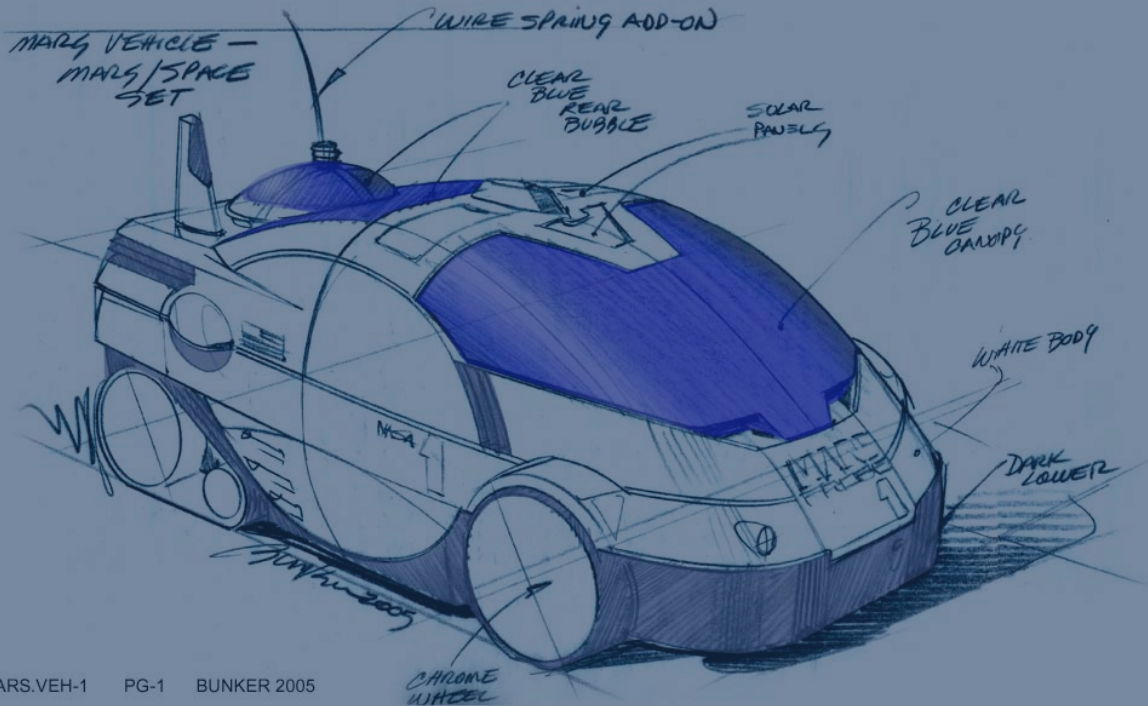


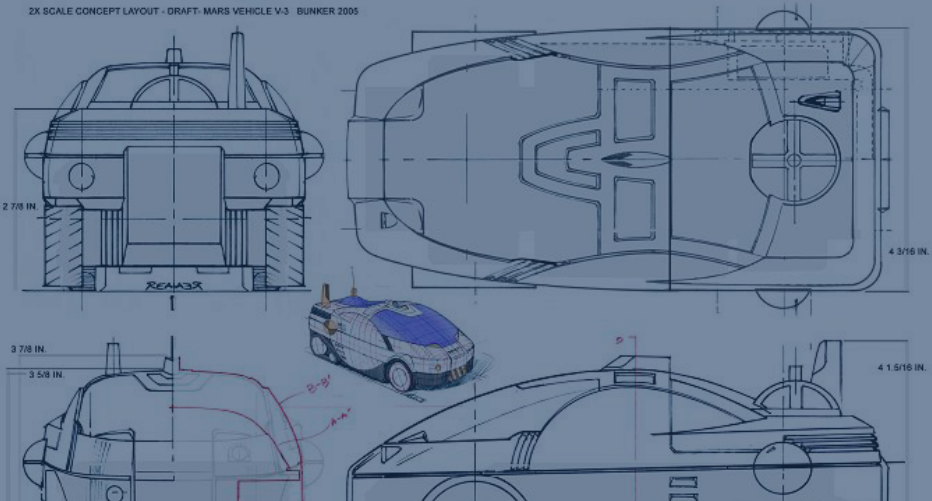
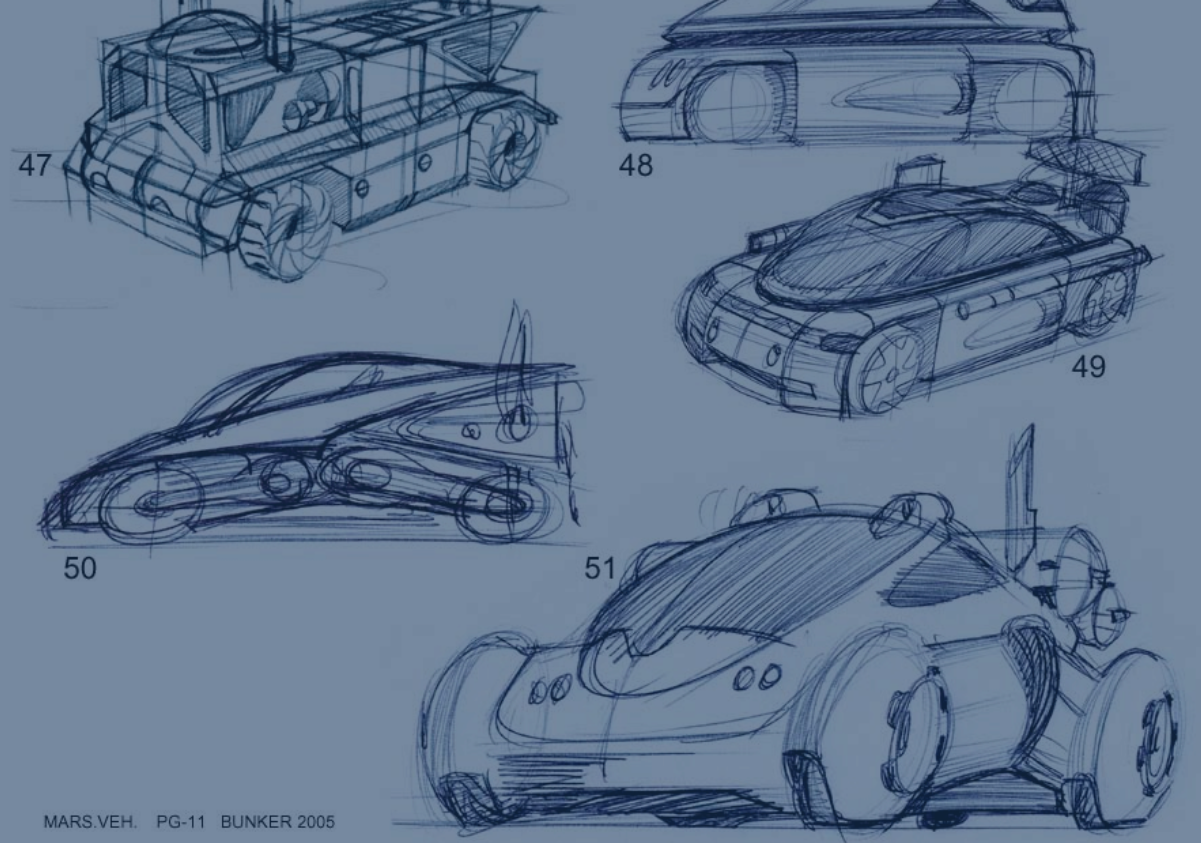
Product Design

