OpenROV Headquarters

This the heart of the OpenROV open-source project. It is the center of R&D of the vehicle, alongside operations for the business, and production of the robots. I chose this site because it is the physical embodiment of the vision of the OpenROV project; to democratize ocean exploration through low-cost open-source underwater robotics. This space is a hub of activity, its front door is always wide open, and visitors and community developers swing through on a regular basis. Ideas flow free, alongside the robots are that continually flow off the hand-built assembly line.
Users are creating robots: From laser cutting plastic to make parts for robots, to soldering and testing new components and parts for R&D and coding software, and testing robots in the test tank, everything revolves around the creation and support of the robots.

Users are collaborating: Conversations spring up organically, new ideas float around aplenty. People float in and out of discussions while they work on implementing previous ideas. It’s an energetic, chaotic and jovial atmosphere, someone runs into another room to grab a prototype to excitedly show to another person. Someone tells a joke, and laughter breaks out in the production area. Something exciting is always happening.
**Senses**

**Sight**

Busy

Clutter

Bins

Well-lit

Stains

Cleaned

Hacky

Bright

Books

Maps

**Sight**

Busy

Clutter

Bins

Well-lit

Stains

Cleaned

Hacky

Bright

Books

Maps
Smell

Ashy

Chem

Clean

Smoky

Solder

Melt

Ionized

Solvent

Breezy

Plasticy

Acrylic

WD-40
Sound

Fans  Thumps  Hum
Motors  Music  Splash
Chat  Pumping  whirrrrr
Typing  Laser  Murmur
Touch

Wet

Dusty

Plasticy

Slippery

Rubber

Oily

Worn

Rough

Smooth

Cold

Dirty

Sticky
Collaborative
Exploratory
Empowering
Color Palette

Ocean Blue
A deep blue, dark enough to be mysterious like the ocean.

Grey Blue
A lighter grey, with a subtle tinge of blue. Like the polypropylene shells of the ROVs, carries the color of the blue environment.

Aqua Blue
Lighter blue, lighter to be more inviting. Wants to be your friend and work together to explore the blue yonder.

Dive Red
High visibility red, reminiscent of the dive flag. Vibrant and bold, going where no-one has gone before.
The sea, once it casts its spell, holds one in its nets forever.
Composition
Version 1 Subjective
Colin Ho
Version 1 - Subjective

Contrast

Harmony
Composition

Version 1 - Subjective

Bold

Subtle
Version 1 - Subjective

Symmetry

Asymmetry
Version 1 - Subjective

Proximity

Similarity
Version 1 - Subjective

Leveling

Sharpening
Composition

Version 1 - Subjective

Symmetry  Asymmetry
Contrast  Harmony
Proximity  Similarity
Bold  Subtle
Leveling  Sharpening
Design Workshop

Composition
Reading & Synopsis
The reading gave me an understanding of the psychophysical basis of how we see and perceive visual meaning. The human desire for balance and resolution guided my decisions making my new set of compositions. Sharp contrast of form, size and placement was used to determine the layout of the composition, while trying to maintain the basic principles of what humans seek visually, such as balance and harmony in order to maintain a pleasing aesthetic.
Design Workshop

Composition

Version 2 Objective
Version 2 - Objective

Contrast

Harmony
Version 2 - Objective

Bold

Subtle
Version 2 - Objective

Symmetry

Asymmetry
Version 2 - Objective

Proximity

Similarity
Version 2 - Objective

Leveling

Sharpening
Composition

Version 2 - Objective

Contrast

Harmony

Symmetry

Asymmetry

Proximity

Similarity

Bold

Subtle

Leveling

Sharpening
Research

OpenROV Cockpit UI

Colin Ho
What is the behavior(s) you are trying to capture? What are your users physically doing?

Exploring
Piloting an OpenROV
Navigating through unknowns
Observing the underwater environment
Operating a underwater vehicle
Configuring an OpenROV
Using a keyboard and joystick
Existing UI interfaces for underwater ROVS (remotely operated vehicles) are designed around bare functionality and hardware constraints; thus they are often ugly, unintuitive and often just rudimentary on-screen overlays with text.
Existing UI interfaces are cluttered and confusing
Existing UI interfaces have a steep learning curve

The new OpenROV UI will be both inviting and attractive to new and old users. The UI will improving the experience of operating the OpenROV through a beautiful and logical interface that isn’t daunting
The UI will keep up with the user, providing the desired functionality and experience for both novices and experienced ROV pilots alike.
Research

Objectives

How will this be a successful user experience?
How will this be a successful design?

This will be successful if a novice user finds the interface engaging, inspiring and “easy to use”
This will be successful if an experienced user find the interface capable, beautiful and elegant and wants to keep on using it.
Who will use this? How will they use it? How if at all, will it change their behavior or the behavior of whomever is around them? What is the need for this? What do they currently do?

Underwater explorers, from aspiring to experienced, and even those who don’t know they are explorers and citizen scientists yet. They will use it to explore and document the underwater environment in any way they see fit. It is to open the exciting world of the underwater majority of our planet. It will hopefully excite and inspire those who use it, and also spark the curiosity of those around them (both physically and in the interwebs), and encourage them to also start exploring!

