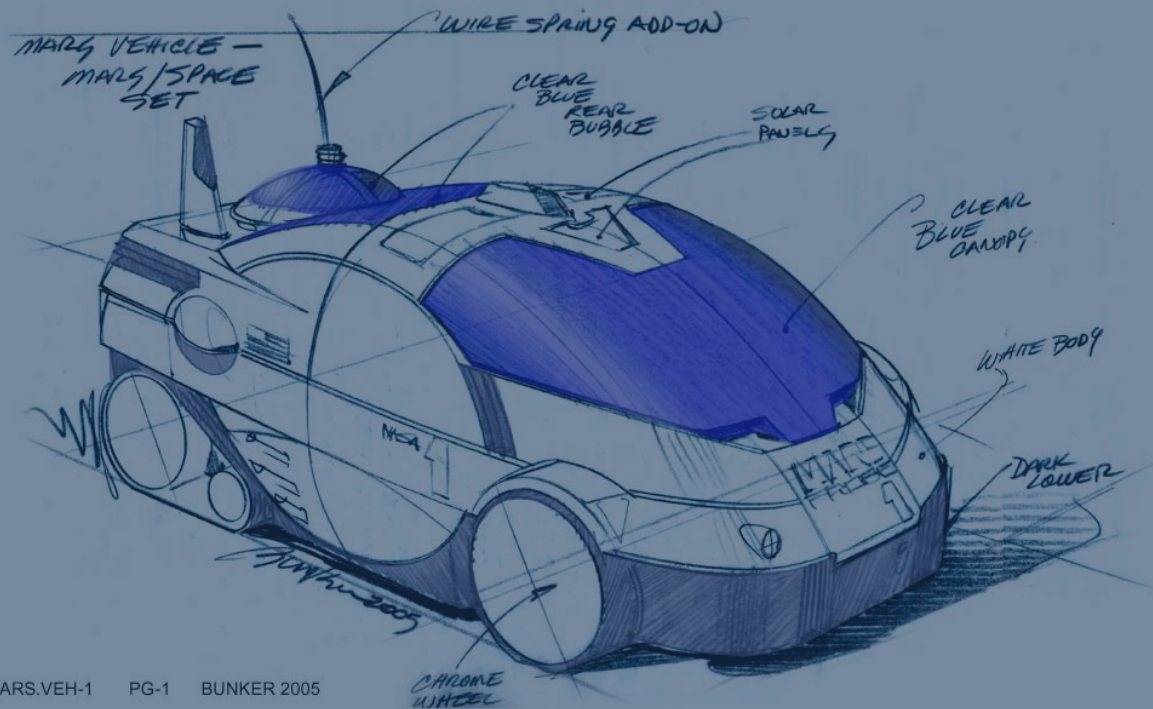


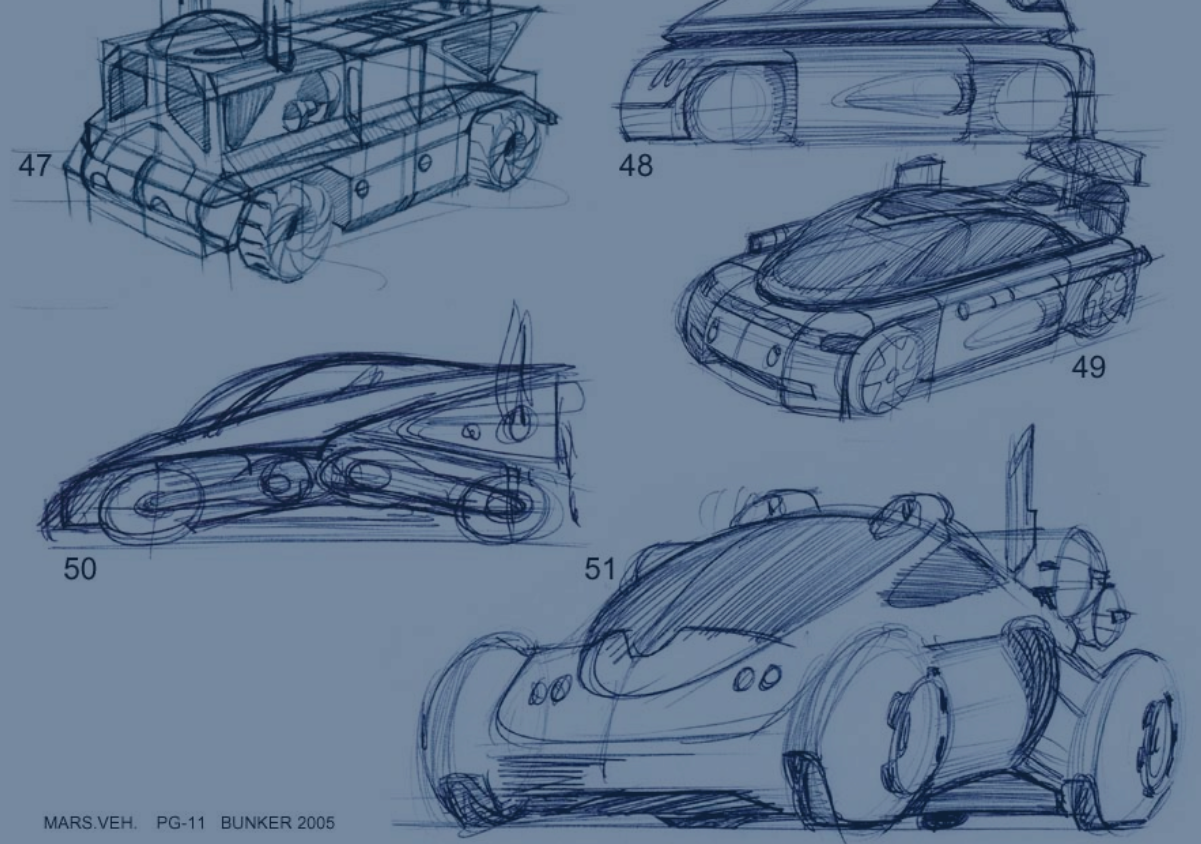
# Product Design

Tony Hu

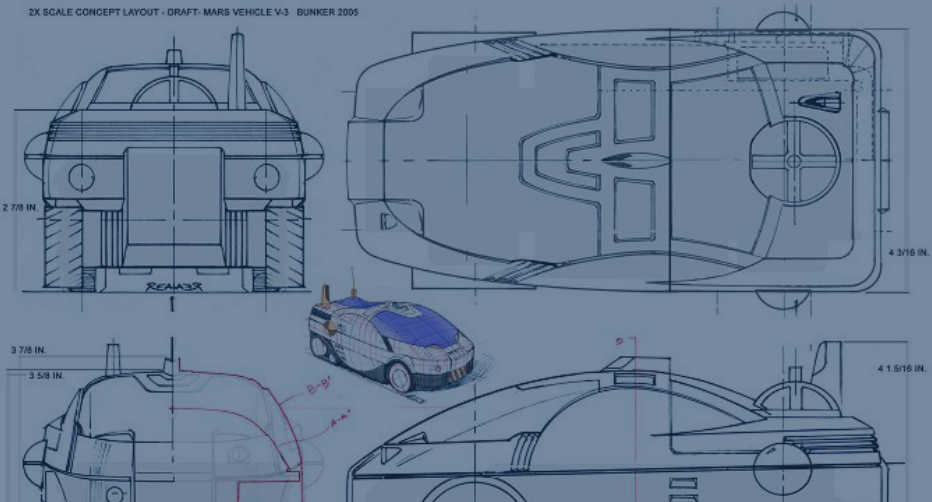
March 4, 2025



MARS.VEH-1 PG-1 BUNKER 2005

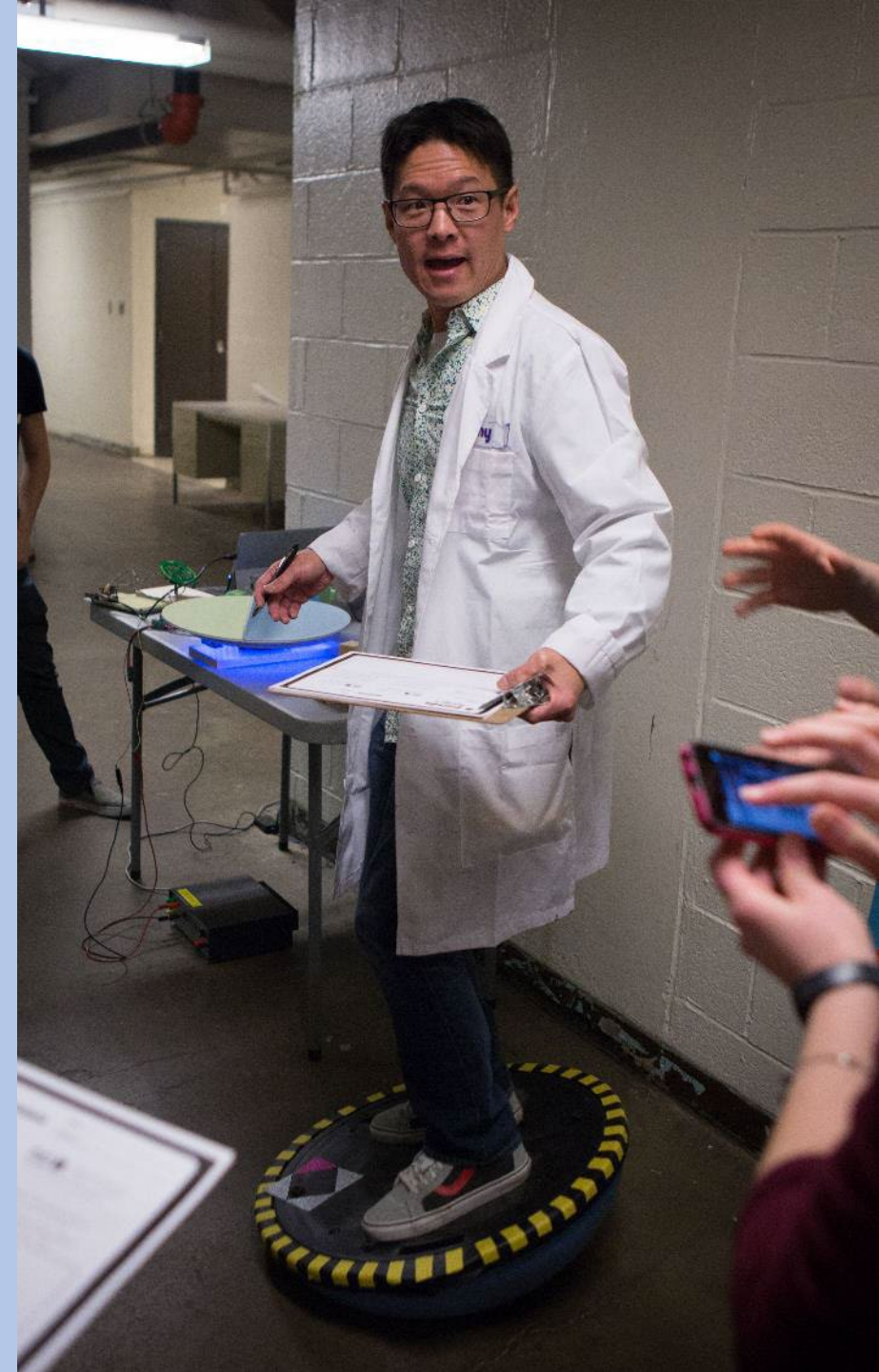


MARS.VEH. PG-11 BUNKER 2005



# Tony Hu

- Director Graduate Engineering Leadership Program
- Past Director Integrated Design & Management Program
- MIT & Stanford design lecturer
- VP PD, consumer products
- Stanford MS Product Design
- MIT SB Course 6-1, Media Lab



# Project requirements

- It should be rugged and able to withstand Boston environment
  - Mechanical design
- Able to be set up by an average person in a variety of outdoor environments
  - Mechanical design, industrial design (ID), human-centered design (HCD)
- It should engage with the community
  - ID, HCD, user experience design (UX), graphic design
- The system should present the information on a dashboard
  - HCD, UX, User interface design (UI), information design

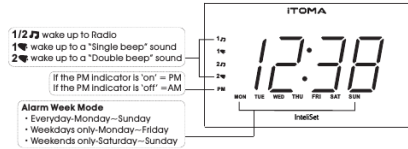
# User Experience Design



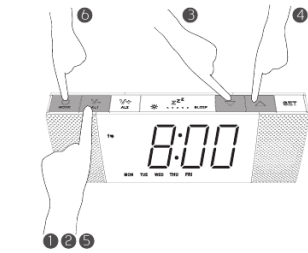
## SETTING THE ALARM

(with the Radio standby operation)

Your clock radio has two separate alarms that can be set and used independently. Be sure that you have set the wake up time correctly by observing the LED display.



### • Preset Alarm



- 1 Press AL 1 (or AL 2) slightly, and repeat doing so if necessary, until AL 1 indicator is shown on the display.
- 2 Press and hold AL 1 (or AL 2)
- 3 Press TUNE▼ to adjust Hour
- 4 Press TUNE▲ to adjust Minutes
- 5 Press and hold AL 1 (or AL 2)
- 6 Press MODE to select the Alarm Week Mode, and the mode will change by one step.

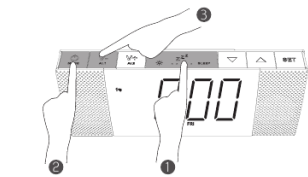
To avoid missing your wake up time, even if you set the radio to a very low volume or even silence (Level 0-8) before turning off the radio, medium radio volume (Level 8) will gradually increase at wake up time. If you need a louder volume for your wake up time, set the radio at higher volume (Level 8-15) before turning it off, that will gradually increase the radio volume to the same preset level when wake up time comes.

**Wake up to Buzzer** : It will begin softly and gradually increase in volume.

**Wake up to Radio** : It will begin softly and gradually increase in volume, but no louder than the volume you set when listening to radio.

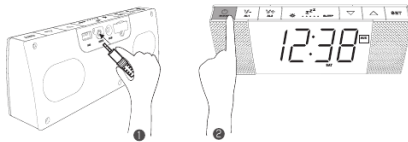
**NOTES**: If you want to set wake up to radio, please refer to "LISTENING TO THE RADIO" for more information.

### • SNOOZE/ REPEAT/ STOP ALARM



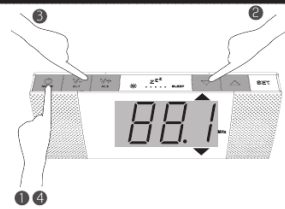
- 1 When the alarm turns "ON", you can press zzz Snooze for a few extra minutes sleep. The alarm will stop for **9 minutes** and then comes "ON" again.
- 2 Press the Snooze button to stop the alarm sooner.
- 3 If you want to turn off the alarm permanently (instead of following the default setting), press AL 1 or AL 2 to turn off the alarm. (AL 1 or AL 2 indicator will be off)

## AUX IN



- 1 Connect the audio source from its earphone jack to with a 3.5mm Male to Male stereo AUX cable (not included).
- 2 Press MODE slightly until the "AUX" indicator is lit on the display. The mode will change by one step.

## LISTEN TO THE RADIO



- 1 Press MODE until the "MHz" indicator is shown on the display.
- 2 Press either TUNE▲ or TUNE▼ slightly, the receiving frequency will increment or decrement by one step.
- 3 Set the volume by pressing either V+ or V- to a level that is desired.
- 4 Press and hold the Power button for 2s to turn off the radio.

Keep the clock radio away from other electronic devices to avoid radio interference. For better reception, fully extend and adjust the position of the FM antenna.