Tony Hu

February 22, 2024

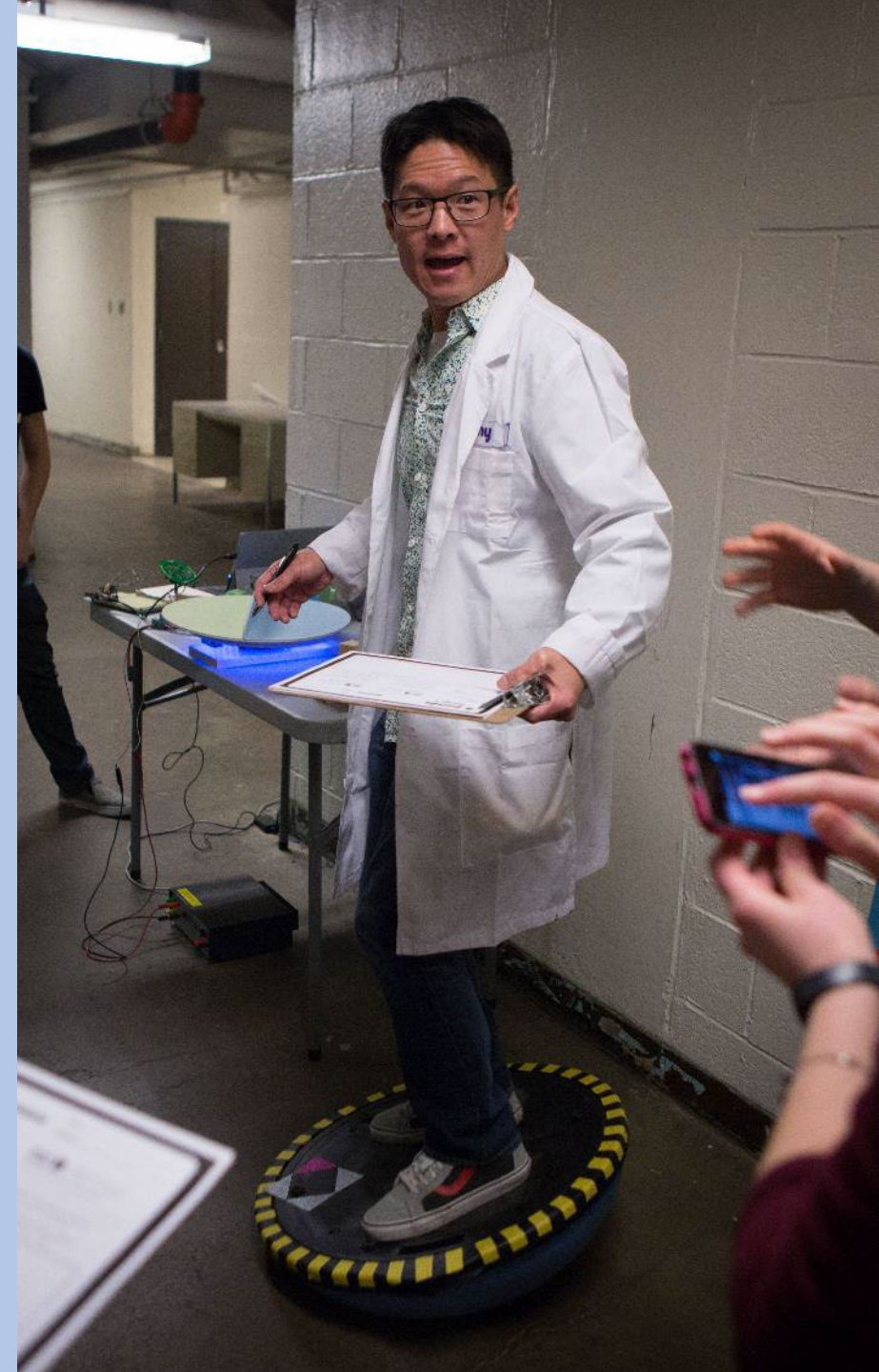


MARS.VEH-1 PG-1 BUNKER 2005



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 Course 6-1, Media Lab



Design

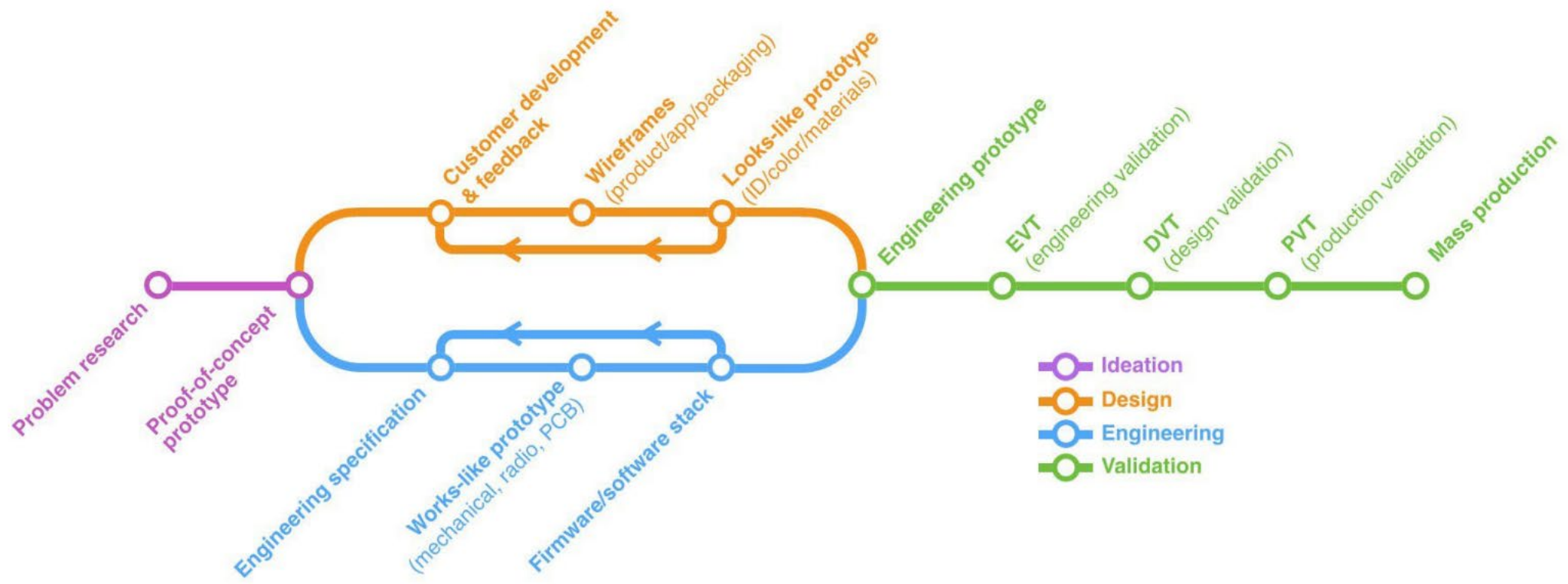
Human-Centered Design

User Experience Design

Product Design

Industrial Design

User Interface Design



Requirements

- Air Temperature
- Relative Humidity
- Surface Temperature
- Self-charging
- Remote data updates
- Robust enough to withstand outdoors
- Robust enough to withstand MIT community
- Air pressure (nice-to-have)
- Lux (nice-to-have)
- Looks cool! (great-to-have)



MITOS

1. It should measure the local weather, at least temperature and humidity and ideally also sun exposure and ground surface temperature and air pressure, all with dynamics appropriate for the use case.***
2. It should be able to measure how many people are in the area passing through (e.g., foot traffic) and lingering.***
3. It should operate without being connected to line voltage.***
4. It should be portable and able to be set up by an average person in a variety of outdoor environments on the MIT campus, including on a tripod or attached to poles of various dimensions.***
5. It should be able to be physically attached to a HOBO MX2302A data logger.*
6. It should report faults, such as battery failure, falling, vandalism, etc.**
7. It should be as inexpensive as possible. *
8. Data from a sensor node should be able to be tied to a location.***
9. It should maintain privacy.***
- 10.It should operate independently without user intervention for 2+ weeks.***
- 11.It should be rugged and able to withstand a summertime Boston-area environment (heat, rain, wind and curious people).***
- 12.Multiple systems should be able to be used simultaneously.***
- 13.The system should present the information on a dashboard (with real-time data outputs to a dashboard if possible), and also allow downloading of raw data.***

Sentimet

1. It should measure the "heat experience" at each bus stop, at least temperature and humidity, but also could include air quality, all with dynamics appropriate to the use case.***
2. It should be able to measure how many people are waiting, and for how long.***
3. It should operate without being connected to line voltage.***
4. It should be installable by a technician, and should be easy to set up.***
5. It should report faults, such as battery failure, falling, vandalism, etc.**
6. It should be as inexpensive as possible. *
7. Data from a sensor node should be able to be tied to a location.***
8. It should maintain privacy.***
9. It should operate independently without user intervention for at least a month.***
- 10.It should be rugged and able to withstand shipping, setup, and operation in the Miami-Dade environment.***
- 11.Multiple systems should be able to be used simultaneously.***
- 12.The system should incorporate data from Swift.ly and present that information to the operator in a useful way.***

Miami-Dade

Mostly the same...could make one overall system, or two slightly different systems

Big Data. Made Easy.

