

Assignment M5

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Abstract—The Method assignments concentrate on the redesign on the MacBook Pro Touch Bar interface to better accommodate user needs and preferences. The Touch Bar is home to a set of primary controls for the laptop, which include brightness, volume, and music, in addition to application-specific controls that change depending on the app in use. The gesture-based Touch Bar is located above the laptop’s keyboard and also features Siri and Touch ID buttons.

1 QUALITATIVE EVALUATION

1.1 Survey report

For the qualitative evaluation, I conducted a survey through the PeerSurvey interface to evaluate the textual prototype designed in Assignment M3 (Cousin, 2021). The raw textual prototype is shown in *Appendix 5.1: Textual prototype*. I made the survey available to fellow Georgia Tech students as well as sent the survey to coworkers at a software development agency. The survey displayed an image of the existing Touch Bar interface and an image of the textual prototype, then asked users a series of questions regarding the prototype.

There were 25 total survey respondents, of which 21 are male and 4 female. Respondents fell into the following age ranges:

- 60% of survey respondents are in the age range of 18–29.
- 32% of survey respondents are in the age range of 30–39.
- 8% of survey respondents are in the age range of 40–49.

The survey went well overall. I was able to address some complaints and ideas that users reported in the first survey and incorporate them into the prototype, then get feedback regarding those changes in this survey iteration. I didn’t run into any issues that I would change organizationally in a future survey.

1.2 Raw results

All users who took the survey said they were either “Somewhat Experienced” or “Very Experienced” with MacOS computers. However, 24% of respondents had never used a MacBook Pro with a Touch Bar before. Satisfaction ratings with the current Touch Bar interface (before redesign) were as follows:

- Very Satisfied: 0%
- Satisfied: 40%
- Neither Satisfied nor Dissatisfied: 32%
- Dissatisfied: 12%
- Very Dissatisfied: 16%

I requested feedback regarding several Touch Bar redesign changes proposed in the textual prototype:

- 84% of users prefer the Siri button removed from the Touch Bar.
- 76% of users prefer the keyboard brightness button included.
- 72% of users prefer the Control Strip expanded by default.
- 68% of users like the addition of Spotlight and Finder buttons.
- 76% of users like the inclusion of a customization button.
- 80% of users prefer a customization menu for creating buttons/widgets.
- 76% of users would use prebuilt themes in a customization menu.
- 74% of those users would like themes for both color schemes and button layouts.
- 72% of users would like to receive suggestions for adding/removing Touch Bar buttons based on app usage (within the customization menu).
- 92% of users would like to receive tactile feedback on button press.
- 76% of users would like swipe gestures to open and close menus.
- 32% of users like or love the idea of requiring more precise button presses; 32% dislike or hate the idea; 36% were neutral.
- 92% of users prefer the prototype over the original interface.

Additional customization menu suggestions from users included allowing the Touch Bar to change themes with the system time, a theme for fn keys only, key combination shortcuts, and “power user” vs. “minimalist” layouts. Other open-form feedback included making the Touch Bar larger, making the fn keys

easier to access, and making the more precise button press feature a customization option rather than an integrated feature.

1.3 Results analysis

My main takeaway from these survey results is that the prototype is a marked improvement over the existing interface, with 92% of users preferring the new Touch Bar design. The addition of tactile feedback upon button press and the removal of the Siri button were the two most-liked adjustments. I expected users to prefer the Siri button removed, but I was surprised to see so many users prefer tactile feedback. I incorporated tactile feedback into the prototype based on a couple of comments in a previous survey, but did not expect it to be so popular—there were other items that received much more attention. I was also surprised to see the low support of the more precise button presses. I thought it would help reduce the rate of accidental button presses, which was a top complaint in previous needfinding. Overall, these results showed that users would support most of the proposed redesign changes.

1.4 Changes based on feedback

Based on the feedback found in survey results, I would remove the requirement of more precise button presses as a feature. Instead, I would take the free-form feedback from one of the users and make the level of button press required a customizable option with a sensitivity threshold. Users who struggle with accidental button presses could increase the threshold, whereas users with accessibility issues might need to lower it. Additionally, I would like to do more testing regarding the addition of the Spotlight and Finder buttons, since only 68% of users preferred it. With the Siri button removed, there will be empty space in the Touch Bar, so I would like to do more needfinding to discover whether the user prefers those buttons or something else.

2 PREDICTIVE EVALUATION

For the predictive evaluation, I will perform a cognitive walkthrough of my verbal prototype of the Touch Bar interface (Cousin, 2021). The verbal prototype can be viewed in *Appendix 5.2: Verbal prototype*. In the cognitive walkthrough, I will go through the steps of a user interacting with the MacBook Pro Touch Bar and investigate what the user might see, think, and do during their interactions.