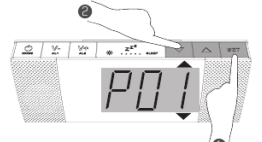
**NOTES**: If you want to set wake up to radio, please go through the procedures of "SETTING THE ALARM" again after you complete the above steps.

### • Storing Stations Automatically



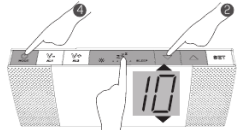
### • Recalling A Station

(Make sure the radio is ON)



- 1 Press SET, and "P XX" will show on the display.
- 2 Press either TUNE▲ or TUNE▼ slightly, can change the memory location is tuned by one step.

### • Sleep To Timer



- 1 Press SLEEP
- 2 Press either SET▲ or SET▼ (± 1 min per click), it will change rapidly by long pressing.
- 3 Press SLEEP (+ 10 min per click) 2 min <Timer< 90 min
- 4 If you want cancel the Timer, press and hold the Snooze button until MHz indicator "OFF".

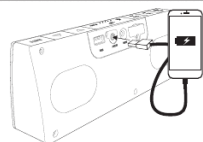
**NOTES**: Remember that the station and volume settings you choose for the Sleep To Radio operation are the same settings you will hear if you set the alarm for Wake To Radio the follow morning.

## DIMMER CONTROL

(with the Radio standby operation)



## USB FOR CHARGING



Output 5V 1A for charging portable digital audio player.

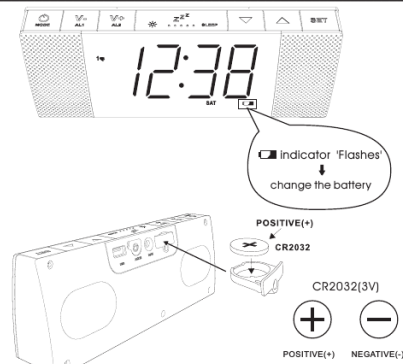
## BLUETOOTH CONNECTED



- 1 Press MODE slightly until the "BT" indicator is shown on the display.
- 2 Select "CKS503BT" from the device list when it appears on your device screen.

**NOTES**: The unit do not have Hands-free speakerphone function

## CHANGING THE LITHIUM BATTERY



The battery backup is intended for short power outages only. The unit's primary functions cannot run on the battery backup alone. This unit uses a button cell battery that will last up to 1 year and maintains the time.

### WARNING

**DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE. DO NOT INGEST BATTERY. CHEMICAL BURN HAZARD**

This product contains a coin/button cell battery. If the coin/button cell battery is swallowed, it can cause severe internal burns in just 2 hours and can lead to death. Keep new and used batteries away from children. If the battery compartment does not close securely, stop using the product and keep it away from children. If you think batteries might have been swallowed or placed inside any part of the body, seek immediate medical attention.

## FCC

### FCC Part 15.19 Warning Statement

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRABLE OPERATION.

### FCC Part 15.21 Warning Statement

NOTE: THE GRANTEE IS NOT RESPONSIBLE FOR ANY CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

### FCC Part 15.105 Warning Statement

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

### RF warning statement:

The device has been evaluated to meet general RF exposure requirement. To maintain compliance with FCC's RF exposure guidelines, this equipment should be installed and operated with a minimum distance of 20cm between the radiator and your body.

## CARE OF CABINETS

### Care Of Cabinets

If the cabinet becomes dusty, wipe it with a soft cloth. If the cabinet becomes smudged or dirty, clean it with a soft, slightly dampened cloth. Never allow water or any liquid to get inside the cabinet. Never use any abrasive cleaners or cleaning pads as these will damage the finish of your radio.

### Lithium Battery Precautions

- Dispose of the old battery properly. Do not leave it lying around where a young child or pet could play with or swallow it. If the battery is swallowed, contact a physician immediately.
- The battery may explode if mistreated. Do not attempt to recharge it or disassemble it. Do not dispose of the old battery in a fire.

The apparatus must not be exposed to dripping or splashing and objects filled with liquids, such as vases, must not be placed on the apparatus.