The first big data platform
for public transit

- Highly accurate real-time passenger information
- Understand and analyze network in real time and historically
- Quickly visualize data to build consensus past, present, and future

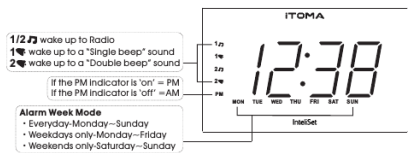


User Experience Design

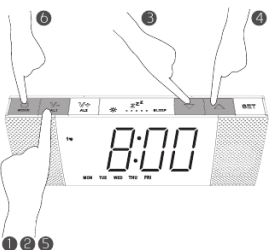
SETTING THE ALARM

(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



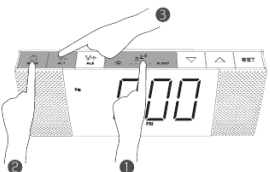
- 1 Press AL 1 (or AL 2) slightly, and repeat doing so if necessary, until AL 1 indicator is shown on the display.
- 2 Press and hold AL 1 (or AL 2)
- 3 Press TUNE▼ to adjust Hour
- 4 Press TUNE▲ to adjust Minutes
- 5 Press and hold AL 1 (or AL 2)
- 6 Press MODE to select the Alarm Week Mode, and the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

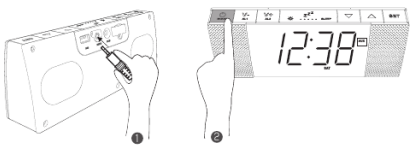
NOTES: If you want to set wake up to radio, please refer to "LISTENING TO THE RADIO" for more information.

• SNOOZE/REPEAT/STOP ALARM



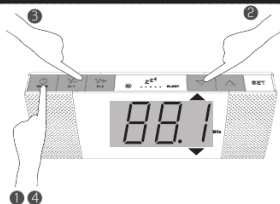
- 1 When the alarm turns "ON", you can press **z** Snooze for a few extra minutes sleep. The alarm will stop for **9 minutes** and then comes "ON" again.
- 2 Press **o** to stop the alarm sooner.
- 3 If you want to turn off the alarm permanently (instead of following the default setting), press AL 1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



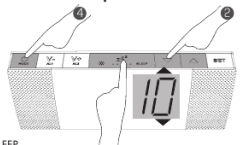
• Recalling A Station

(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 **o** until MHz indicator "OFF".

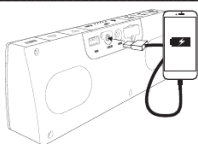
NOTES: Remember that the station and volume settings you choose for the Sleep To Radio operation are the same settings you will hear if you set the alarm for Wake To Radio the following morning.

DIMMER CONTROL

(with the Radio standby operation)



USB FOR CHARGING



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

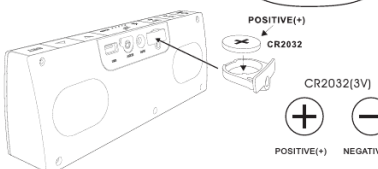
BLUETOOTH CONNECTED



- 1 Press MODE slightly until the "BT" indicator is shown on the display.
- 2 Select "CKX503BT" 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 AND MAINTENANCE

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 misrreated. 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.....V.4.1
 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 12
AM PM

ALARM SET

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


AM
PM
Alarm
10:10

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 red hair, wearing a light purple long-sleeved button-down shirt. She is shown in profile, facing left, with her right hand held out as if speaking. In the foreground, a grey smart speaker is visible, with four small white circles on its top surface. A large, light blue speech bubble with a black outline is positioned above the speaker, containing the text: "OK Google, set an alarm for 6 AM on Tuesdays and Thursdays." The background consists of simple lines representing a room with windows and a door.

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







Please enter your phone number:

