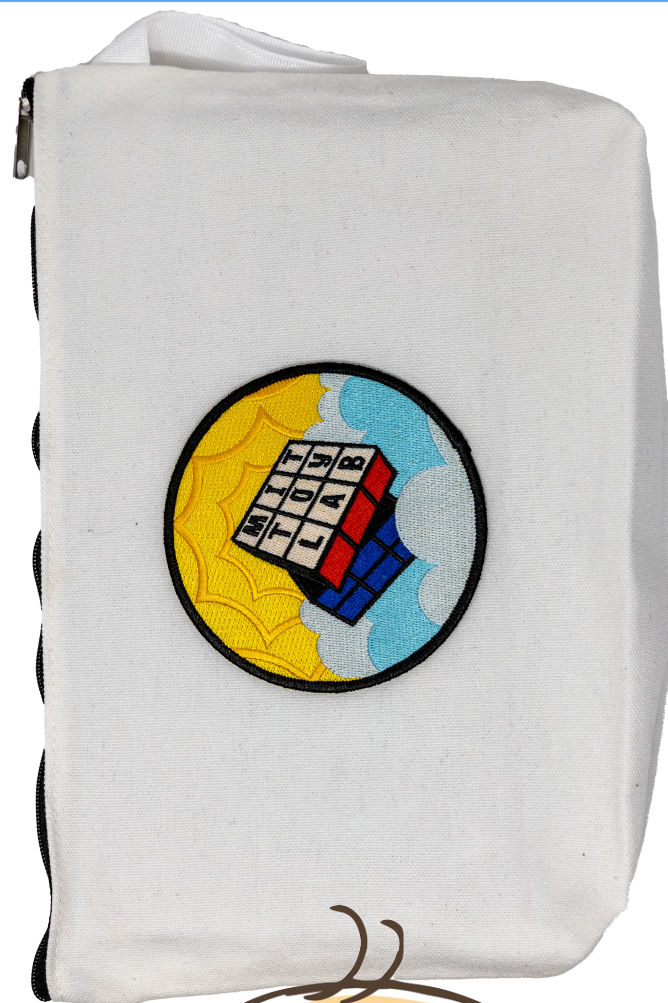
Getting Shady

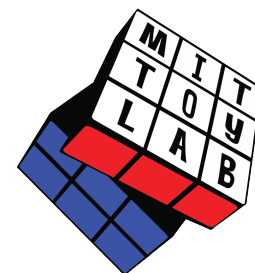
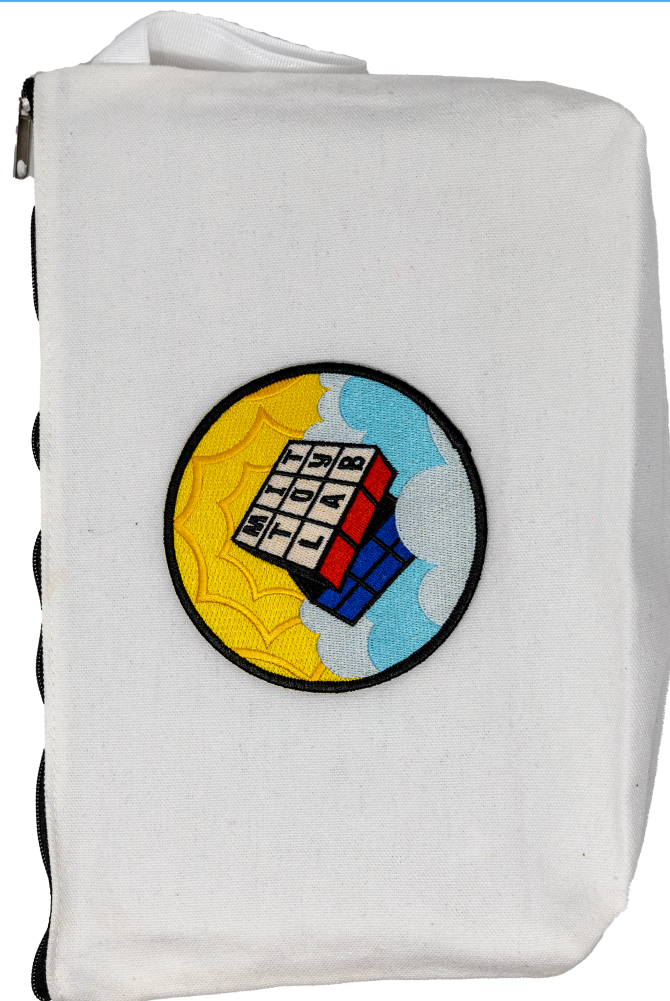
(aka using a marker)