This marking indicates that this product should not be disposed of with other household wastes throughout the country. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle this unit responsibly so as to promote the re-use of material resources. To return your used device, please use return and collection systems or contact the retailer where the product was purchased as they know how to safely recycle this product.

### IMPORTANT NOTICE

Daylight Saving Time is NOT observed in Hawaii, American Samoa, Guam, Puerto Rico, the Virgin Islands and in, most of Arizona, with exception of the Navajo Indian Reservation in Arizona. Beginning in 2007, this Clock Radio will automatically advance by one hour at the beginning of Daylight Saving Time on the second Sunday in March. And it will automatically return to Standard Time on the first Sunday in November. If you live in an area that does not observe Daylight Saving Time it will be necessary for you to manually set the clock back one hour at the beginning of the Daylight Saving Time, and forward one hour at the end of Daylight Saving Time. A simple way to do this is to change the TIME ZONE setting. Set the clock to the next higher numbered time zone at the beginning of Daylight Saving Time, and set the clock back to your correct time zone at the end of Daylight Saving Time.

## SPECIFICATIONS

### AUDIO

Frequency Range(FM).....87.5-108 MHz  
Speaker Impedance.....4 Ω

### GENERAL

Bluetooth Version.....V4.1  
Power Adapter.....DC 5V IN  
Output Power .....0.8W x 2  
Battery Backup.....3V CR2032 Lithium Battery  
(Lithium battery will work for approximately 3 years before needing to be replaced with new battery)  
Dimensions.....8.27(W) x 1.77(D) x 3.07(H) inches  
Weight.....0.86 lbs

Specifications are subject to change without notice.

## ITOMA 1-Year Limited Warranty

ITOMA (Hong Kong) Company Limited (ITOMA) warrants to be original consumer of this ITOMA product that it will furnish a replacement for, or, at its sole option, repair any part which proves (upon inspection by ITOMA) to be defective under normal use within 1 year of the original purchase date.

This warranty does not apply to appearance items, including, but not limited to, antennas, knobs, cabinets, or cases, and in the case of batteries, for damage caused by leaking batteries. It also does not apply to the product, or to any part thereof, that has been damaged through misuse or negligence.

Furthermore, this warranty will become invalid if, in the judgment of ITOMA the product or any part thereof has been installed incorrectly, repaired or altered by other than ITOMA Service Department.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state. Some states do not allow the exclusion or limitation of incidental or consequential damages or limitations on how long an implied warranty lasts, so the above exclusions and limitation may not apply to you.

For Service, Warranty, or Product Information,  
Please contact ITOMA (Hong Kong) Company Limited,  
info@itoma.com.hk

**PLEASE SAVE THIS CARD TOGETHER WITH ORIGINAL DATED PROOF OF PURCHASE FOR YOUR RECORDS AND FOR CUSTOMER SERVICE.**



HOUR

12 1 2 3 4 5 6 7 8 9 10 11

AM PM

ALARM SET

MINUTE

0 5 10 15 20 25 30 35 40 45 50 55

AM  
PM  
Alarm

12:00

SONY




It's a Sony

FM 88 92 96 100 104 108 MHz

AM 53 60 70 80 100 120 140 160 X10kHz

EZ  
ALARM



An illustration of a woman with long, straight, reddish-brown hair, wearing a light purple long-sleeved button-down shirt. She is shown from the chest up, in profile, facing left. Her right hand is raised, palm facing up, in a gesturing motion. In the foreground, the back of a grey, boxy smart speaker is visible, featuring four small circular sensors. A large, light blue speech bubble with a black outline originates from the woman, containing the text "OK Google, set an alarm for 6 AM on Tuesdays and Thursdays." The background consists of simple vertical lines representing a wall or window frame, with a light yellow and green color scheme.

**“OK Google, set an alarm for 6 AM on Tuesdays and Thursdays.”**









**Please enter your phone number:**

(216) 409-9989

+

Submit







# Human-Centered Design

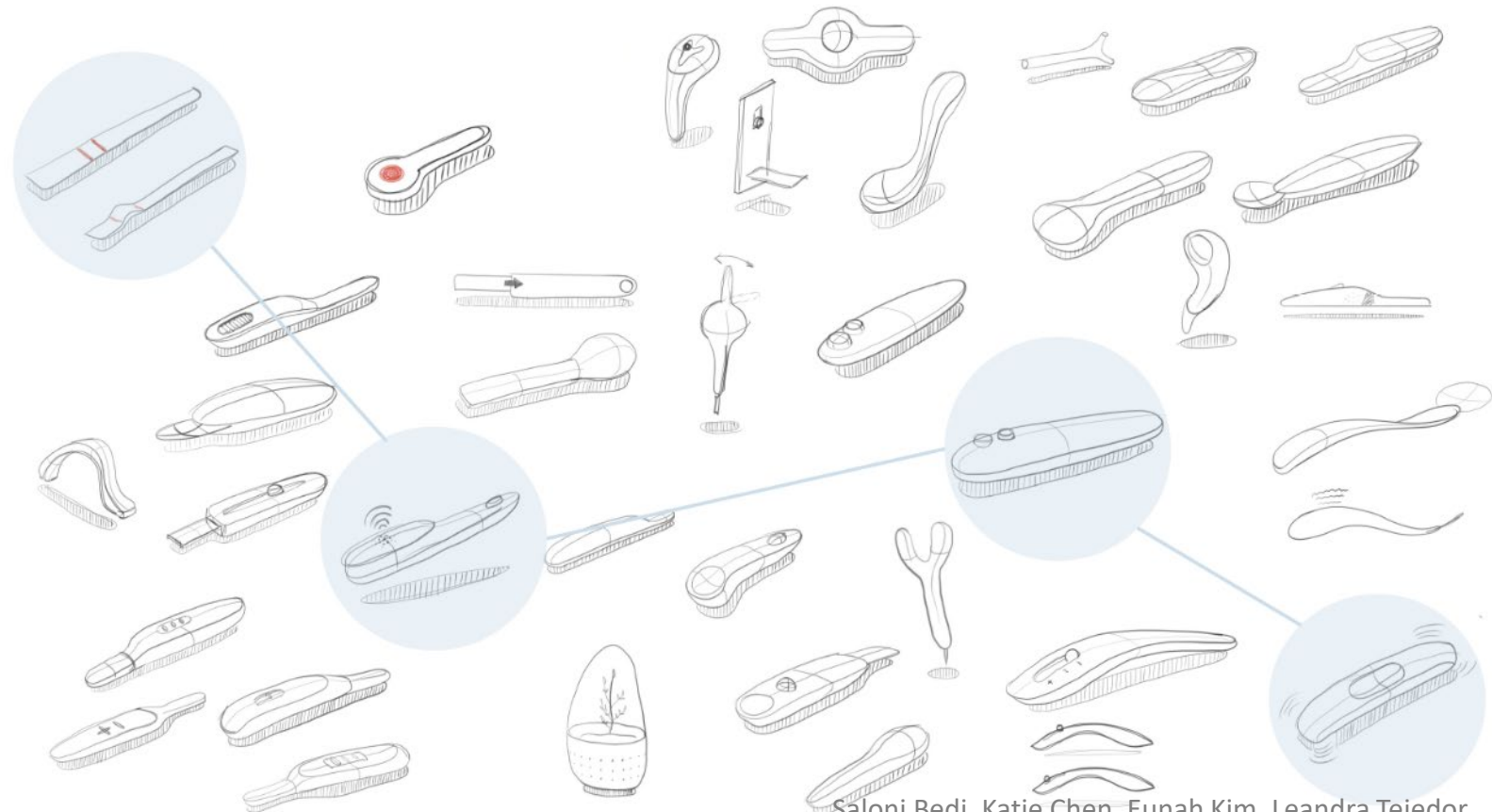


# Human-Centered Design

- Focus on stakeholder needs

# Human-Centered Design

- Focus on stakeholder needs
- More ideas are better



# Human-Centered Design

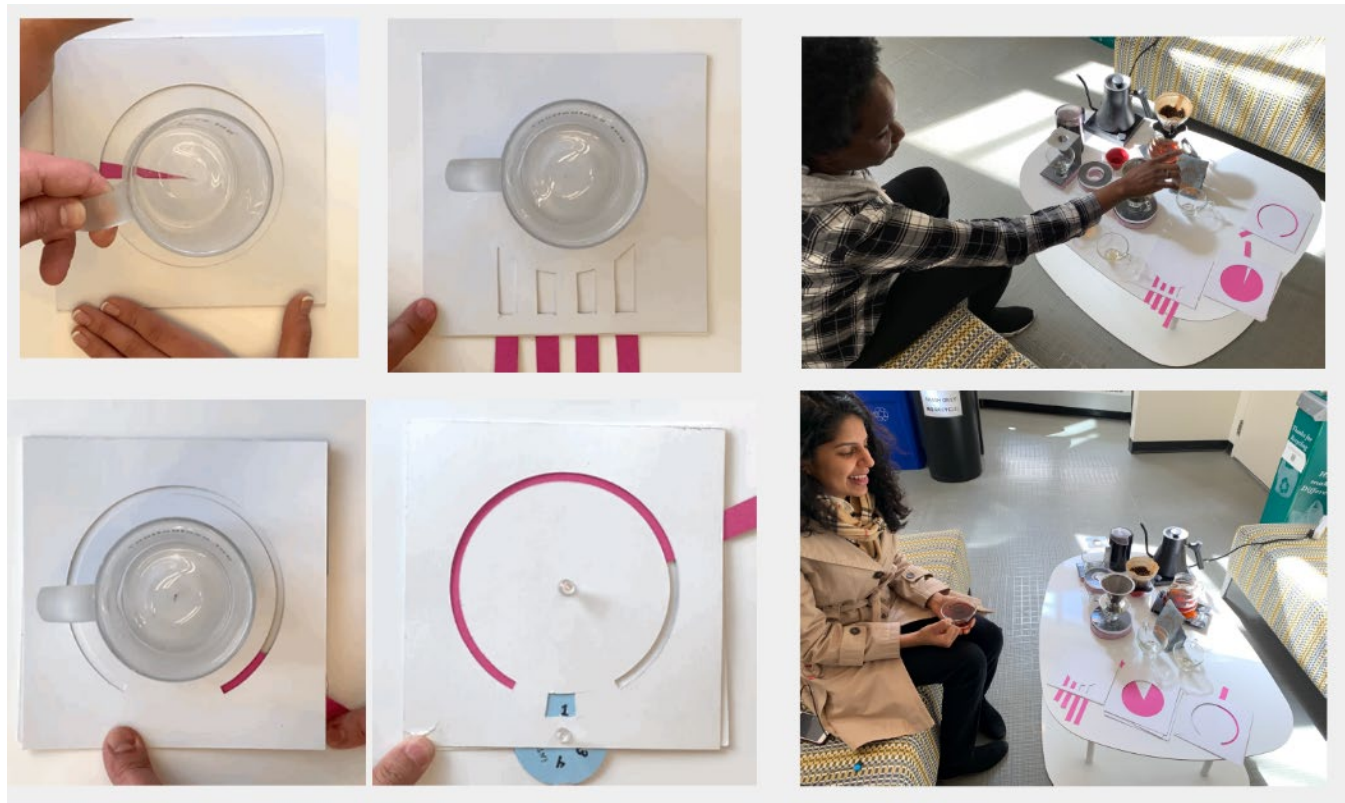
- Focus on stakeholder needs
- More ideas are better
- Quick & dirty prototypes