(216) 409-9989





Human-Centered Design

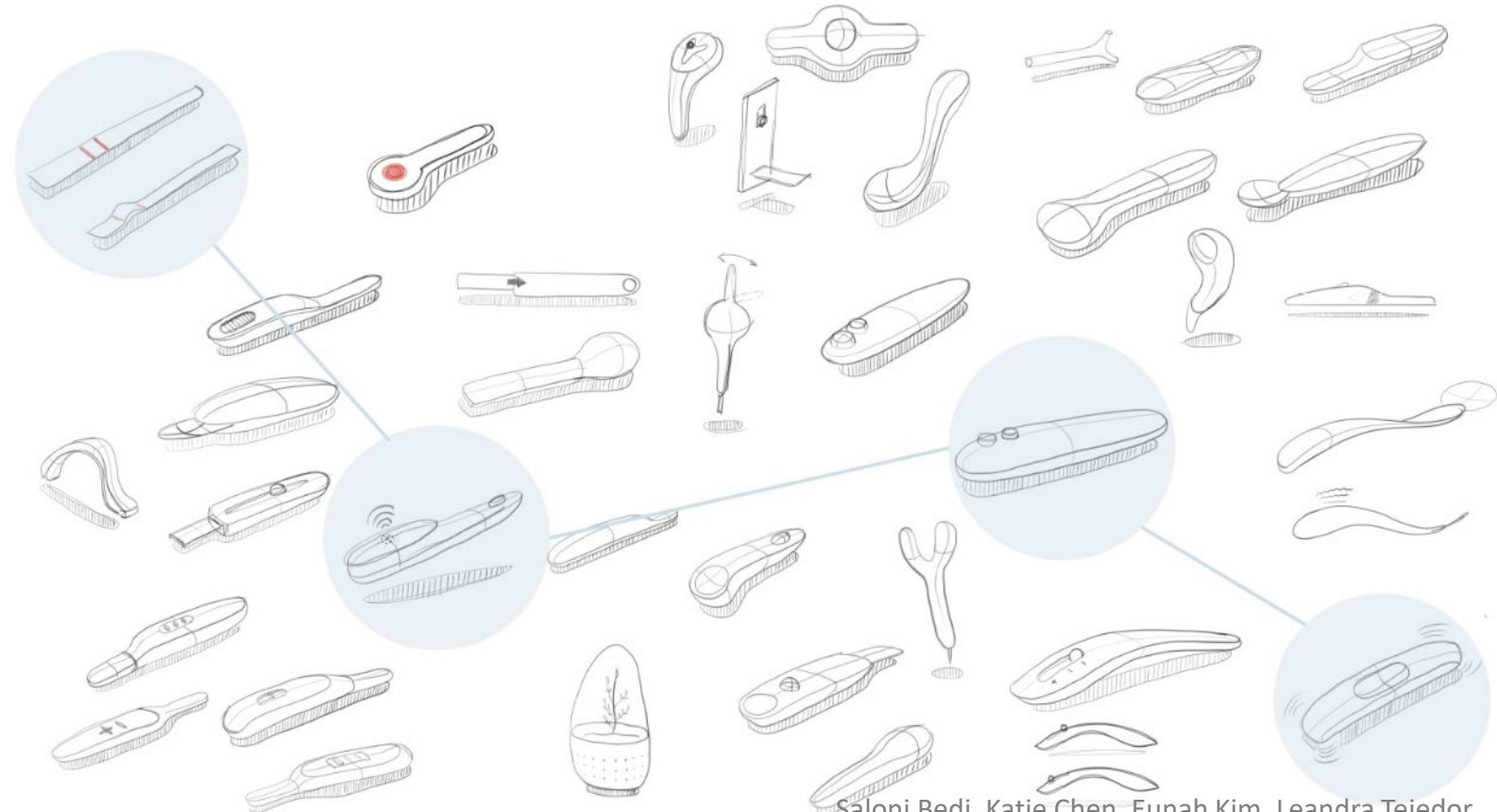
Human-Centered Design

- 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



Works-Like, Looks-Like Prototypes



Gyrus ACMI

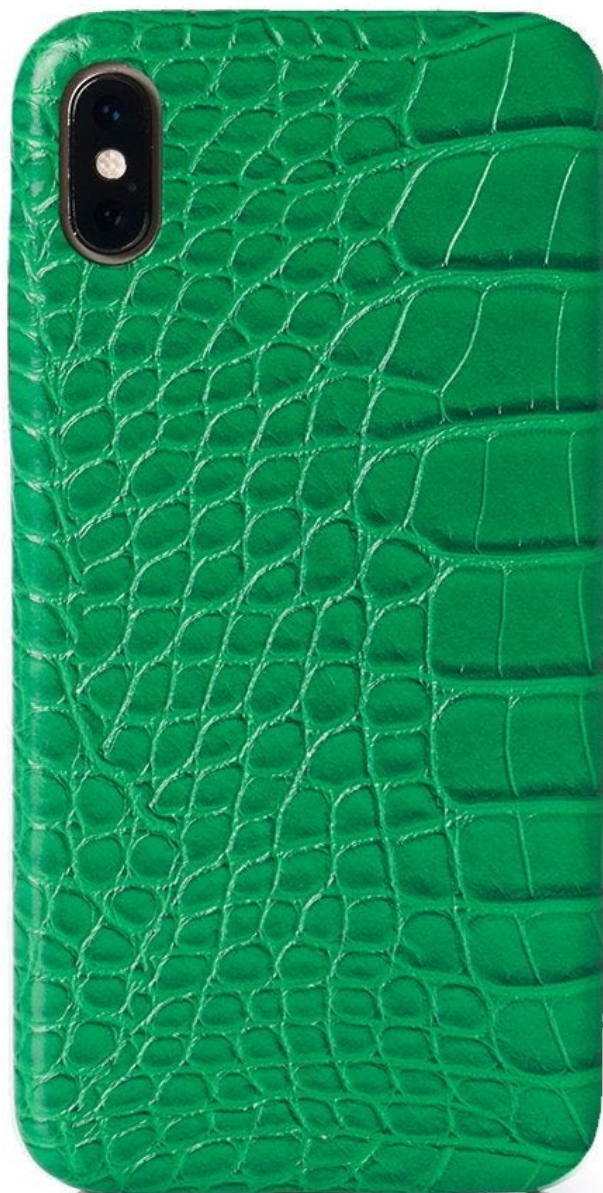
Works-Like, Looks-Like Prototypes