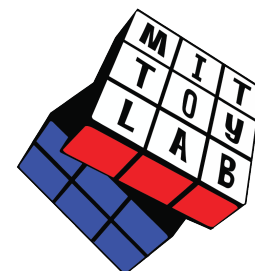


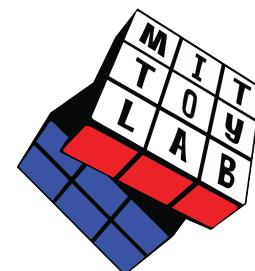












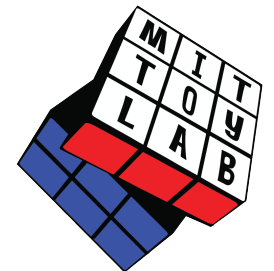
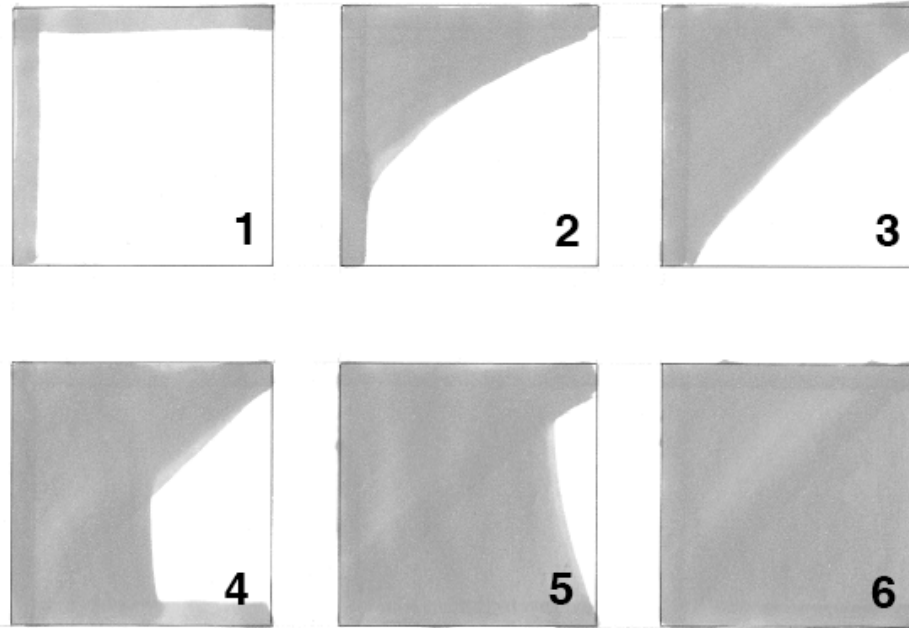
Using a marker

Keep a wet edge

Keep marker moving

Overlap strokes

Constant speed



Light and shade



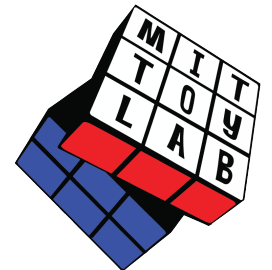
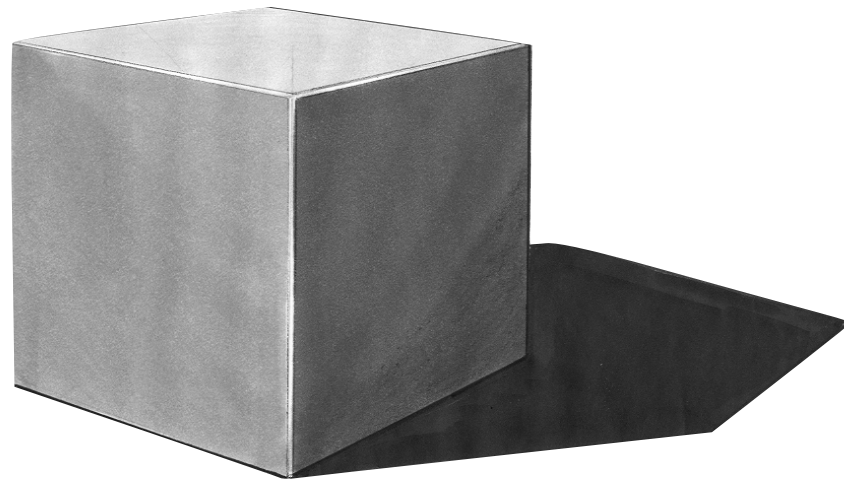
Light and shade