# Human-Centered Design

- Focus on stakeholder needs
- More ideas are better
- Quick & dirty prototypes
- Test with users



# Human-Centered Design

- Focus on stakeholder needs
- More ideas are better
- Quick & dirty prototypes
- Test with users
- Iterate to a solution



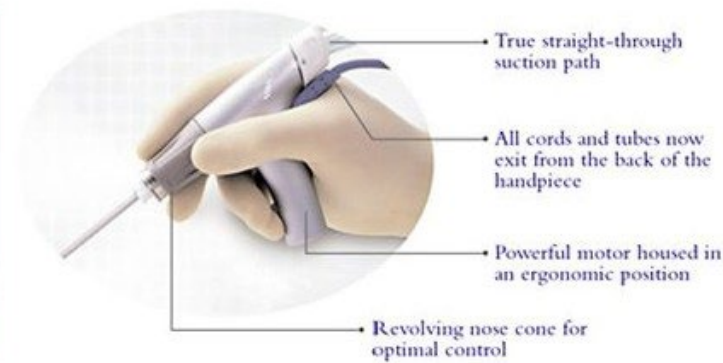
# Wireframes

## Prototyping strategy

- Don't prototype just for the sake of it
- Identify risk and uncertainties
- Formulate questions that will reduce/eliminate risk
- Get the answers the fastest, cheapest way possible