Industrial Design











Metro Transit

TRANSIT INFORMATION
612-373-3333
TTY 612-346-9142
metrotransit.org
Also available by mobile device
Metro Transit

metrotransit.org

19 DOWNTOWN

1641

1641

TicketKing



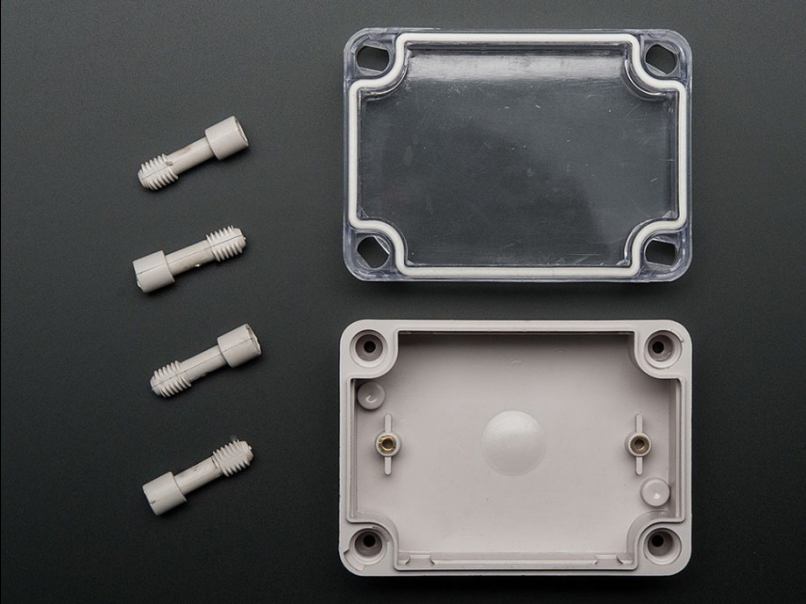
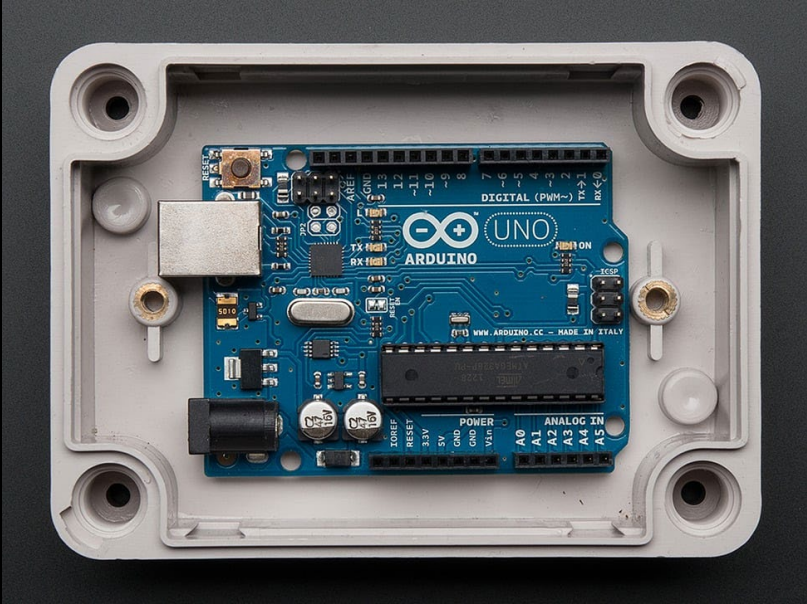