Choose a light direction

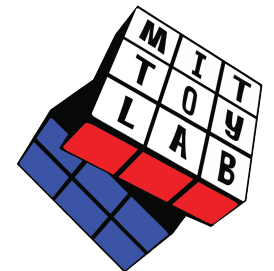
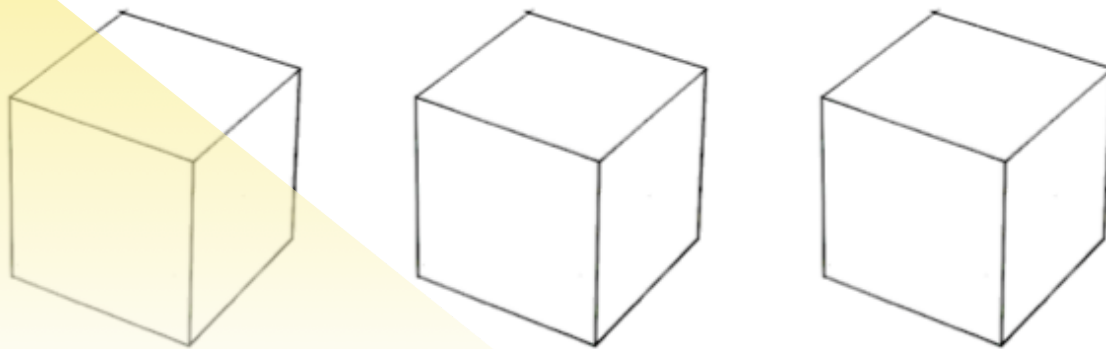
1-2-3 method

30%, 50%, 70% gray

Start with lightest

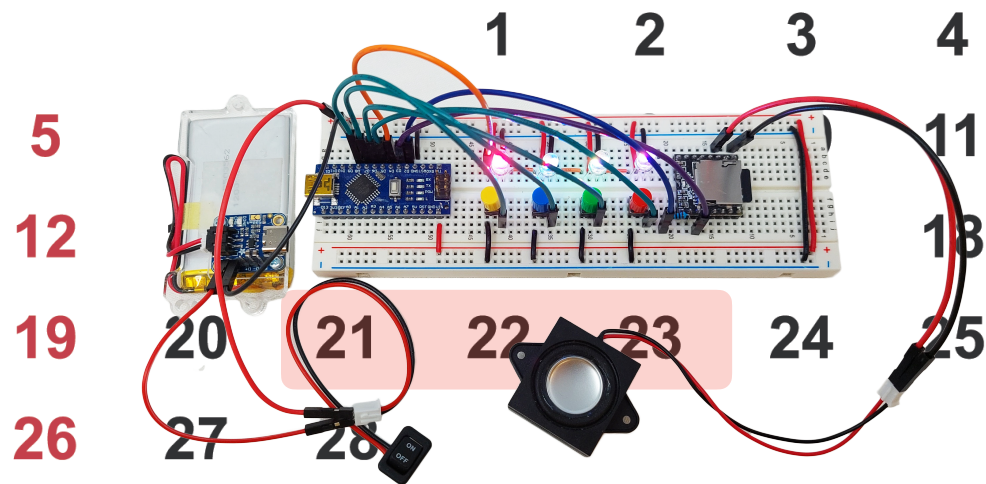


Let's practice!



February

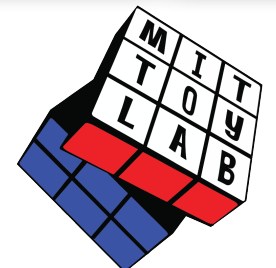
Su Mo Tu We Th Fr Sa



March

Su	Mo	Tu	We	Th	Fr	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Su	Mo	Tu
2	3	4
9	10	11
16	17	18
23	24	25
30		



February

Course Info
Syllabus
Course Staff
Teams
Toy Museum



Accessibility

Fri, Feb 24: The theme

Please bring your sketch kit, name tag and design notebook.