# Works-Like, Looks-Like Prototypes



Gyrus ACMI

# Works-Like, Looks-Like Prototypes



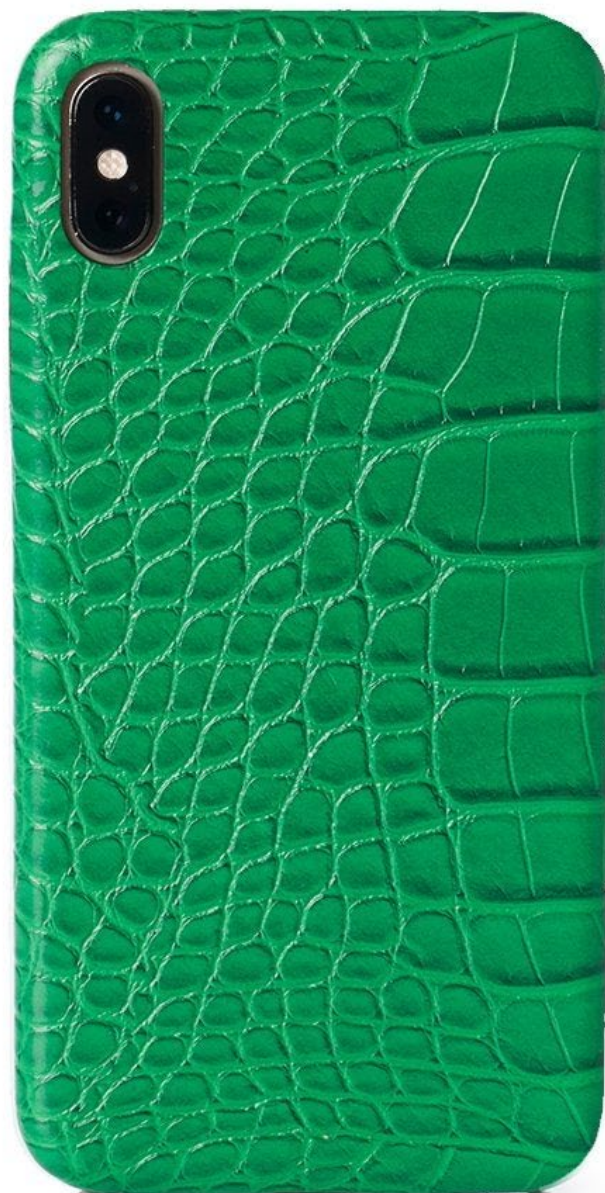
Sentio Solutions

# Industrial Design















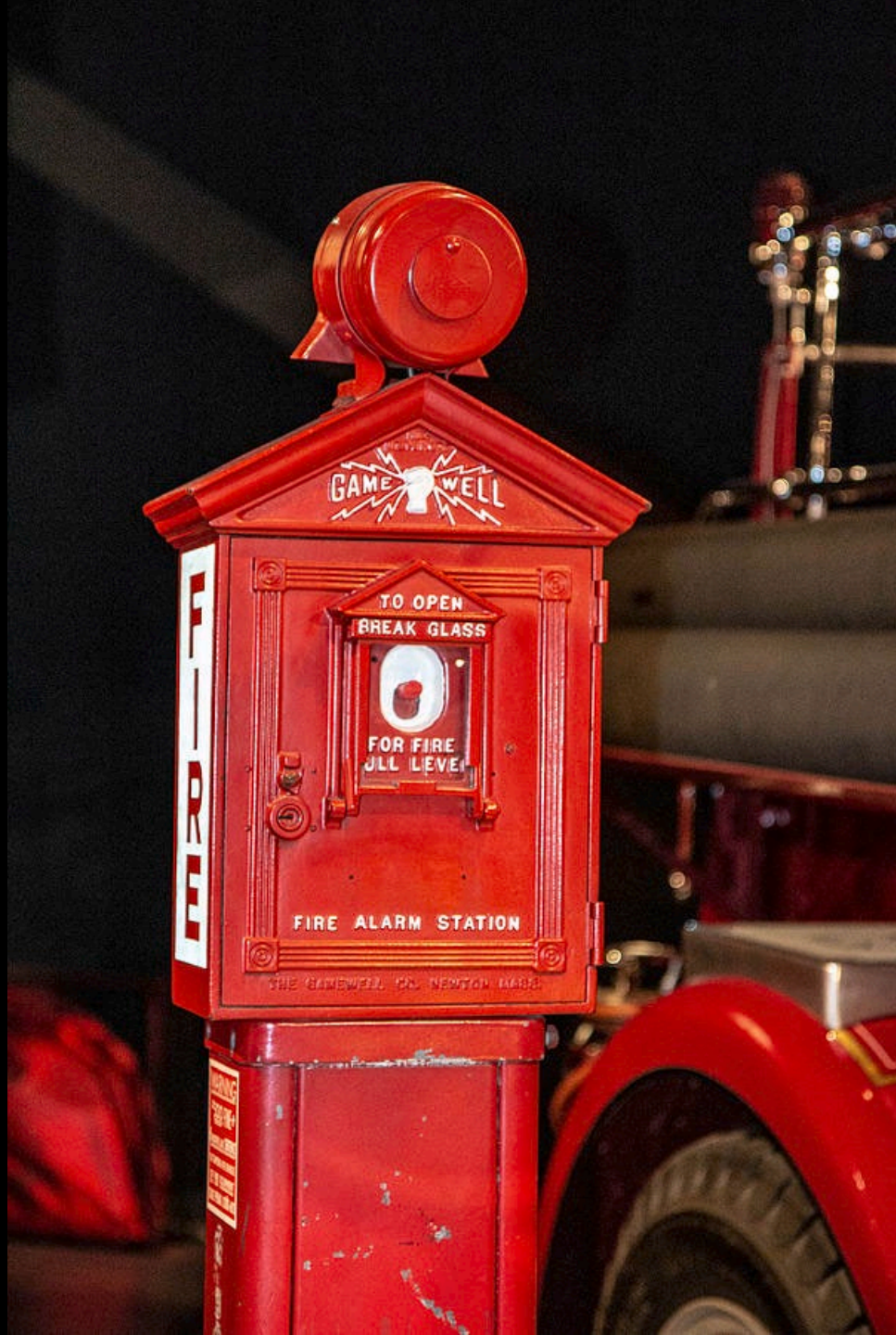








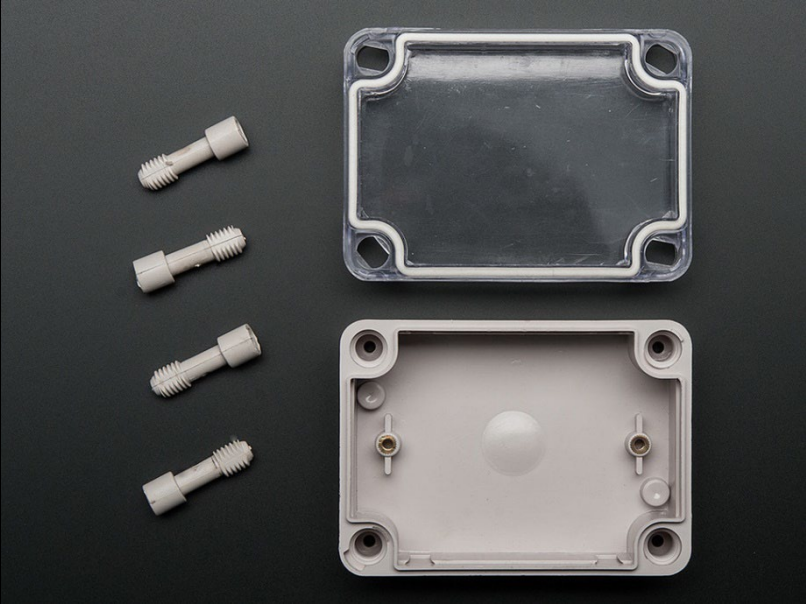
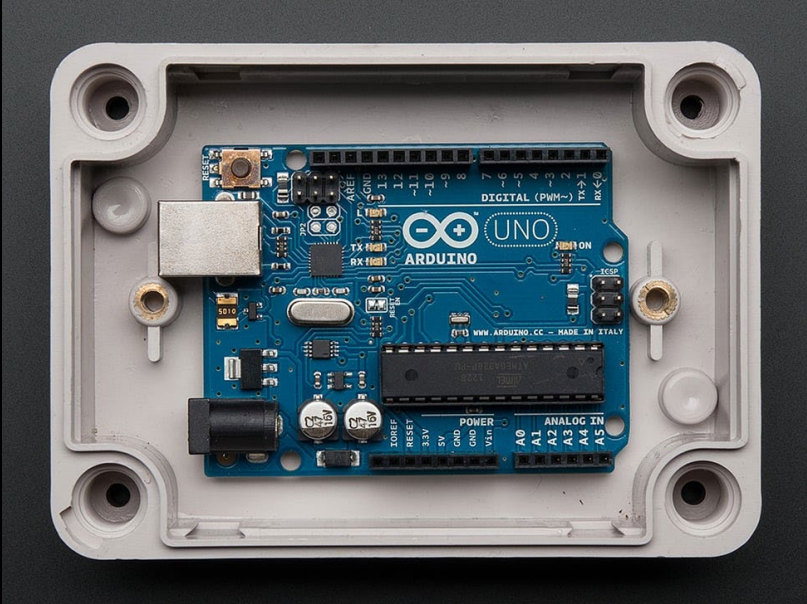














ID Exercise!

# It's your turn!

- Sculpt a shape that communicates one of the following:
  - Fun
  - Dignity
  - Action
  - Technology
  - Strength
  - Luxury
- Don't sculpt anything representational