 ARMORLOGIX



ID Exercise!

It's your turn!

- Make a more-or-less rectangular shape that communicates one of the following:
 - Joy
 - Sadness
 - Anger
 - Calm
 - Strength
 - Excitement

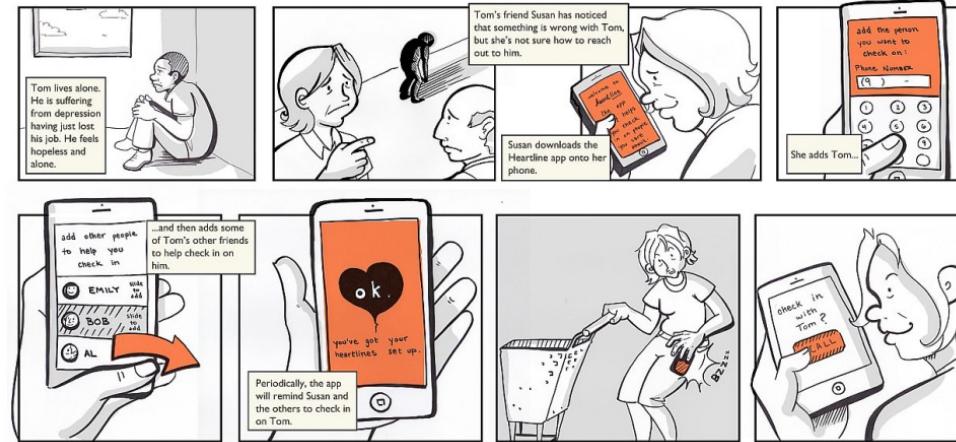
(Don't tell anyone which one you're working on!)



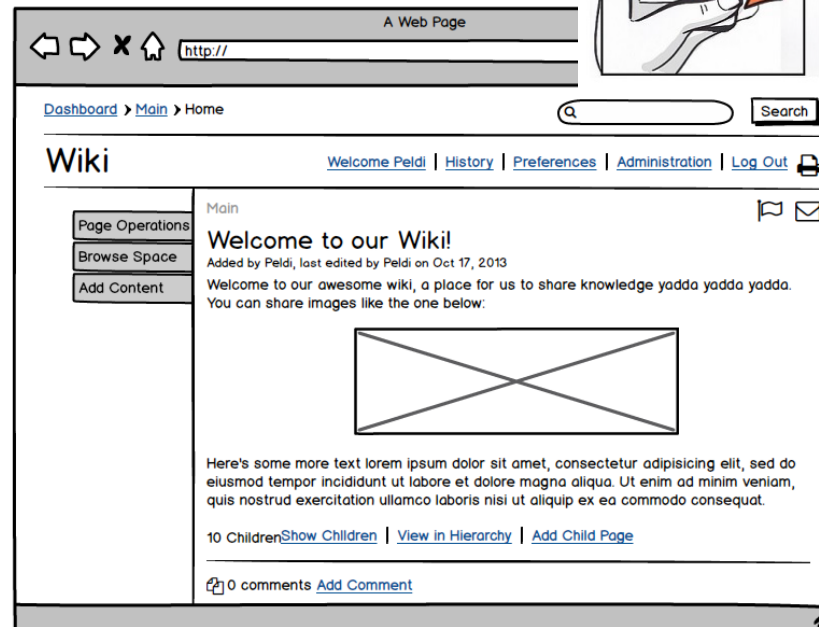
User Interface Design

Prototyping

- Software
- Services



Chelsea Hostetter



Basalmiq

Prototyping

Should be in iPhone device size

what are each of the buttons and what do they do instead of signs to make it clear?

we need a next button, and a way to flip the cheat card

should get some direction on the screens but, otherwise hard to understand the value

I would show a percentage on the progress bar

should we have tips for understanding different grammar tips taught?

lets call a prof for professor and performance for now to share

progress bar should be smaller on the page

Pop ups to let the user know of action completion would be great

make a card that has feedback on the learning to be made, making for someone to make a request on long

agree with Andrea - menus could be names for now

what actions are we looking for the user to make on worksheet? should we show a cheat card?