Lecture 5: Getting shady, Toober breadboard toolkit

Lecture 4: Get the points, Toober electronics overview [slides](#)

Labs Week of Feb 20

Lab 2: **Toobers, get ready to play!** MaBreaking bread(boards) together
Toobers electronics breadboarding

Please bring your laptop with the Arduino IDE installed (see the [to-do section](#)).

We will be taking your picture for your portfolio page in lab.

In lab: [Toober breadboarding instructions](#)

Things to-do

before lab 2 Please [install and configure your Arduino IDE](#) (click on "Toobers").
Ask for help on the [#ask-the-TAs](#) channel in Slack

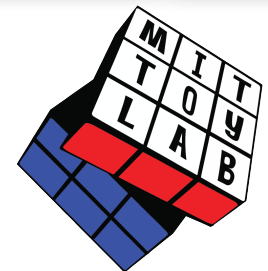
before lab 2 Please check the [Lab 2 makeup schedule](#) for your room and time
assignment, if you are doing a Lab 2 makeup.

later this week Sign up and attend extra lab hours to finish your pull toy or
toobers breadboarding. (Thursdays 9AM-12PM, 2-5PM, 7-10PM, and
Fridays 9AM-12PM)

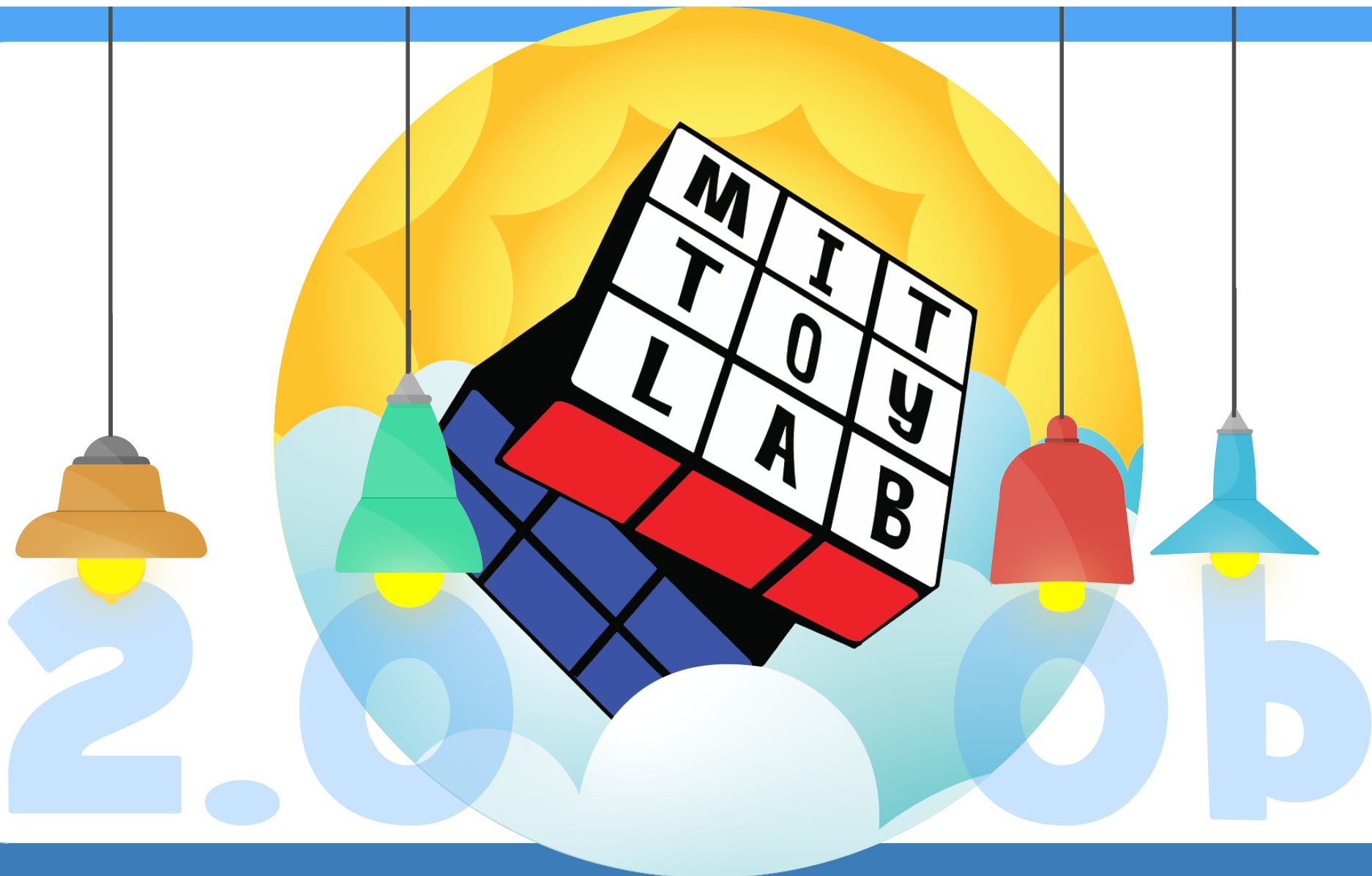
March

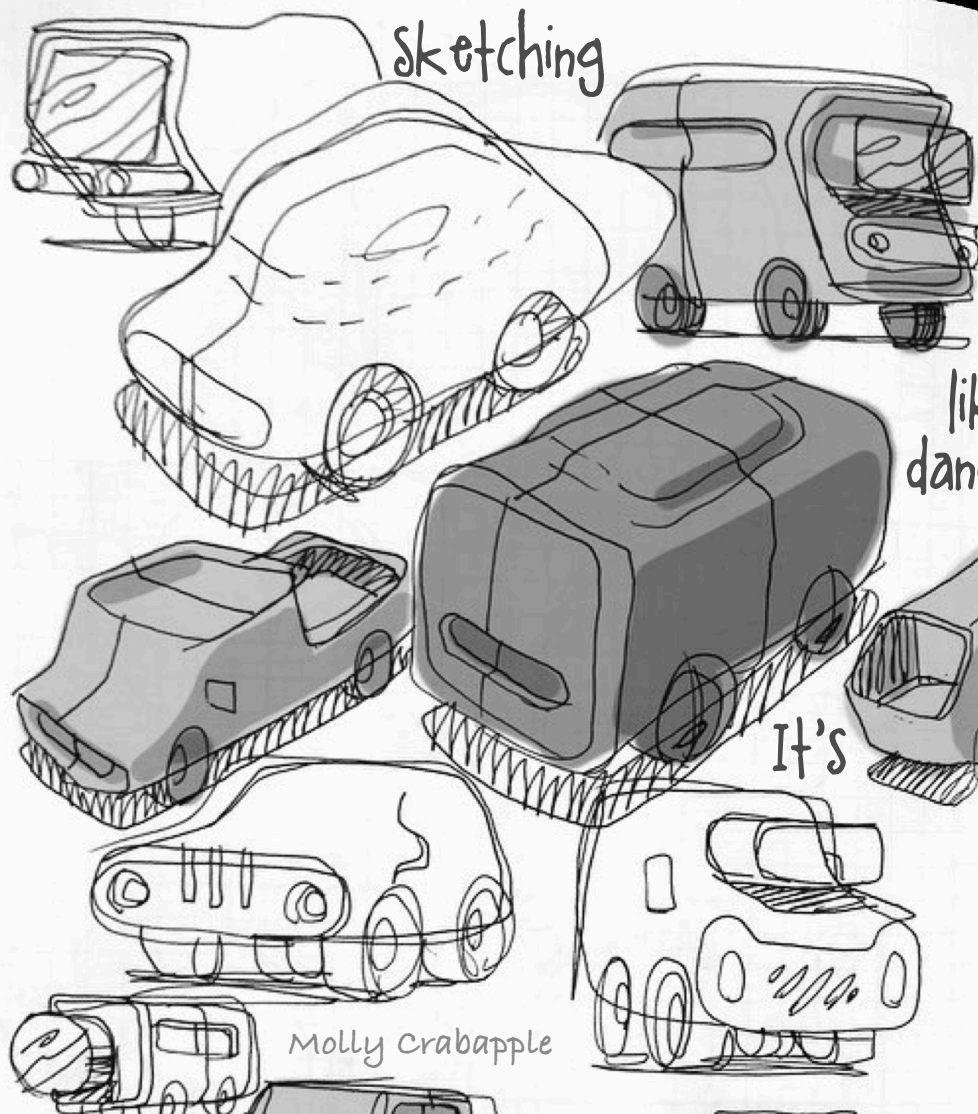
Su	Mo	Tu	We	Th	Fr	Sa
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12	13	14	15	16	17	18
19	20	21	22	23	24	25
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Su	Mo	Tu
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23	24	25
30		