  - Make it abstract
  - No faces, bodies, or words!



Michael's

(Don't tell anyone which one you're working on!)

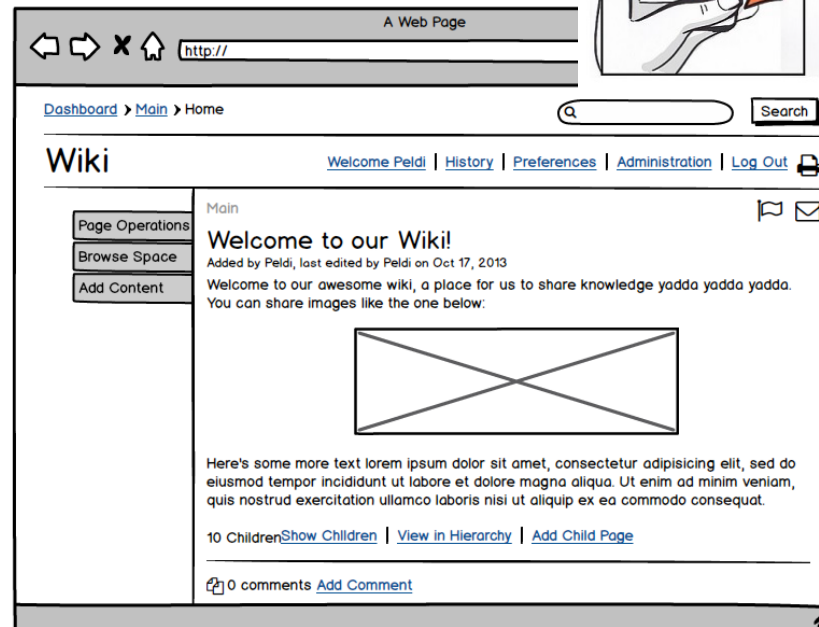
# User Interface Design

# Prototyping

- Software
- Services



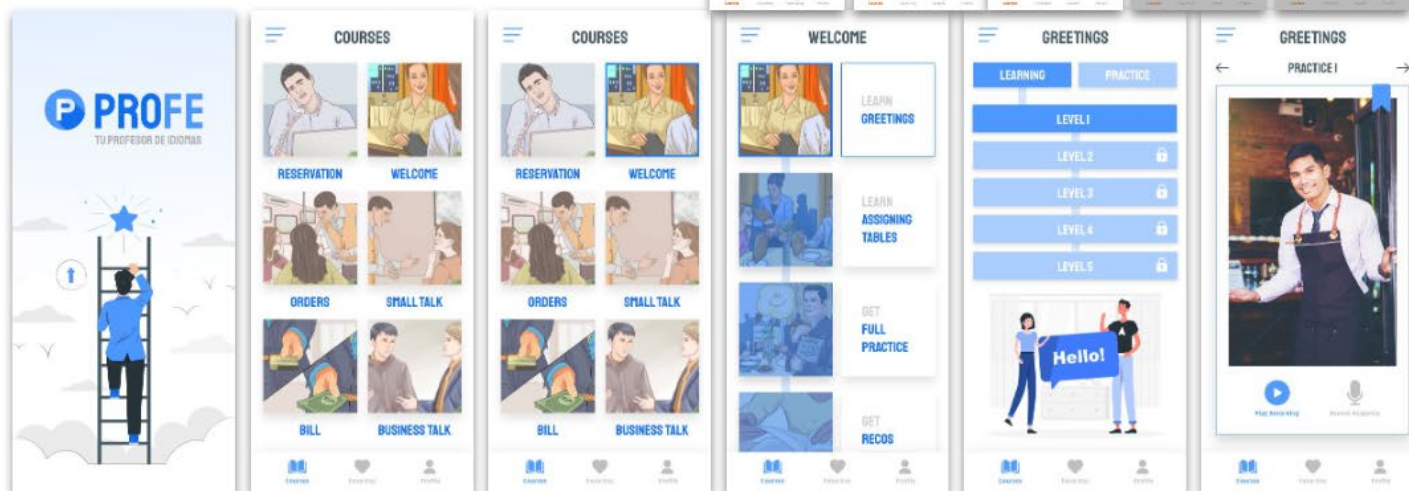
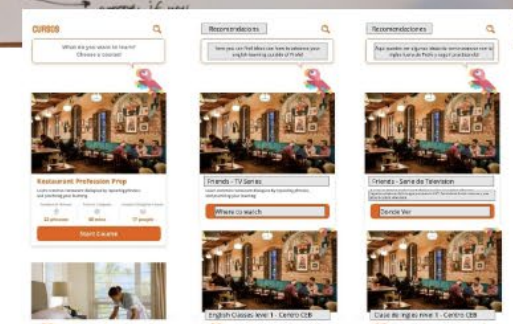
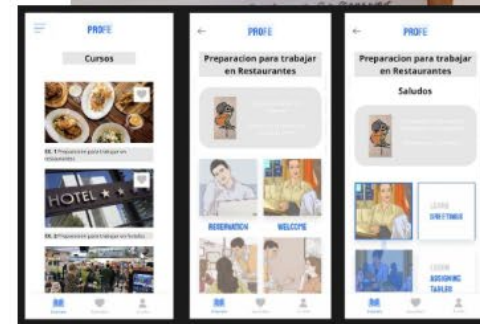
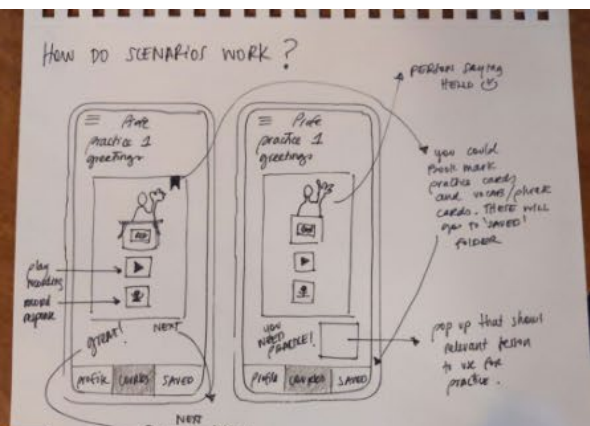
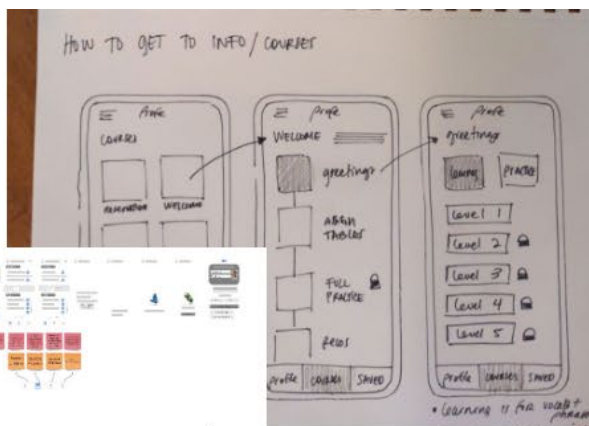
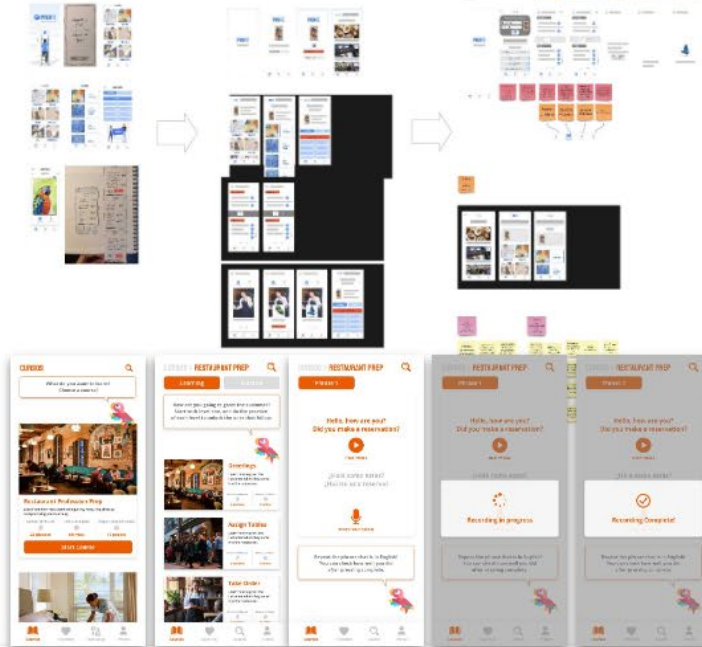
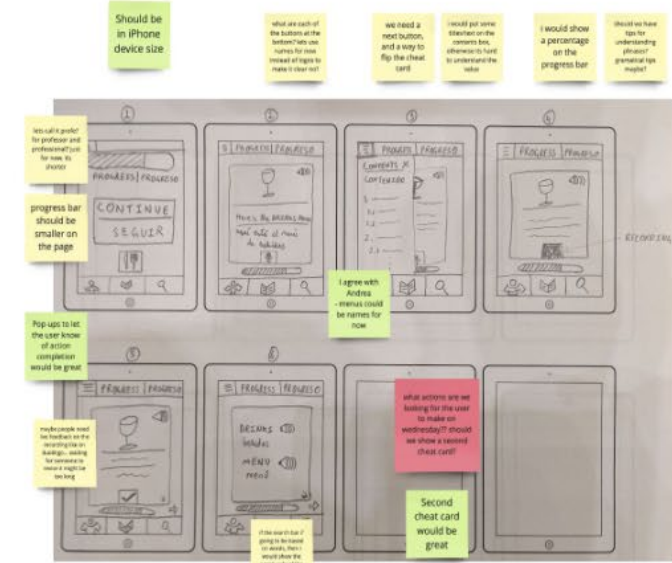
Chelsea Hostetter