Our aquatic blue heart of the planet is so poorly understood, we’ve only mapped a small fraction of the ocean, and have caught only tiny glimpses of the biodiversity of the oceans. They are rapidly changing and being destroyed, through climate change and our commercial activities. We need to better understand and capture what are oceans and aquatic environments are like now, to hopefully preserve and save them for the future.

Currently most people don’t realize that they can participate in ocean/aquatic exploration and science, and we want to enable anybody and everybody to become citizen scientists and explorers. People can currently scuba dive, but is expensive and dangerous.
Where will you find this UI?

The UI is accessed through simply navigating to the URL for the robot. This is done by the robot hosting a webserver aboard itself (already how we do it).
The screen size will be a standard web browser window for an 1080p screen (1920x1080) – For which there is a safe usable area of (1885 x 860)

Source - http://www.websitedimensions.com/
Research

Persona 1

Diving Dave

AGE
45

Passion
Being in the water

Occupation
Diver

Familiarity with Technology
Low

Diving Dave loves the ocean and tries to get into the water whenever he has the chance. He used to be a contractor, but now owns a dive shop and dives for a living. For him the ocean has cast its spell on him, and he wants to explore it even more. He really wants to dive all the time everywhere, but many things limit how far he can go, mainly his body. He has heard much about ROVs and even piloted ROVs in the past for specific salvaging jobs, but they were really expensive (at least 2x times the cost of a good set of scuba gear!). He wants something that can let him dive, without him diving.

Persona 2

Maker Mark

AGE | Occupation | Hobby | Familiarity with Technology
---|---|---|---
26 | Software Developer | Tinkering | High

Mark loves to build and tinker with things, and always has a side project going. He loves the idea of getting out and exploring and travelling the world, but never really does because it seems too daunting. His full-time job is as an software engineer for the Widget Corporation, so he has his daily 9 to 5 grind. But on the weekends, he is either in the garage or at his desk, hacking away on his various hardware and software projects. He’s always learning new ways of fabricating things, and loves collecting tools to help him in his various projects. He has a 3D printer and a drone, among other things in his maker pile-o-stuff.
Curious Cindy is interested in STEM but doesn’t know where to start. She is inspired by women scientists, and aspires to be like them. She is a digital native, and remembers using computers as far back as she can. She isn’t terribly familiar with robots and the underwater world, but finds it intriguing, but is also daunted and doesn’t know where to even start!
Research

Use Case Scenario

Write a scenario that describes what a user would do with the app. This scenario will then be used to create user flow and app screens. Use simple directions.

Bob wants to explore a coral reef
1. He turns on the OpenROV
2. He enters the robot URL into a web browser
3. He does a system check of the robot through the UI to test everything
4. He changes some system settings of the robot
5. He deploys the robot
6. He pilots the robot around the reef
7. He finds something cool, and shares his dive to Youtube and OpenExplorer
What type of experience do you want to provide for your user?

The interface will help uncover the curiosity and explorer in everybody. I hope to reinvigorate that child-like sense of wonder for the world. I want to users to feel invited and encouraged to make their own adventures. I want them to fall in love with the aquatic world and to also share them with others. I want it to be an exciting gateway into uncovering the unknown.
Style Guide

Formal Collage

Feeling – Explorative, curious
Contrast – Known, ordinary
Aesthetic Analysis

Metroid Prime and Star Citizen were chosen as examples of aesthetic and futuristic interfaces that are designed to immerse the users in the narrative of the story. But they also balance their aesthetics with true functionality, in that both are designed for real-time high-speed interaction. They relate to the OpenROV in that the OpenROV cockpit’s goal is to immerse the user and draw them into imagining the worlds they could explore with its aesthetics, while still being highly functional, and relaying high density information to the user.
Metroid Prime

Video game design is always at a tension between aesthetics vs usability; games are inherently incentivized to synthesize both functionality and aesthetics in order to create an ambience and immerse the player in a narrative, while still needing to be functional. The context and framing of the UI is based around the fiction of the HUD in Samus Aran’s helmet, which provides a diegetic framework that is consistent in the narrative the game is trying to convey. Core functionality is simple and consistent; persistent statuses are fixtures in the HUD, and contextual AR menus pop up as needed. The UI is designed to provide the core functionality to the user, add to the immersiveness in its aesthetic delivery, but otherwise get out of the way. However there are many aesthetic embellishments (patterns, textures, non-functional gauges) that while adding to the mood and feel of the interface do nothing for the usability, if anything hurt it. The user flow of the interface lives within the main HUD, and menus are pulled up within this same helmet frame. Many point to this interface as an inspiration for many modern diegetic first person shooter interfaces (Dead Space, Halo4, etc.). I find the interface to be both functional and immersive for the narrative, but a bit noisy. Its layout is clearly based on the input constraints of the game controller, but everything is intuitive and easy to navigate to.
Examples

01 – Main HUD-based UI Interface
The primary interface is based around the helmet HUD of the character. All core informational UI elements (status, map, etc.) are persistent transparent overlays. Various diegetic elements (frame of helmet, gradient, various effects and transitions) are used to provide context and create an ambience.

02 – Menu Interface
The menu interface uses a tabular two column format, with main components in the left column, which bring up sub selections on the right. Notice the curvature of the menu, used to create depth and to match the distortion of being inside a helmet. Control information is always provided at the bottom of the screen.