2.1 Cognitive walkthrough

I will explore the **control strip** and the **customization menu**, as well as perform several specific tasks:

- Turn volume up
- Swipe gestures to open/close control strip
- Open Spotlight app
- Use function keys

2.1.1 Control Strip exploration

The user has the default Touch Bar layout and sees that the Control Strip is illuminated and expanded by default when their laptop is open. Buttons for screen brightness, Mission Control, Launchpad, keyboard brightness, music controls, volume controls, and a customization menu are displayed. An arrow is displayed indicating that the menu is open but can be swiped to close. The options displayed to the user at this time are meant to encourage efficiency and make the user as comfortable in their workflow as possible. The user is encouraged to interact with any of these buttons at any time. Specific buttons show the user what to do. For example, the screen brightness buttons use the principles of consistency and mapping to show the user how to use them. The sun icon is universally known to represent light or brightness on computers, touchscreens, and even airplanes, making it consistent with other interfaces. It has a small sun and a big sun, for less bright and more bright. This mapping helps shrink the gulf of execution by showing the user what the results of their actions will be before they perform them. Keyboard brightness buttons function in an almost identical way, but affect the brightness of the keyboard rather than the screen. The buttons show a brightness ring much like the sun, but around a flat rectangle appearing to indicate the keyboard. This is consistent with the other interface buttons, but in case the user is unsure what they do, they can easily find out through the principle of discoverability. Volume and music controls also leverage the principle of consistency and use a layout that most users will be familiar with from other interfaces. Mission Control, Launchpad, and the customization menu may be unfamiliar to some users, but the principle of discoverability makes them simple to learn—a press of a button opens the corresponding menu and teaches the user what they do. The Control Strip has added haptic feedback upon button press, indicating to the user through a slight

tactile feedback indicator that the button was successfully pressed, to increase the user's levels of ease and comfort felt.

2.1.2 Customization menu exploration

The customization menu allows the user to create custom widgets and buttons that can be added to the Touch Bar, as well as custom themes that can be applied to the bar. The user taps the customization menu button directly from the Touch Bar. It opens the menu and prompts them with three options: Create/Edit Button, Create/Edit Widget, and Create/Edit Theme. At the bottom of the menu window is a visual display of the current Touch Bar layout, with applied customization options. This menu leverages principles of discoverability and simplicity—the main functions of the menu are easy for the user to explore and learn without an instruction menu, and with both text and visual instructions, users of different backgrounds can understand the interface.

2.1.3 Turn volume up

The user wants to turn the volume up. The Control Strip is already expanded, so the volume up button is visible. The user taps the button and receives haptic feedback upon button press, letting them know it was a successful press. A volume indicator briefly displays on screen, showing the user the volume went up, and the sound audibly goes up as well, indicated by any audio playing. This is sufficient feedback to know that the volume was successfully increased.

2.1.4 Swipe menu gestures

The user wants to swipe to close the Control Strip. An arrow pointing right (inward) displays to the left of the Control Strip while it is open. The user can either tap or swipe the arrow to close the menu. Upon tap or swipe, the menu is instantly closed. Through the principle of discoverability, the user can learn to close the menu. However, the user might not know that swipe capabilities are integrated in the Touch Bar. It would be better to teach the user about this feature in some way, possibly through a tutorial.

2.1.5 Open Spotlight app

A Spotlight app button is included in the Touch Bar by default, which launches the Spotlight app. Spotlight is a quick search to look for files or applications on the computer, or perform calculations or conversions. The icon representing

Spotlight is a magnifying glass, which is consistent with the Spotlight button displayed in the Mac menu bar or when the user presses the hotkeys Command + Space. When the user taps the button, the user receives haptic feedback and the Spotlight menu bar instantly appears on screen. This is sufficient feedback and an easier to discover way to access Spotlight than remembering the hotkeys.

2.1.6 Use function keys

My goal as the user is wanting to access the function keys for use during application development. I tap the fn key on the physical keyboard, which displays the Touch Bar function keys menu briefly. I realize I have to hold the fn key in order to get the touch menu to stay displayed, then tap the function key I need. I had to learn this through trial and error, and the steps required to press F12, for example, are more than they would be on a physical keyboard, which only requires a single button press. This piece of the interface is not good in terms of user ease and comfort, because it requires a hand stretch or two fingers to hold the fn key while tapping another key across the keyboard. The interface feels visible in this case and has a larger gulf of execution because the user has to think about the actions they're performing.

3 EVALUATION SUMMARY

3.1 Next iteration

In the next iteration of the design life cycle, I would conduct more user research to better understand what users would like to see included in the Touch Bar, as well as how to reduce accidental button presses without also reducing accessibility. Then, I would like to create a higher-fidelity prototype for evaluation. I would like to capture user feedback in an empirical evaluation of the higher-fidelity prototype.