Basalmiq

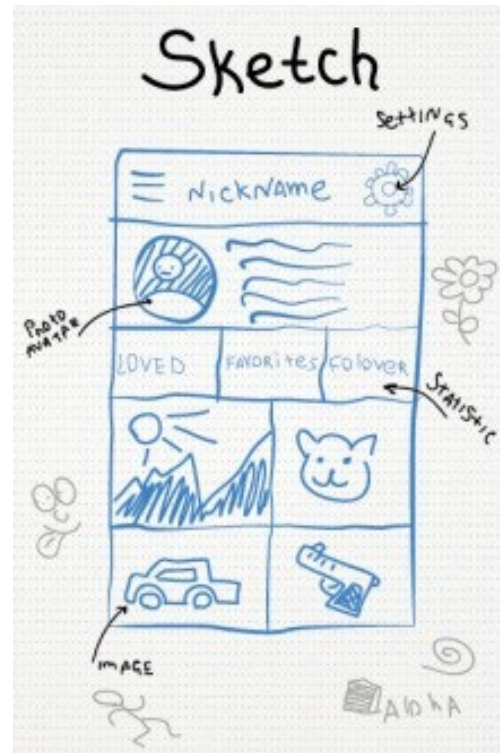


# Prototyping



# Low-fidelity vs High-fidelity

- User interface



Mockup (mock-up)





# Low-fidelity vs High-fidelity

- User interface: paper prototypes



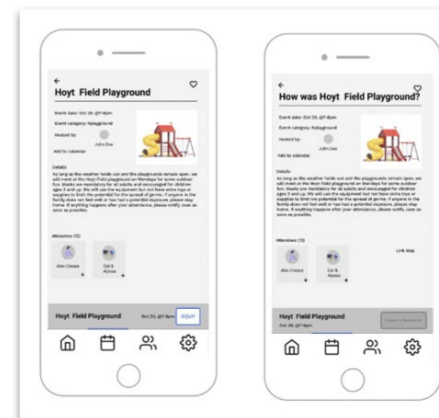
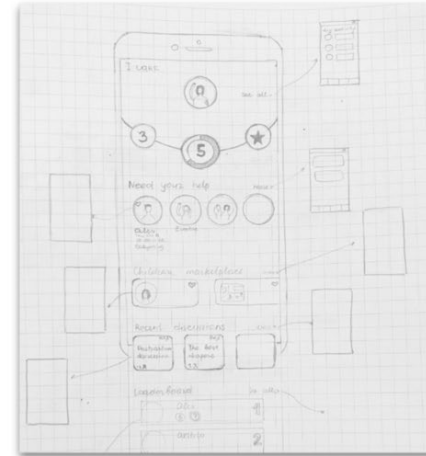
Nielsen Norman Group



aaronbrako.com

# Low-fidelity vs High-fidelity

- Low fidelity
  - Quick and cheap
  - Lots of iterations
  - Focus on answering questions
- High fidelity
  - Refinement
  - Details



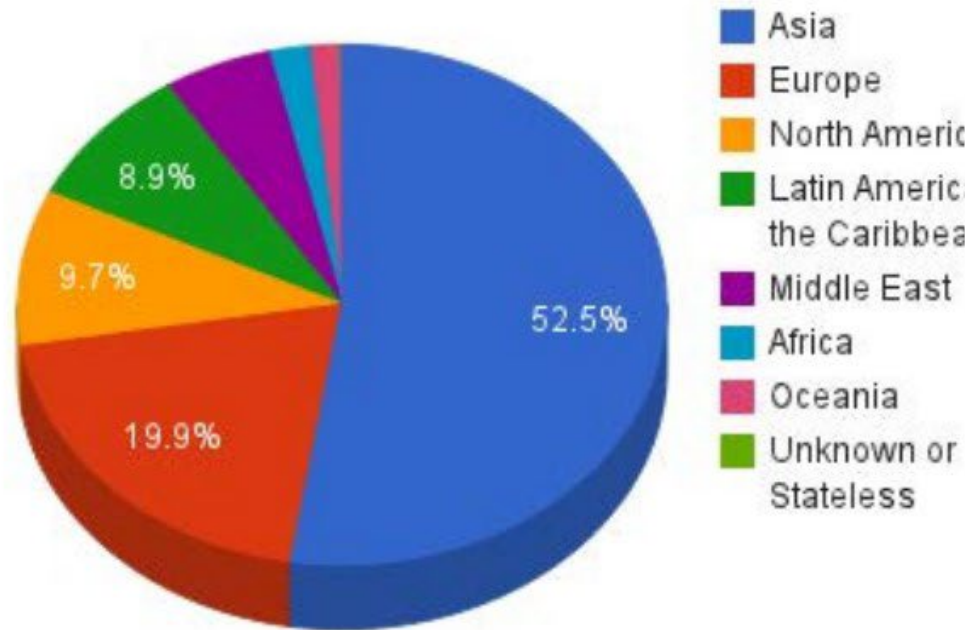


# Information Design

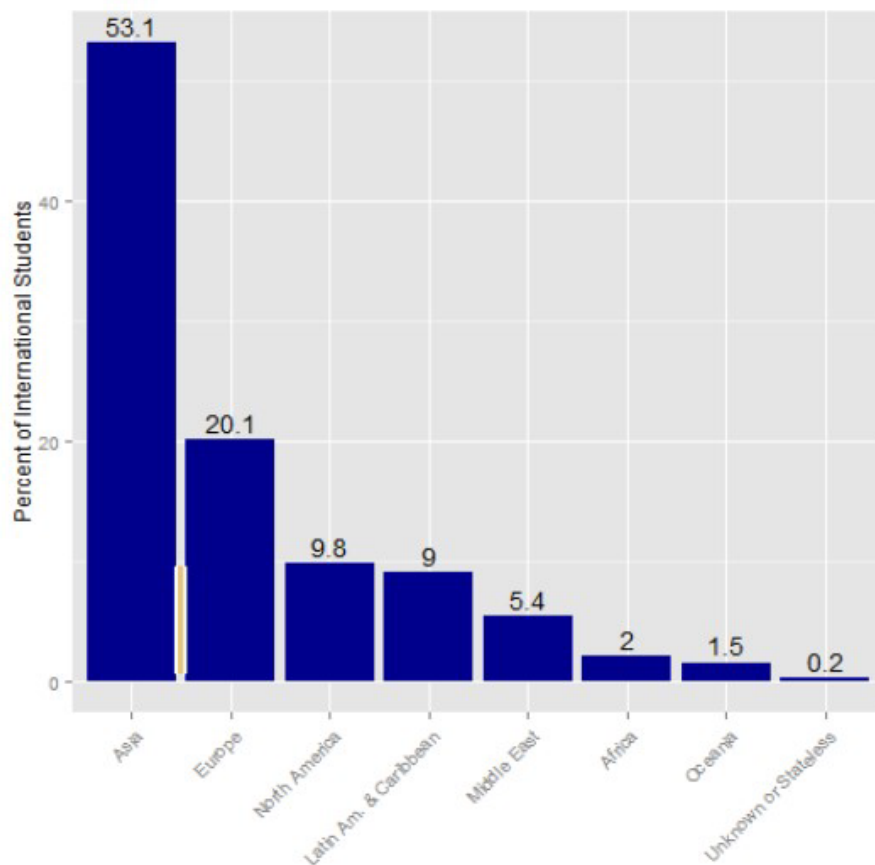


PARKING SCHEDULE			
	M-F	SAT	SUN
7am	(P) FREE	(P) FREE	(P) FREE
8am	Ⓜ	(P) 1 HR	
8 <sup>30</sup> am		Ⓜ	
4pm		(P) 1 HR	
7pm	(P) 1 HR	(P) FREE	
	(P) FREE		

## MIT International Graduate Students



# Better Visualization?



- All data is visible!
- Don't lose small regions.
- Can easily compare relative sizes
- Something to consider is that, for some people and applications, being not as “visually exciting” is a negative.