03 – Map Interface
This sub menu takes an existing item on the interface and blows it up into greater detail. A 3D map is presented, with Strong contrasting colors are used to indicate points of interest. Note that these menus are presented as an overlay onto the persistent HUD, thus playing into the narrative of the interface existing within the game world.
Objectives

1: Immerse player in narrative through embedding UI into the world and fiction of the game

2: Simple and clear hierarchies for visual statuses and controls key to game mechanics (i.e. bold and persistent display of core statuses, temporary statuses or separate sub menus for other things)

3: Consistency of UI in narrative of interface (all in HUD)
Metroid Prime

Explorers (gamers) use this interface. They use it as the framing for their adventure, solving puzzles, fighting aliens, and exploring mysterious landscapes. It is their suit and visor through which they view and interact with the world. The UI is manipulated using a game controller (Nintendo Gamecube or Wii), and is thus designed around a limited set of direct interactions that the user can make. Rather than mouse and keyboard, you have joysticks and a limited set of buttons. The interface is designed for immersing just the user, no affordances are made for external viewers, but they might be drawn in by the aesthetics and at a glance understand what they are seeing.
Color Palette

01 – Future blue
R - 118%
G - 185%
B - 255%

02 - Gold
R - 255%
G - 148%
B - 10%

03 – Dark Blue
R - 45%
G - 68%
B - 82%

03 – Indicator Green
R - 0%
G - 157%
B - 12%

The blue is pervasive throughout the interface and is used as the main color type. Other colors are used for contrasting or in menus, or the green I used for high contrast indicators. The gold in the menus was probably chosen to match the color of Samus's suit, rather than usability.
They chose these colors to fit within an aesthetic, as well as to provide functionality. The heavy use of the gradients of aqua makes things look holographic and futuristic, which is clearly the aesthetic they are shooting for. Its predominant use helps highlight the contrast of the other colors used; and there is a consistent palette of contrasted colors for indicating a grade of visual importance.
Analysis 1

Typography

Metroid Prime

Type Inventory:
There seems to be only one type face used.
It only comes in 3 sizes.
The variations represent titles, body/menu items, detail items. This is consistent across the UI.
The exact font used could not be found, but it was close to VipnagorgiaWalia
Typography

Metroid Prime

The designers chose this typeface for both aesthetics and technical constraints. Its geometric monospaced glyphs give it a futuristic computer/interface-y look, but also probably make it easier for the game console to render. Since the typeface characters are similarly shaped, it is aesthetically balanced, but not as readable.

I would use a lighter weight typeface that is more readable and that has proper kerning. It would still be sans serif, and slightly geometric, but not as heavily as this typeface.
Assets

Metroid Prime

OpenROV Cockpit UI

Interface Aesthetics
Spring 2015

Elisabeth Prescott & Kimiko Ryokai
Imagery

Metroid Prime

The imagery chosen was specific to fitting and creating the world in which the player is exploring and a part of. The interface and translucent overlays played to the science fiction aspects, and darkness is used to bring mystery. The interface is a thin glowing technology shield that protects the player from the harsh environment. The imagery used is both functional and aesthetic; it serves all the core information the user needs in a quick and mostly unobtrusive manner, but the aesthetic flourishes are strong and consistent which help immerse the user in the fictional world.
Star Citizen

The interface is heavily more focused on usability versus aesthetics, but that being said it is very aesthetic. The interface is designed around the diegetic mindset of making the interface exist within the world and narrative (it is a HUD projected into the cockpit), but is very much functional and has much less visual fluff the Metroid Prime. The layout is quite busy, but only because there are many many things that need to displayed. Given how much information is displayed, it is very clean, balanced and pleasing to look at. Real estate is appropriately split up, and it creates clear hierarchies and groupings between different components. It is mostly consistent in its design language. If there were actually space ships like these, I wouldn’t be surprised if the interface looked somewhat like this.
01 - Cockpit
The focus is on providing the user as much of the surrounding information without blocking them. Immersion is created by the rendering of the physical cockpit. The interface is all transparent HUD, thus maintaining as much visual information of the environment as possible.

02 - Context
The interface is designed around the user controlling and actuating a space ship for dogfighting in space. The game itself is expanding and has goals of creating a persistent MMORPG like universe with an economy and more, but right now the main focus is in the basic battle mechanics. Twitch reflexes and situational awareness are paramount.

03 – Interface Layout
The diagram shows the main components of the HUD interface layout, and how they are grouped. Left is self, right is enemy. Center and bottom provide statuses.
Name of UI Example 2

1: Clear and functional interface
2: Immersion through full diegetic design
3: Everything you need but focus when you need it
4: Make it feel like an actual real spaceship
Users

Name of UI Example 2

Spaceship pilots, space pirates, and interstellar explorers use this interface. Specifically, space combat simulation and spaceflight enthusiasts play this game. They interface with either a mouse and keyboard, but ideally with a joystick and throttle stick setup with many keys to control each of the many things that can and need to be actuated. The need for this is to have an immersive sci-fi space epic universe that people can lose themselves in. People will play this game whenever they want to fly off into the wild black yonder.
The colors indicate the state, from blue = neutral to green = friendly, to damaged and critical/hostile. This color language is consistent throughout the interface.
Star Citizen