Second cheat card would be great

if the user is going to be asked to make a card, then what after the answer is given, call

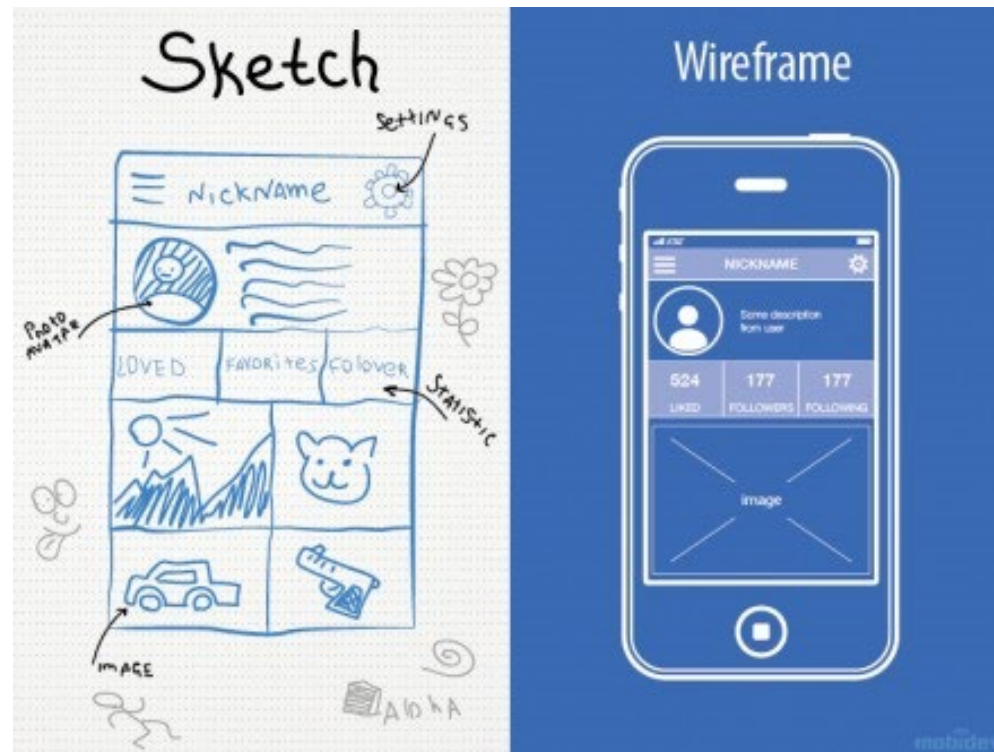
HOW TO GET TO INFO/COURSES

HOW DO SCENARIOS WORK?

iPhone X wireframe template

Low-fidelity vs High-fidelity

- User interface



Mockup (mock-up)



Low-fidelity vs High-fidelity

- User interface: paper prototypes



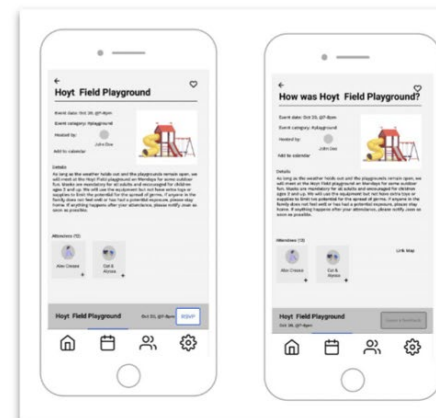
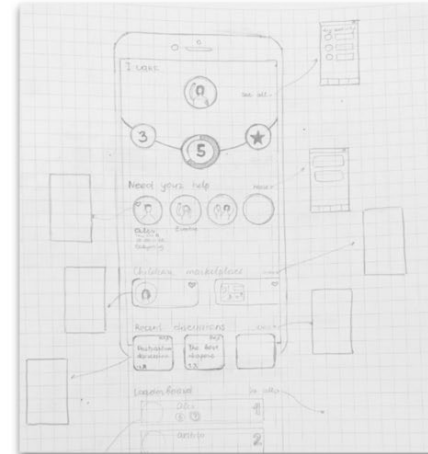
Nielsen Norman Group