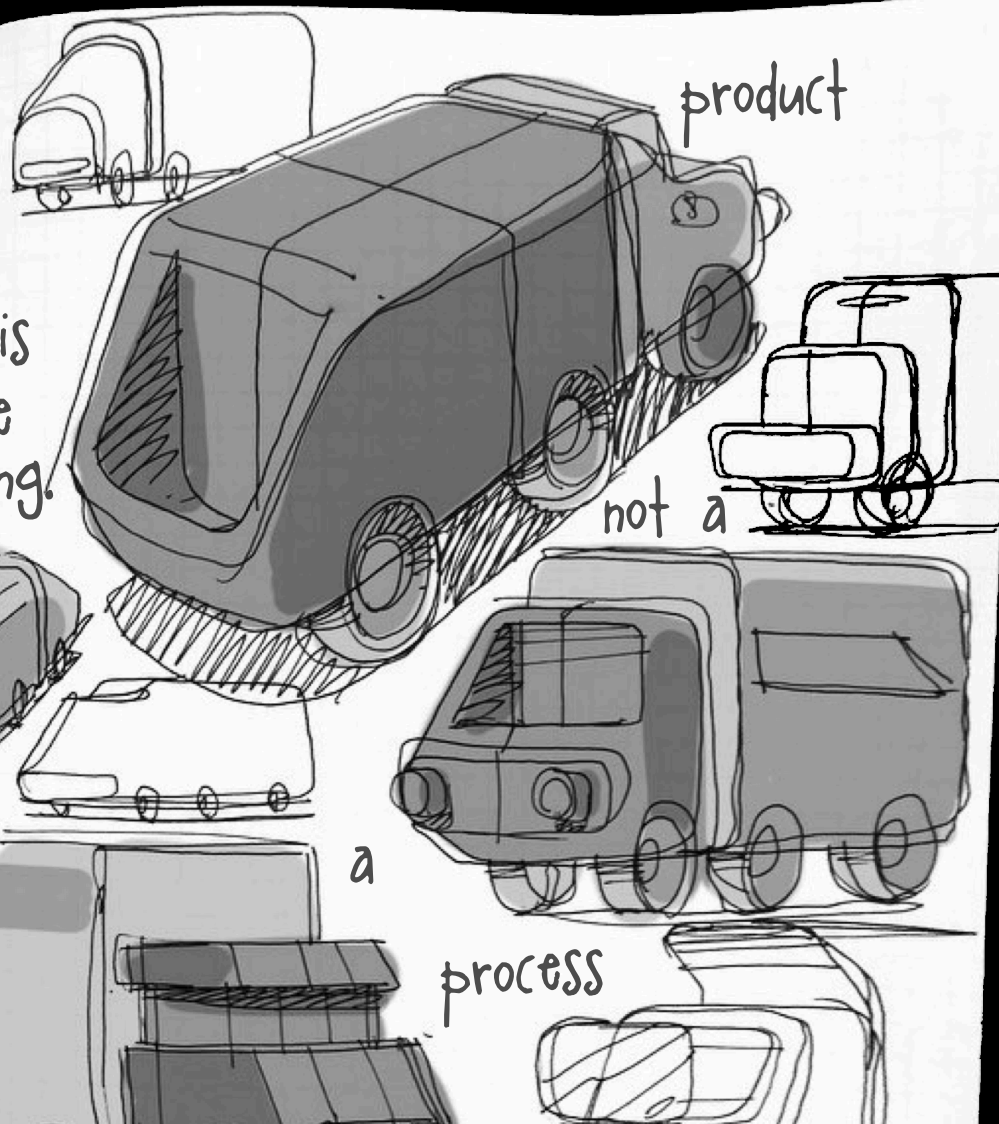


sketching

is
like
dancing.

It's

Molly Crabapple



product

not a

a

process