The future is blue, and it also contrasts well against the dark bleak blackness of space. We associate blue to be cool and collected, and the progression of blue to red is a scale as severity/intensity is an intuitive color mapping. The very heavy use of the light blue is probably aesthetic; actual HUD in fighter jets use green, since studies have shown the human eye is most sensitive to it, and it does well in darkness. However blue is the color of the future (according to sci-fi movies), thus the interface is blue. The brighter/translucent nature of the palette is mostly an aesthetic choice, that plays into the diegetic narrative of how the fictional interface works.
Typography

Star Citizen

Type Inventory:
There is only one font in the UI. There appear to be two sizes of the font, however the HUD interface is warped to give the perspective of a projected HUD, thus it isn’t completely clear if there are just 2 or 3. Line weight and ALL CAPS are used to distinguish type, and darker vs lighter shades of the same color direct focus. The larger type represents group numbers, velocity, and score. The smaller type represents everything else. This is consistent across the entire UI. The size seems to be chosen on what was the smallest but still clear and legible size. There is greater variation in the color, shading, CAPS, and line weight to discern between labels, data, and indicators.

The font closest to the UI font is Electrolize
Star Citizen

The typeface was chosen for equal line weight so it could be tiny but still sharp and legible against a contrasted background. It is successful in the symmetrical geometric typeface matches the aesthetic of existing vector projected HUDs of fighter jets, and the imagined aesthetic of a futuristic engineered spacecraft. However due to the highly similar geometric constraint of characters, its not as readable. Words turn into blocks, and you have to focus and strain a bit to read them. The typeface is both aesthetic and functional, but a less similar character typeface might make it more readable; but it might require the font size to be larger, thus taking up more real estate on a pixel squeezed screen.
Analysis 2

Assets

Star Citizen

- Velocity Ladder
- Main Engine Throttle
- Fuel Qty
- Velocity Units
- Thrust Force (N) TVI

Powered
1. CF-17 Bell Turret 1500 1500

Unpowered
4. NK-14 Neutron Gun 67%

Destroyed
4. NK-14 Neutron Gun 97%
4. Talon Missile Rack 100%

Heat Level (the more red, the hotter)
- 1500 rounds remaining for each gun
- Energy weapon at 67% of full power
- 4 missiles, one of which is armed

Power buttons toggle power on and off.

Group 2
- These weapons are in Group 1

Group 3
- Missiles (can’t be assigned to a weapon group)
- Countermeasures (can’t be assigned to a weapon group)

Interface Aesthetics
Spring 2015

Elisabeth Prescott & Kimiko Ryokai
A lot of the imagery from this interface are token tropes from sci-fi; asteroid fields, dramatic lighting against a planet, zooming through a floating metropolis. The imagery is very much aesthetic, it matches what people have come to expect from a spacecraft cockpit, but it strives to be as functional as possible given the narrative and fiction that it is trying to convey. The physical cockpits and viewports changing from spacecraft to spacecraft fit within a diegetic philosophy. The HUD distortion does not improve functionality, but is aesthetic and strives to place the player into the seat and perspective of the cockpit (you can even look back at yourself).
Design Workshop

Typography 1

Colin Ho
You will design UI of a new mobile weather app. Create typographic hierarchy with the following set of rules:

- Use Verdana as typeface
- Use scale
- You may use rotation of text
- Background is white and figure is black
- No gray scale (only black or white)
- No images/photos/illustrations
- No italics or weight (bold)
- Screen size is 750 × 1334px
- Use all the copy below:

  February 23, 2015
  Berkeley, CA 94720
  Monday Clear
  Precipitation: 0%
  Humidity: 62%
  Wind: 7mph
  68 °F/°C
  Tuesday 64
  Wednesday 64
  Thursday 66
  Friday 66
Typography 1

Version 1

Typographic Hierarchy

Version 1 should focus on typographic hierarchy (i.e., help a user understand information through a logical and meaningful journey).

The current information (temp, Clear) is of greatest importance, thus it largest and positioned at top. Their relative placement is to balance the composition and create a grouped rectangle. The detailed information is placed to the right and smaller, but still maintaining a rectangular outline to maintain balance. Subsequent days follow, with the temperature leading and falling on the straight gridline.
Version 2

Emotional

Version 2 in contrast, should play with possible emotional aspects of interaction with a weather app (e.g., funny, nostalgic, angry, etc.). You are free to interpret the possible emotional aspects. However, the same rules apply to this version.

Surprising weather!
I wanted to show the circular nature of weather as time sweeps downwards, the days almost fall off one at a time. The location is contrasted to point out it is of importance, and the introduction of more imbalanced whitespace makes the rotating swing more dynamic (hopefully).
Typography 1

Version 1

68°F Clear
Monday

Precipitation 0%
Humidity 62%
Wind 7mph

64 Tuesday
64 Wednesday
66 Thursday
66 Friday

Berkeley, CA
94720

February 23, 2015

Version 2

Clear
Monday

68°F

Precipitation 0%
Humidity 62%
Wind 7mph

64 Tuesday
64 Wednesday
66 Thursday
66 Friday

Berkeley, CA
94720

February 23, 2015
Style Guide & Wireframe
OpenROV Cockpit UI
Colin Ho
Create 3-5 wireframe sketches with grids by only using the blocking method. Must use the final format size. Show examples in full size if possible, on black, no other type or information on screen. Show with and without grids. Grid to include, Column, Rows, Modules, and definition of why you chose this grid. Which constraint helped you set this grid?
Goal is to focus on balance, and keep the part of the video that is most important uncluttered - which is the bottom (typically looking at the bottom surface of aquatic body). Overlaid Elements provide critical stats to piloting the ROV (navigation, location, thrust settings, camera angle), and a thin opaque top bar gives space to operational statuses environmental statuses that need high contrast (battery, connectivity). The closer elements are to the center of the UI, the more critical they are to operation, the further from center the less critical they are (system status, other metrics, UI interactions for set-and-forget settings).