aaronbrako.com

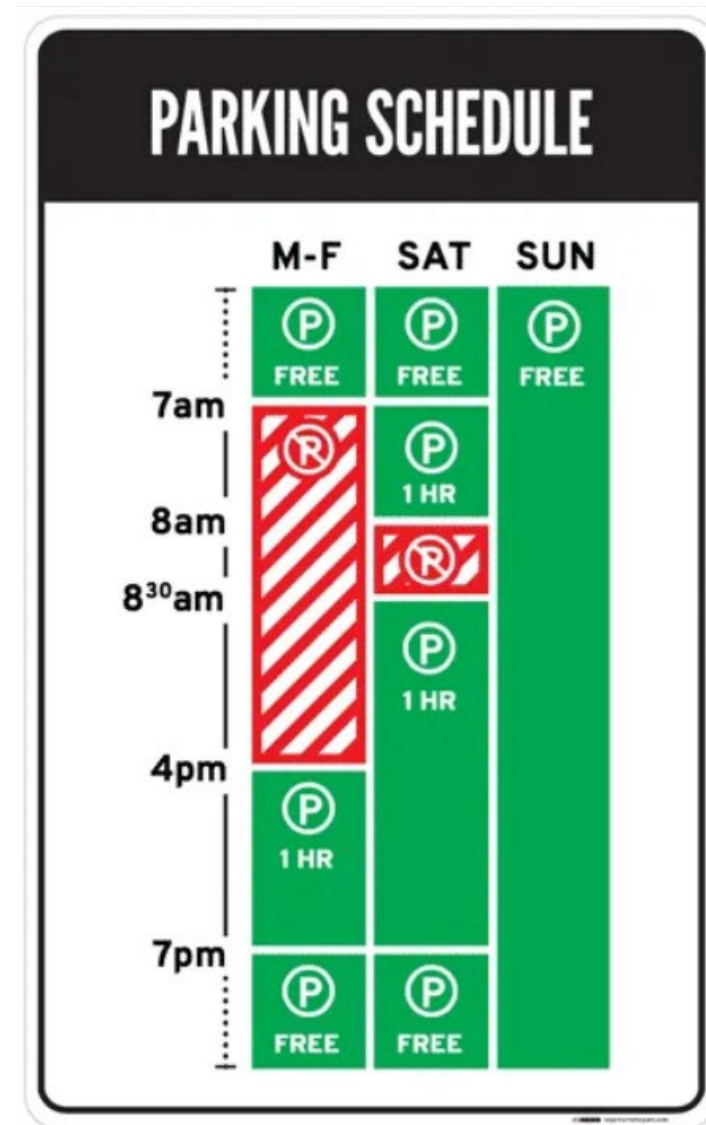
Low-fidelity vs High-fidelity

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



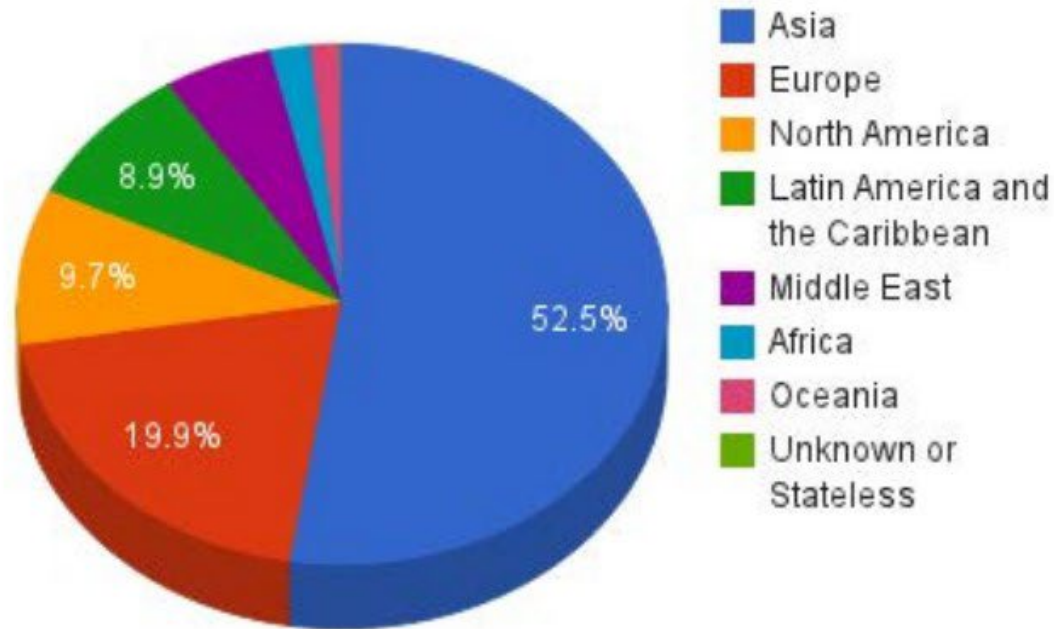
IDM team: Aidana, Akshita, Alex, Eunhae

Information Design



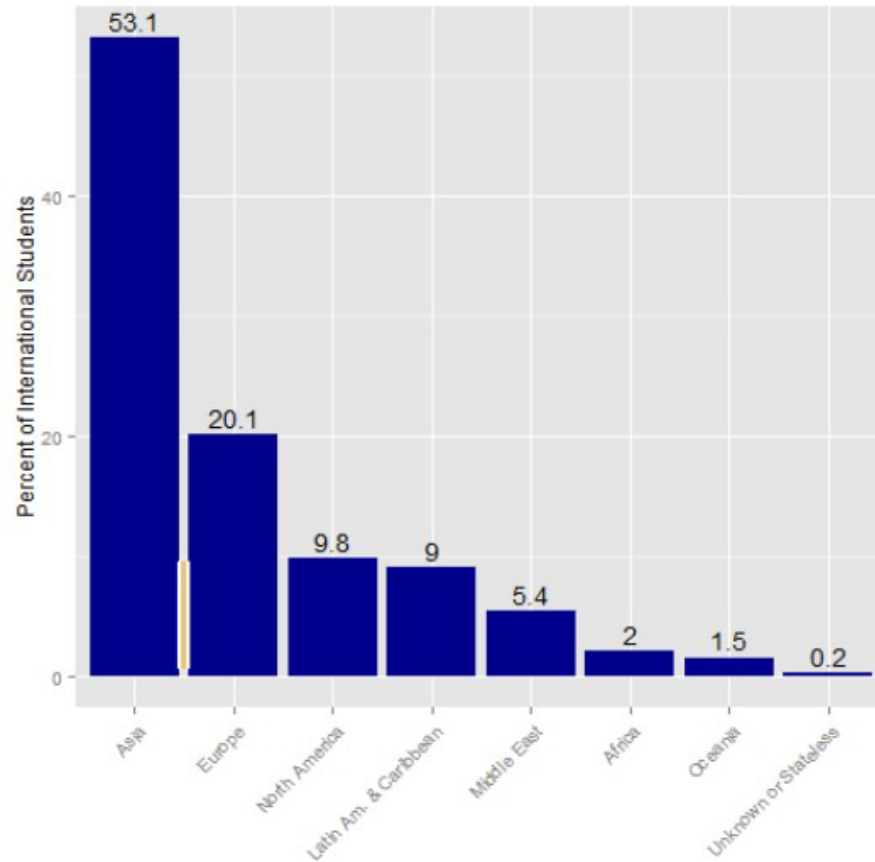
Bad Visualization?

MIT International Graduate Students



- Not all points can be labeled, so data is lost
- Colors are meaningless, are close enough to be a confusing, but are still needed to make it at all readable.
- 3D adds nothing, visible volume is larger than true share

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!

- 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