3.2 Additional needfinding

I would like to address a few items in additional needfinding: buttons that the user would like to see included in the Touch Bar by default, how to best reduce accidental button presses without introducing accessibility issues, and a theme that has function keys displayed by default. In this iteration of needfinding, only 68% of users liked the addition of Spotlight and Finder buttons. I would like to see if there are different buttons that users would prefer to see integrated in the Touch Bar. Since the Siri button was removed, it is ideal to find a replacement

button that appears in the bar by default. I would also like to investigate whether there is a better way to reduce accidental button presses than the current proposed design, which includes requiring more precise button presses. Only 32% of users said they like or love that idea, with an equal number saying they dislike or hate it. One survey participant mentioned potential accessibility issues with this feature where some users might not be able to press the button enough to trigger an action.

3.3 Design alternatives

As an existing prototype update, I might consider making the more precise button press feature a customization option instead of an integrated feature, and include a slider for sensitivity that the user can adjust. This would address the survey feedback regarding accessibility issues with requiring a more precise button press, but still potentially reduce the accidental brushes of the Touch Bar buttons. Additionally, based on the new needfinding results, I might incorporate different buttons into the Touch Bar by default depending on user preferences. This might involve removing the Spotlight and/or Finder buttons and instead incorporating different buttons.

3.4 Prototype revisions

I expect to take the prototypes to the next level of fidelity in the next iteration through the design life cycle. The current paper and verbal prototypes are low fidelity, and I would like to create polished wireframes to represent the redesign at this point. The evaluations have, in general, been quite positive, so it should be low risk to create this higher-fidelity prototype. Since the Touch Bar is hardware-based, wireframes might be the highest-fidelity prototype I could reasonably create without spending a lot of money to create something. Computer hardware is generally expensive to produce.

3.5 Future evaluation

Assuming I create the high-fidelity wireframes, I would plan to conduct an empirical evaluation next. My prototypes should be ready for the rigor of a true empirical evaluation at this point, since users have generally provided positive feedback toward most of the design thus far. With the couple revisions mentioned implemented in the new prototype, we could gather final user feedback in this iteration. For the empirical evaluation, I would like to create a

similar high-fidelity wireframe version of the existing Touch Bar interface to use as a comparison point. I would use within-subjects design to conduct a comparison within a single user group that experiences multiple treatments (the prototype and the original design). Users would be asked a series of questions regarding each design, then I would conduct hypothesis testing using a paired t-test to analyze data.

4 REFERENCES

1. Cousin, L. (2021). Assignment M3 [Unpublished manuscript]. Georgia Institute of Technology.

5 APPENDICES

Appendix 5.1: Textual prototype

The Touch Bar will be modified to have a new default configuration for all users out of the box. The Siri button and keyboard brightness button will be removed and instead be options that can be added during customization. These were the two most commonly removed buttons discovered during needfinding. The Control Strip will be expanded by default when no other apps have an active Touch Bar control display. Spotlight and the Finder button will also be integrated into the Touch Bar default display. The Touch Bar will also feature a customize button that links to the existing customization menu for the Touch Bar. Two additions we'll include with this prototype are the ability for the user to create custom buttons and widgets for various applications, and provided suggestions for button additions and removals based on app or shortcut usage.

In addition to the design-based changes, we will also incorporate tactile feedback into the Touch Bar interface. This will include haptic feedback upon button press by default (although this could be customized to disable in the customization menu). This will provide the user the feeling of being more in control of the button interface and give it a more physical keyboard-like feeling. We will also integrate additional swipe-based gestures, such as swipe to open and close the Control Strip, and swipe to move forward and back in browser tabs. Finally, we'll include more precise touch recognition so that it's harder to accidentally press buttons—for example, the touch action must take place in the center of the button or cover a minimal part of the button real estate in order to activate the press.

Appendix 5.2: Verbal prototype

Imagine an interface that's like a mini touch screen strip above your laptop's keyboard—that's the MacBook Pro Touch Bar. This prototype seeks to make it act more like a typical touch screen by integrating swipe-based gestures such as forward and back in the browser, and opening and closing menus by swiping left and right. Other branches we want to explore include how to make the Touch Bar feel more natural, akin to a physical keyboard, through the use of haptic feedback; and addressing the layout, configuration, and customization.

Conversational questions we might ask during verbal prototyping:

- Would gestures enhance your interactions with the Touch Bar?
- Would haptic feedback from buttons improve your experience?
- Do you prefer buttons that require more targeted presses?
- What would you change about the default configuration of the Touch Bar? Would you add, remove, or rearrange any items?
- What customization options would you like to see implemented?
- Would you like to see the Siri and keyboard brightness buttons removed?
- Would you like to see Finder, Spotlight, and customize buttons added?
- Would you like the Control Strip menu open or closed by default?

I expect to see answers leaning toward enhanced customizability and adding haptic feedback and gestures. Users might have various preferences regarding default configurations. We can cater to the majority and provide the best possible default layout, but we can cater to everyone else through customizability. Based on answers, we can ask more followup questions regarding the default configuration or the customizability to determine what best fits the user.