Grid
A 20 pixel grid is used for objects and gutters between objects. This small grid was chosen based on keeping the objects as small and thin as possible, while big enough to be legible (approx. size of 22 pt Caps font).
Goal is to minimally impede video in background, and move overlaid elements to the periphery.

A thin opaque menu bar is moved to the bottom, since the user’s eyes will naturally hang out mostly on the bottom of the video feed, minimizing eye movement distance.

Symmetry is maintained, and things are blocked out into thinner longer bars along the edges. A few UI blocks are placed below the center of the video frame, and larger than the central elements to simulate depth & perspective.

Grid
A 20 pixel grid is used again for objects and gutters between objects. This small grid was chosen based on keeping the objects as small and thin as possible, while big enough to be legible (approx. size of 22 pt Caps font).
Design Workshop

Typography 2
Colin Ho
You will design UI of a new mobile weather app. Create typographic hierarchy with the following set of rules:

- Use Verdana as typeface
- Use scale
- Use **weight**
- You may use rotation of text
- Background is white and figure is black
- No gray scale (only black or white)
- No images/photos/illustrations
- No italics
- Screen size is 750 × 1334px
- Use all the copy below:

  February 23, 2015
  Berkeley, CA 94720
  Monday Clear
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  Humidity: 62%
  Wind: 7mph
  68°F
  Tuesday 64
  Wednesday 64
  Thursday 66
  Friday 66
Version 1

Typographic Hierarchy

The most important thing in the UI is today’s temperature and conditions, so they dominate the top half of the screen. This group forms a box, which takes up just over half the screen to make it pop out even more. Boxes are created to follow the grid defined by the temperature numbers.

The forecast temperature group is set to follow the grid imposed by the 8, but also have healthy padding to ensure clear distinction. The days of the week have emphasis (size+weight) presented to the first distinguishing letters, as they are the most important in the names of each day. The thin grouping and offset alignment aids in contrasting itself from the other groups.

The location/date information.

The UI uses 3 primary type sizes (30, 48, 96) to help create a clear hierarchy, but some elements have different sizes to...
Version 2
Emotional

Emotion: Surprising weather
Last time I tried to convey the circular nature of time in the weather, but this time I decided to take a more angular approach. The eye still follows a circular path from today’s date to the forecast along a clockwise spiral. However the sharp angles and orthogonal grouping makes it more dynamic and interesting. Tension is created in the top left corner by the intersection of the temperature with the screen, which contrasts the rest of the composition that obeys a strict 30 pixel padding. Like the last composition, weight and size are used in combination to highlight to the important datums. Finally, different angles helps not only to make it more surprising, but also further delineate the grouping of the different components.

One issue is the readability of the forecast; being tilted at 60° makes it a bit of an angle. I played with tilting the forecast dates in parallel with “today’s” block, but it confused the clear grouping.
Design Workshop

Typography 3

Colin Ho
You will design UI of a new mobile weather app. Create typographic hierarchy with the following set of rules:

- Use Comic Sans, Georgia, and Helvetica as typefaces
- Use scale
- Use **weight**
- You may use rotation of text
- Background is white and figure is black
- No gray scale (only black or white)
- No images/photos/illustrations
- No italics
- Screen size is 750 × 1334px
- Use all the copy below:

February 23, 2015  
Berkeley, CA 94720  
Monday Clear  
Precipitation: 0%  
Humidity: 62%  
Wind: 7mph  
68°F  
Tuesday 64  
Wednesday 64  
Thursday 66  
Friday 66
Typographic Hierarchy

I went back to the basics, focusing on keeping it simple and creating a simple hierarchy based on a top to bottom flow of time. Two columns provide the grid for the composition, and the current day’s temperature and day provide the anchor which the composition builds off of.

Ample padding gives the composition more room to breathe, and grouping is provided by proximity and similarity of type scale.

The date and location still follow the two column grid to keep the composition level, but are nestled closer to the edge to add some sharpening to differentiate and contrast the group from the temp/day pairs.
Surprising weather!
My previous compositions were not successful in both conveying the emotion and being a good composition. For this I desired to keep things simple, conveying surprise only through a surprising typeface and scale.

Everything else fall within a centered box, with the exception of the date.
Wireframe Anatomy
User Modes

Three primary user interaction modes were determined from user studies

Main mode
Content is king - video is maximized, everything else is minimized. UI is pared down to critical UI elements necessary for operation.