UI Exercise!



# It's your turn!

- Team project
- Design the dashboard display for an electric vehicle. Consider what should be shown:
  - Time
  - Speed
  - Battery life
  - Miles remaining
  - Drive mode
  - Odometer
  - Tire pressure
  - Outside temperature

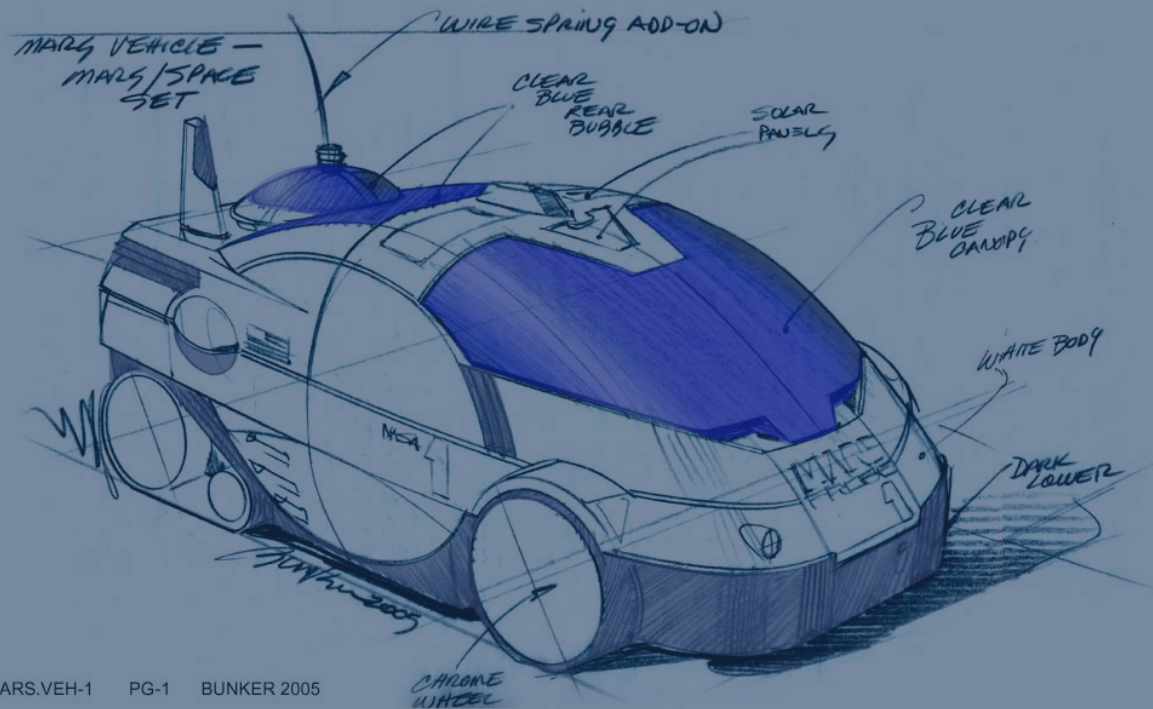


# Design Case Study

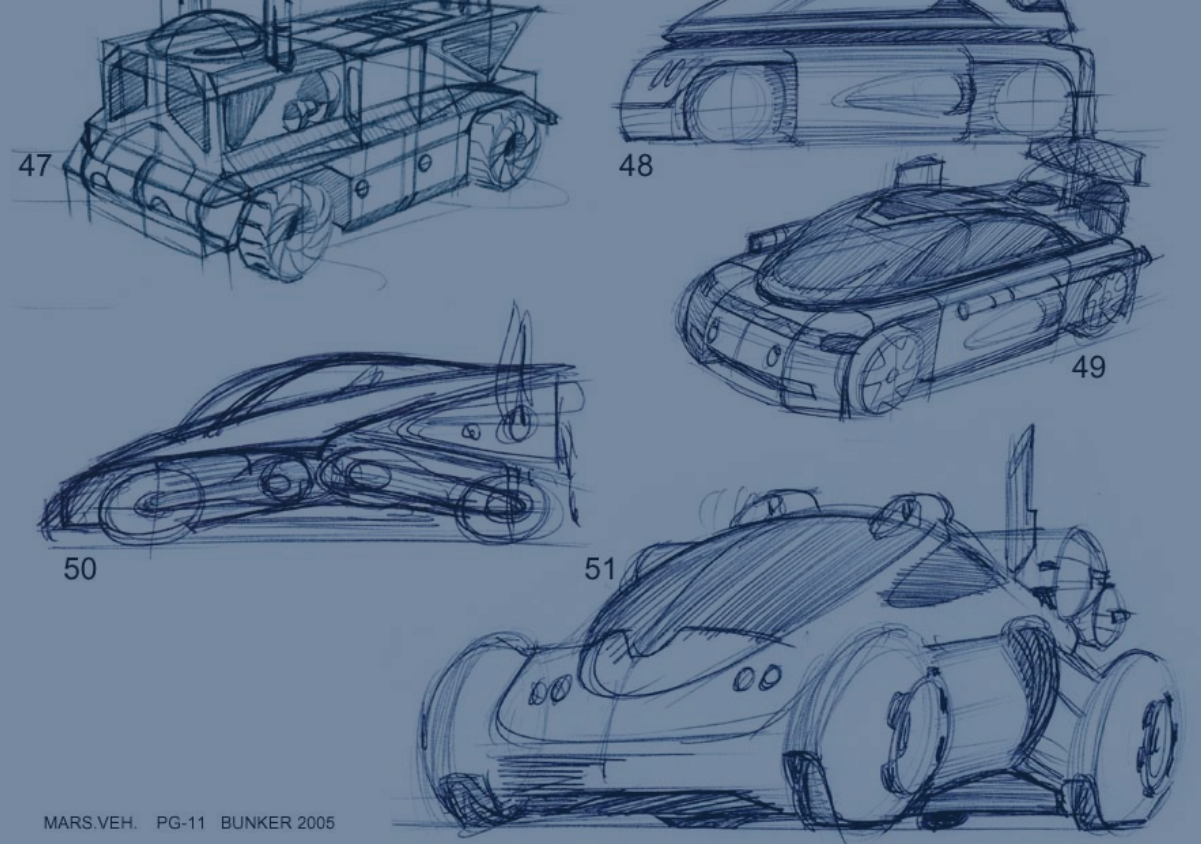
# Product Design

Tony Hu

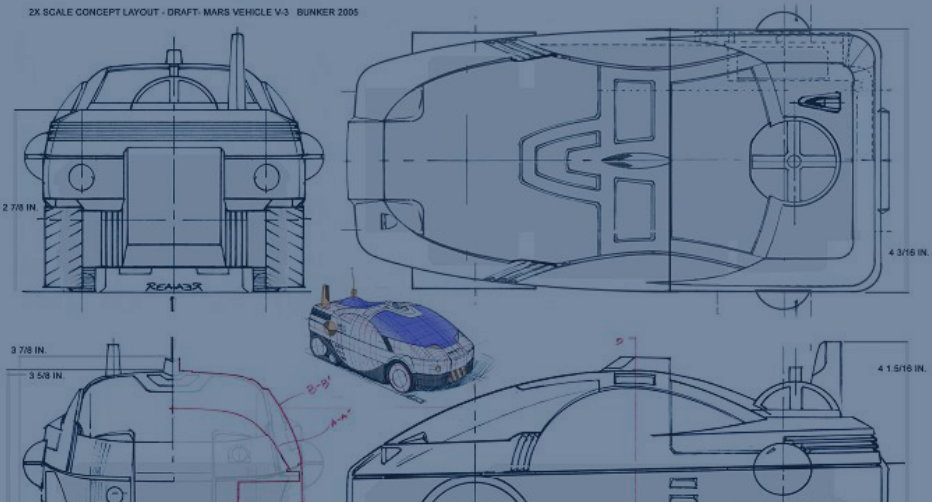
February 22, 2024



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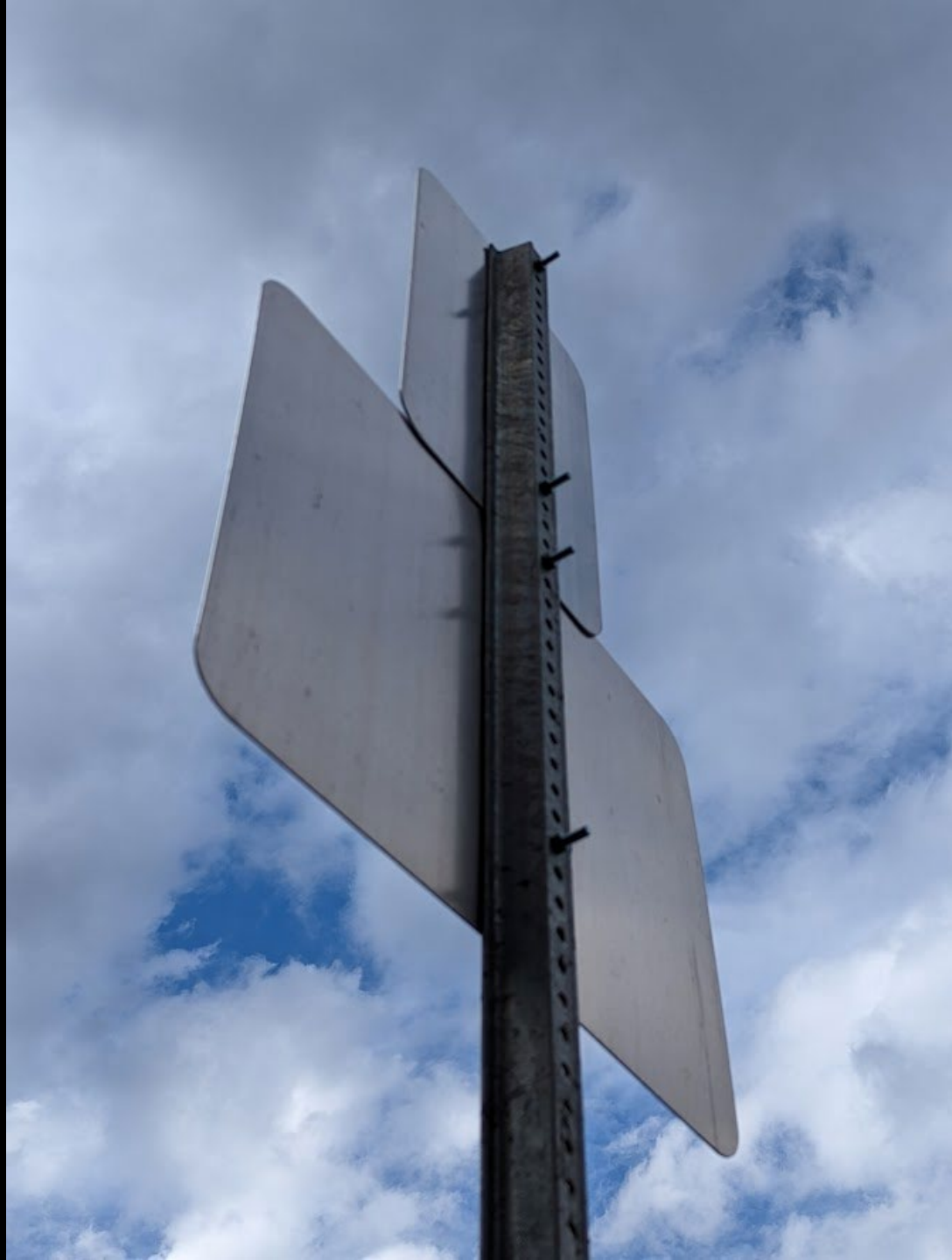
MARS.VEH. PG-11 BUNKER 2005























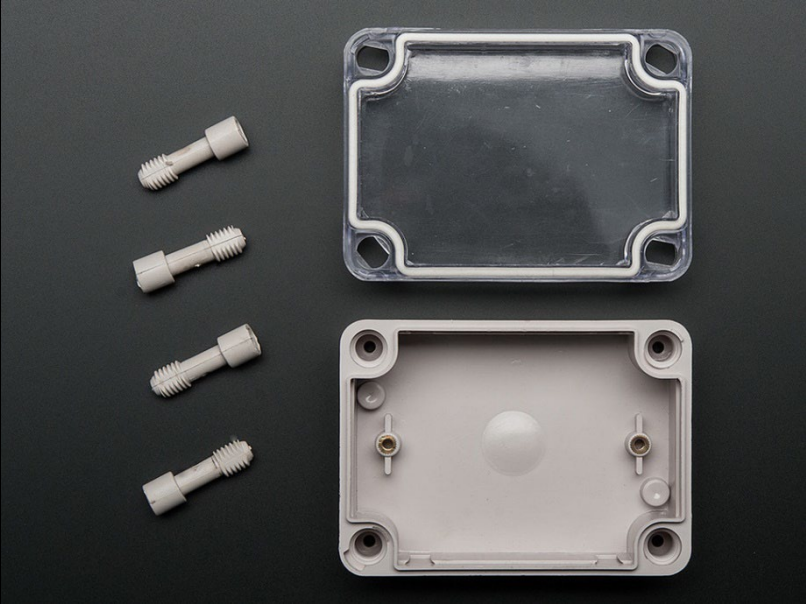
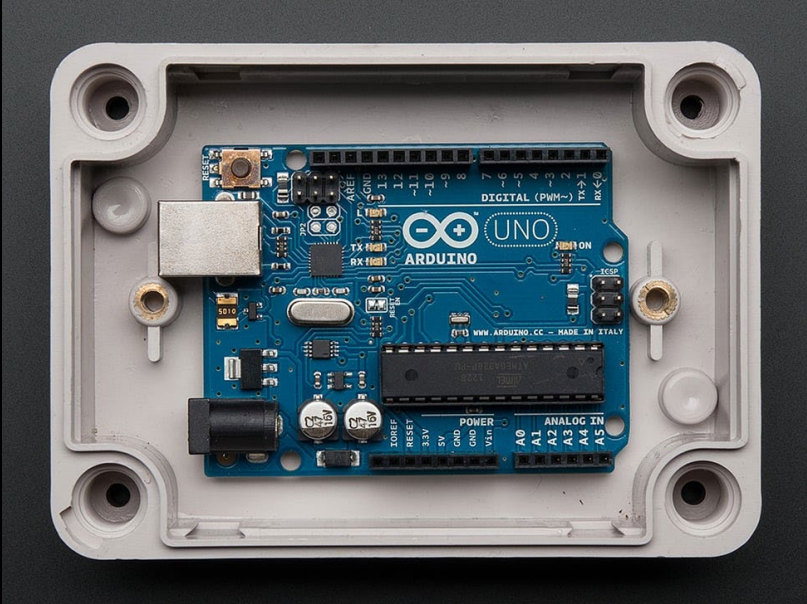




**TRASH**

<b>YES</b>	<ul style="list-style-type: none"><li>✓ Coffee cups and lids</li><li>✓ Single use plastic</li><li>✓ Small paper plates</li><li>✓ Clean paper napkins</li><li>✓ Disposable gloves</li><li>✓ Food waste</li></ul>	<b>NO</b>	<ul style="list-style-type: none"><li>✗ Large appliances</li><li>✗ Stoves</li><li>✗ Dishwashers</li><li>✗ Freezers</li><li>✗ A/C units</li><li>✗ Dryers</li><li>✗ Washers</li><li>✗ Tubs</li><li>✗ Sinks</li><li>✗ Bathtubs</li><li>✗ Toilets</li><li>✗ Water heaters</li><li>✗ Radiators</li><li>✗ Boilers</li><li>✗ Furnaces</li><li>✗ Air conditioning units</li><li>✗ Stoves</li><li>✗ Dishwashers</li><li>✗ Freezers</li><li>✗ A/C units</li><li>✗ Dryers</li><li>✗ Washers</li><li>✗ Tubs</li><li>✗ Sinks</li><li>✗ Bathtubs</li><li>✗ Toilets</li><li>✗ Water heaters</li><li>✗ Radiators</li><li>✗ Boilers</li><li>✗ Furnaces</li><li>✗ Air conditioning units</li></ul>
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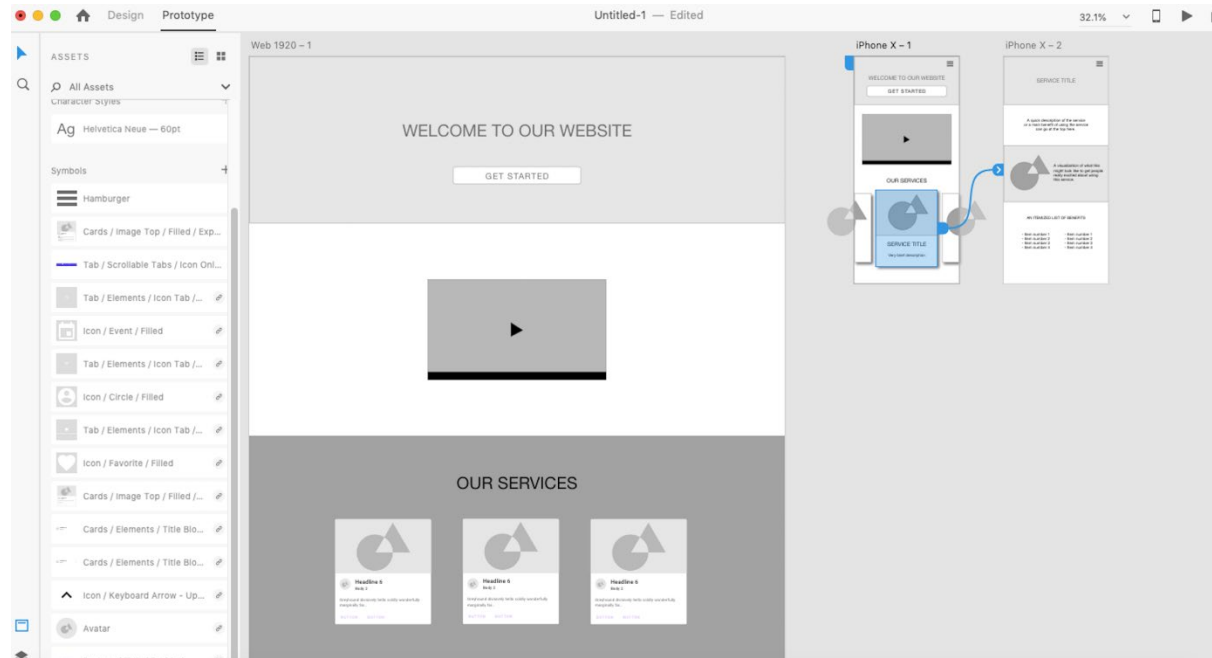






# Low-fidelity vs High-fidelity

- User interface: wireframes
  - Figma
  - Adobe XD
  - Balsamiq



# Low-fidelity vs High-fidelity

- User interface: interactive prototypes
  - Figma
  - Adobe XD