Context Mode
Additional non-critical UI elements are activated based on context. This is the main mode augmented with additional statuses and elements.
- When a non-critical control is changed (ex. Lights dimmed)
- Direct interaction user interaction (mouse movement, hotkey)

Settings mode
Overlay screen for adjusting vehicle settings, options, and non-critical vehicle controls
Main Mode

Instrument Panel
The core panel instruments used for the operation of the ROV

Video Feed
Content is long form, the HD video stream from the ROV is minimally obstructed by all other elements. No UI elements are placed in the bottom or sides of the feed so the pilot view is maximized.
Wireframe Anatomy

Context Mode

Instrument Panel
Instruments, logs, and utilities to support the immediate operation of the ROV.

Settings
Access to the menu and additional settings for the ROV.

Non-Critical Statuses
Other statuses and interaction elements that are useful for tracking and recording the dive.

Video Feed
The HD video stream from the ROV. All other elements are transparent overlays, in order to keep focus on this central content.

Full Screen
Shaped placement based on best practices and to encourage users to full screen the interface.

OpenROV Cockpit UI – Colin Ho
Menu Mode

- **Instrument Panel**: All the instruments and statuses are shown to enable users to view vehicle changes while adjusting settings.

- **Settings Box**: A transparent box creates an overlay that contains various settings, and elements the user can adjust while keeping the video feed running in the background.

- **Sensors**: Sensor configuration settings.

- **Full Screen**: Smart placement based on best practices and to encourage users to full screen the interface.

**Menu List**
A column of menu items lets the user choose what settings menu to open. The selected menu is highlighted.

**Menu Bar**
The menu bar is split into three sections: a top row, a middle menu list, and a ROV status bar.

**ROV Status Bar**
Displays ROV status and adds the current status of the vehicle.

**Vehicle Settings**
Clusters of various vehicle component settings are placed next to where they actually are.

**ROV Graphic**
An outline of the ROV is shown to provide spatial context for each of the ROV settings.

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OpenROV Cockpit UI – Colin Ho

Interface Aesthetics
Spring 2015

Elisabeth Prescott & Kimiko Ryokai
User Flow
User Flow

Flow 1
Jesse has just finished building her OpenROV kit, and turns it on for the first time. Success! She is greeted by the dive screen and a pre-dive check test!

Flow 2
Jesse realizes from the test that she wired up one of the thrusters backwards. She goes into the vehicle settings, and switches around the thruster configuration.

Flow 3
Jesse is now ready to dive! She plops the ROV off the dock and into the deep blue yonder. She gazes through the cockpit into a whole new world waiting to be explored!
Wireframe to Design
Design – Context Mode – Main Instrument Cluster

Design Study 1
first try, repurposed GPS location ring for compass. Letters too small and the level bars are a bit awkward from left to right.

Design Study 2
Simplified compass: make it a tad larger and repositioned it to make space for the heading label below. Added battery outline to see if it would be better. Added outline to battery to make it clearer. Made laser icon with heavier weight. Level wedge indicators are now vertically oriented. Using Exo 2 type face. Added lock indicators for depth and heading lock.

Design Study final
reduced opacity of all UI elements to 50%, scooted level wedges and respective icons closer to centered between adjacent icons. Changed typeface back to Dosis. Removed outline on battery since it was too sharp and led the eye away from the compass. The compass is the only closed loop shape, making it a bit more visually magnetic? But battery outline is harder to see. Will make it visually change color as it gets lower.

Other UI ideas that haven’t been implemented
Auto-adjusting opacity of overlay based on current background tone to make sure it has enough contrast. Use color as a critical status indicator (when close to max depth, when battery is low).
Design Study 01
Goal: clarity, unambiguous, easy on eyes, and inviting, and professional.
The design was chosen to be completely flat, and to use easily distinguishable iconography to indicate the various functions. The positioning of elements is loosely based on the Android Material style guide as best-practice. The icons are taken or modified from the Google Material design set. Hierarchy is communicated through size and position, from the center to the edges. The centerpiece is the compass, which should aid the pilot to intuitively make heading adjustments. The two flanking depth and battery gauges align with the vertical metaphor of the things they are measuring. The typeface chosen is Dosis, which has a nice engineered and geometric feel that is DIN-esque, but remains approachable and human through its roundness.
Design Study 02

Goal: The second iteration adjusted for balance and clarity. Various element adjusted to even out the composition. For the center pod of instruments, the compass was increased in size, and thinned out to have it match the other instruments. The labels were moved around and all aligned. Heading and depth lock indicators were added to the instruments. The battery was given a thin outline to increase contrast. A new horizontal-shooting laser icon was designed with thicker line weight, to better match the other icons. Level indicators for the thrust and lighting were aligned with the other vertical level indicators. The keyboard icon was swapped out, and the camera icon was modified for higher contrast and to simplify the form. The typeface chosen was Exo 2, it has a smooth curving geometry which gives it a futuristic edge. Exo 2 is bit wider than Dosis, improving readability.
Final Design
Goal: Combining the best points of the design studies
The central pod is mostly the same from the second study, but the type size is now leveled. The compass label is emphasized through an increased weight. The symmetric keyboard icon is chosen for balance, and the thrust level and lighting elements are now evenly spaced beside their adjacent elements. The full-screen icon is moved to the top right bar since it was just too sharp in the bottom right corner, and it now follows standard practice placement. The transparency level is increased further to 50%. The typeface chosen was dosis, it fits the feel of the interface more, Exo was too sharp.
The main piloting mode is a stripped down version of the context mode. For most of the users operation, only the central three instruments are needed for vehicle operation. Whenever the user changes a vehicle setting (lights, laser, thrust level, camera angle), mouses over the screen, or hits a hotkey (such as spacebar), this context mode screen will fade in with all the additional statuses and UI elements. This ensures that every vehicle status is readily available to user on demand based on context. The user only gets what they need. What they need is an unobstructed view of the beautiful world they are exploring.
Design – Menu Mode Overview
Design Study 01
Goal: Create an intuitive and quick menu system
The menu system is designed by having no deeply nested setting; everything should be accessible within one interaction. Inspiration is taken from Tesla’s vehicle interface, with a graphic of the vehicle and relevant settings located to the systems in proximity. Still in process of generating all the sliders and icons for interaction.
Process Document

Color & Design

OpenROV Cockpit UI
Colin Ho
Style Guide

Color – Context Mode Overview

Color Study 1

Color Study 2

Color Study 3

Color Study Final

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Color Study 01
I originally chose the orange indicators and white background for contrast and because I felt the orange was quite pleasant, and I now realized it is complementary to the dark/deep blue color!

I replaced the depth gauge with an expanded gauge on the left hand side of the screen. Ticks at every 10 meter mark. More useful than the teeny gauge. Also changed laser icon to show it is a scaling laser (tape and two dots). Tried to match form with other icons a bit better. Thruster cluster also shows current each thruster current output (from user feedback). Changed thruster levels from bar to number.
Color – Context Mode 2

Color Study 2

Color:
Tried a color hierarchy, red being most important, orange moderate and then moving down to green. Changed main pointer indicators to red. Red is high contrast, but is a bit harsh. Adds stress? Other colors feel like they distract away from the important information.

Composition:
Moved depth gauge to right. Main compass moved down with its head label above. It makes it more sharpened? But it’s a bit wonky. I like how compass is the first thing you see when eyes move up from video feed.
Style Guide

Color – Context Mode 3

Colors:
Removed extra colors. Red looked a bit weird as well. Went back to complementary orange. The minimal use of colors helps draw the eyes towards the only things that matter. Colors might be added based on criticality context (if battery gets too low, then color is added).

Composition:
Depth gauge is reduced further, to give video more space and reduce sharpening. More balanced with the compass now (which now has a triangle the opposite direction, like a compass). Reduced size of icons down to 16x16 pixels to give the composition more space and thus reduced sharpening of the icons.
Color – Context Mode Final

Increased text size of the compass degrees directions and reduced size of text for the thrust level and battery percentage. Adjusted spacing of thrust cluster for balancing.
Color – Main Mode Final

Color Study Final
Only the compass and depth gauges now. Battery removed (will only appear when its low).
Style Guide

Color – Menu Mode Overview

Color Study 1

Color Study 2

Color Study 3

Color Study Final

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**Color – Menu Mode 1**

The Menu colors try to stay consistent with the basic white for everything and orange for indicators.

**Composition:**
The menu bar on the side only have the icon with a background bar to give the menu a more open feel. Correlation between the thruster slider clusters and their positioning w.r.t. the corresponding item isn’t very strong.

Sensor calibration buttons feel a bit awkward as well. They aren’t specifically correlated to a position w.r.t. the ROV outline so its confusing.
Color – Menu Mode 2

Color Study 2

Colors are used to accent the thruster indicator sliders to show they can move. Makes it more clear?

Composition:
Changed Thruster clusters to align under the heading in this nice wedge/triangle cluster. Clusters them together as a single block/better.
Lines added to directly correlate cluster to part. Makes a lot more sense.
Sensor calibration buttons added to side.
Menu bar is expanded. Sharpens it, but also makes it easier to see correlation between icon+label pair. Single menu block seems cleaner.
The indicator orange is used to highlight the current heading even further, as well as all items that can be interacted with. Too much orange… Maybe only for items of interaction?

Composition:
Menu is visually split into three different groups with dark/light bars. Menu selection is indicated by color now. Orange is a bit hard to read on the grey background.
Lightened up the menu background by decreasing opacity. Went back to the single menu bar, but with a lighter less opaque grey. Setting cluster callout lines are now a lighter shade of the same yellow, just turned down the saturation. All interactable icons are now Orange.

Composition:
Menu went back to the single bar, with a cutout indicating current selection. Menu labels are also now 14px to better fill out the horizontal bar space. Size of Ethernet latency label is increased.
Towards Final Design: Part 1

OpenROV Cockpit UI
Hierarchy & Composition

Have you created order and level of importance in your design? Established the visual levels of dominance and subordination?

White space: “Nothing is an important something.”

Empty space is needed in all compositions. It is imperative to accessibility and navigation. Space provides pathways, or channels, that lead the eye through the design, while directing the visual focus toward the positive areas of the compositional space.

Grid

Baseline used or not? When is grid broken?

The grid renders the elements it controls into a neutral spatial field of regularity that permits accessibility—viewers know where to locate information they seek because the junctures of horizontal and vertical divisions act as signposts for locating that information. The system helps the viewer understand its use. In one sense, the grid is like a visual filing cabinet.

Effective grid is not a rigid formula but a flexible and resilient structure, a skeleton that moves in concert with the muscular mass of information.

Typography

What does the type signify?

The key to good type layouts is contrast. In choosing to mix typefaces, be sure to select counterparts with enough contrast—but be aware of their similarities as well. E.g., different in stroke contrast and detail, but construction is similarly geometric.

Colors

Which color contrast(s) are used in your design and why you chose the(se) particular color contrast(s)?

We experience color based on the interaction among colors. People respond to the relationships among colors. In human visual experience, colors appear as interrelated sensations that cannot be predicted from the response generated from viewing colors in isolation.
Process

Synthesis Context Menu Overview

Study 1 - Hierarchy

Study 2 - Grid

Study 3 - Typography

Study 4 - Colors
Context Menu 1 - Hierarchy

In the context menu I enlarged the various status indicators to give them more importance in the context mode hierarchy. The depth and heading gauges are now pushed to the left. All context is grouped within the first row of the grid, and then subsectioned into three clusters. Visually, the center cluster is the most important.
In the grid study, I realigned the compass to fit within a 3x3 box within the grid. I also adjusted the center instrument console so all the statuses fall within the grid better, rather than have typographical labels pop out and break it. The dive time indicator on the right is also expanded and adjusted to fit the grid precisely. The depth gauge is moved to the right to better balance out the composition.
I was previously only using a single typeface, and more or less the same type size. Now I’ve moved to having two typefaces: Open Sans used for numbers and headings, and Dosis used for labels and indicators. Both geometric sans serif typefaces, however Dosis is distinct in its roundness and is condensing width. Weight is used to differentiate important vs background elements. For the Context menu typography is sparse, but these typeface semantics carry over to the menu mode.
The color contrasts used are blue and orange. Since the operating environment (video feed) will mostly be a blue tinge, the orange contrasts well. The orange is used to accentuate important items of note/change. In this study I added it to the settings, and full-screen icons to indicate to the user that these are main icons of interaction. Orange is also used for the status bars to heighten contrast.
The final composition uses the strongly aligned grid as well as a few of the color accentuations. The hierarchical split between the top, left and right help distinguish the different elements and their important in the context menu. Two typefaces are now used, and their weights help distinguish the relative importance.
Process

Synthesis Menu Mode Overview

Study 1 - Hierarchy

Study 2 - Grid

Study 3 - Typography

Study 4 - Colors

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Study 1 – Hierarchy

Increased menu background to the whole screen to cover the context and main menu. Menu is like a glass filter that overlays everything.
Study 2 - Grid
In the grid study, all the elements are realigned with the grid. Previously they were half a grid-space off. Now all headings and UI elements (buttons and sliders) are now within the main grid. All the labels fit within the padding spaces.
Synthesis  Menu mode 3 - Typography

I was previously only using a single typeface, and more or less the same type size. Now I've moved to having two typefaces: Open Sans used for numbers and headings, and Dosis used for labels and indicators. Both a geometric sans serif typefaces, however Dosis is distinct in its roundness and is condensing width. Weight is used to differentiate important vs background elements, but these typeface semantics carry over to the menu mode. Type size is increased to 21px for the headings, and 16px for the labels.
Process

Synthesis  Menu mode 4 – Color

The color contrasts used are white, dark grey, and orange. Saturation is used to indicated items of relative importance (selected items vs inactive items). Color is added to the back button and the power button.

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The final composition uses the strongly aligned grid, new typefaces and sizes, as well as a few of the color accentuations. The full-screen icon is also now on this layer, to make it obvious that it can be interacted with.
Towards Final Design: Part 2
Hierarchy & Composition

Have you created order and level of importance in your design? Established the visual levels of dominance and subordination?

White space: “Nothing is an important something.”

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Synthesis Context Menu Overview

Study 1

Study 2

Study 3

Study Final

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Synthesis

Context Menu 1 – Switching sides

Study 1
Flipped where the heading and depth are, changed battery to a vertical position. Bar graphs are now just white outlines with solid orange bar inside
Synthesis  Context Menu 2 - Alignment

Study 2
Changed position of icons to left justified on left half, right justified right half (suggestion of someone from community. Looks awkward Compass is now just an arrow, adjusted spacing of heading directions.
Synthesis  Context Menu 3 – Playing with grid

Study 3
Tried evenly spacing out icons. Kinda aligns with grid, but not strictly (1/2 steps). Looks kina weird. Loses hierarchy? But more leveled looking...
    logo sticks out for sure
Compass simplified down to single triangle.
Synthesis Context Menu final

Study final
Retained simplified triangle compass
Changed it to three clusters again. Was thinking about how to even out the spacing, but it looked weird when it wasn't aligned to grid.
Laser dots fill when lasers are activated
Opacity of arrow from compass is increased.
The main mode now expands to the whole screen, there is a 20 pixel border between elements and the edges – the compass is now equally aligned top-right. The depth gauge is now aligned to the bottom.
About the same as the last one, just added new context menu to the background, and adjusted the menu bar color to make it darker to help contrast with icons+labels. Most importantly, the depth gauge and the compass are both visible through the transparent menu – which lets the user calibrate and zero the sensors and validate their output.