Terpmap

Team Members

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Overview

Terpmap is a bucket-list based guide and introduction to UMD's Campus. It was developed with the goal of introducing new students to UMD's campus and the "Must-Do" activities in the area. The list of activities is based on and branches off from the bucket list in the University of Maryland 'M-Book' published by the UMD Alumni Association. Terpmap assists users in locating, tracking, and describing these activities via Mapkit-oriented user interface. This bucket list activity tracker for University of Maryland students allows the user to check on-campus items off of the UMD bucket list and sends the user notifications when their device is close to a bucket list activity.

Goals

Create a map app relevant to the University of Maryland Campus

The first main goal we set out for our application to achieve was to provide a pleasant user interface and navigation experience to support a users' geolocation of points of interest around campus. We wanted the map to be centered on the UMD campus and also highlight notable locations on campus. The initial version of the map interface was implemented based on the lectures and lecture slides about using MapKit. It was just a static map that showed the region for the map centered on the UMD campus.

Add interactive map features like panning and zooming

It was important to us to allow the user to manipulate the map as they would likely be used to doing in any other map application, so we set out to add panning and zooming capability to our map. We wanted the user to be able to manipulate the map to see locations nearby to their location as well as find campus buildings and items from the bucket list across the campus on the map. This turned out to be a simpler task than anticipated, but did need to be written explicitly into our code.

Create a bucket list of on-campus activities

It was essential that users could easily track completion of the list of activities. We also needed to decide what items should go on the bucket list and found some online sources useful in determining what would go on our list. Terpmap accommodates this by providing a tab view with a scrollable list that details the description of each activity, alongside with a checkbox for the user to indicate each task's completion status.

Utilize the notification system to alert the user when they are near one of their bucket list items

Another important goal was to implement location proximity-based notifications so that the app notifies the user when they are sufficiently close to an activity. If the notification is triggered, the app prompts the user to check an item off their bucket list and lets the user know what activity they are near. This feature required not only permission to access the user's location data but also authorization to send notifications. The notifications are scheduled on instantiation of the app with their triggers set to a radius around the GPS coordinates of each bucket list item's location.

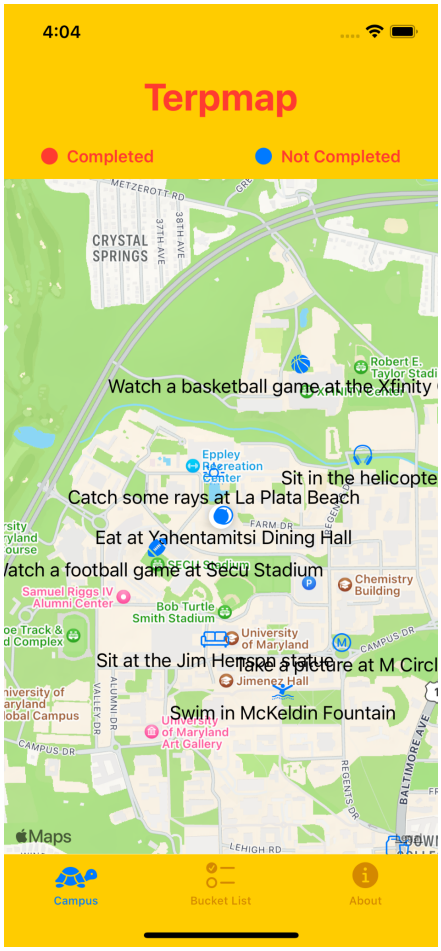
Labels identifying notable locations on-campus with bucket list activities
This was a stretch goal that we were able to accomplish by finding icons in SF Symbols that corresponded to each bucket list to accompany the descriptions of the activities both on the map and in the bucket-list tabs. Each activity was assigned a unique image from SF Symbols to be easily identifiable by the user. These symbols are consistent across different tabs of the app - the map and the bucket list view (see images below). We implemented a color scheme legend on the two tabs so that the activities that are completed would have icons that are red in color, whereas activities still remaining incomplete are blue in color. This coloring scheme too is consistent across different tabs.

Indicate parking lot unavailability on game days
This was a stretch goal that we were not able to accomplish. We deemed it infeasible since we lost one group member rather late in our development process, and instead decided to focus on other goals that seemed more manageable given our limited time frame.

Integrate GPS / location service
The idea of this stretch goal was to further enhance the user's map experience to provide more features commonly used in other map applications. We implemented this stretch goal by making the map center on and track the user's location when location services are authorized on the device.

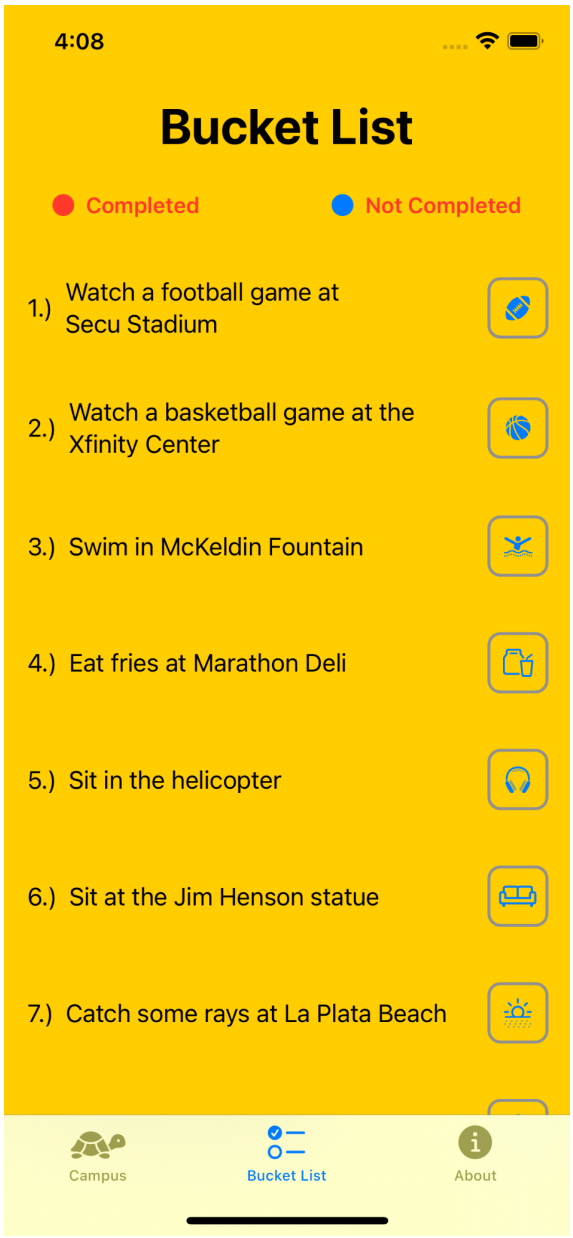
Implement a 'mark complete' button option for when users are near their bucket list items
A bucket list is only useful if you can check off each item as you do it. And it needs to stay checked on subsequent times the app is opened. We implemented this stretch goal by incorporating persistence using User Defaults so that the user's checked off items will remain checked off after exiting the app. The "check marks" are also the same icons as on the map for a cuter look that coordinates well with the map view.

User Interactions



On initial startup, the user is greeted with the “Campus” view:
At this screen, the user can quickly locate their position relative to the nearby bucket list items. This assumes that the user is located at the UMD campus already, and will not geo-lock to the campus itself. Completion can be tracked using the legend provided at the top of this “Campus” view, and details of each activity can be found on the “Bucket List” view. Each icon is unique so that the user can quickly differentiate between the various locations indicated on the map and their associated bucket list activities.

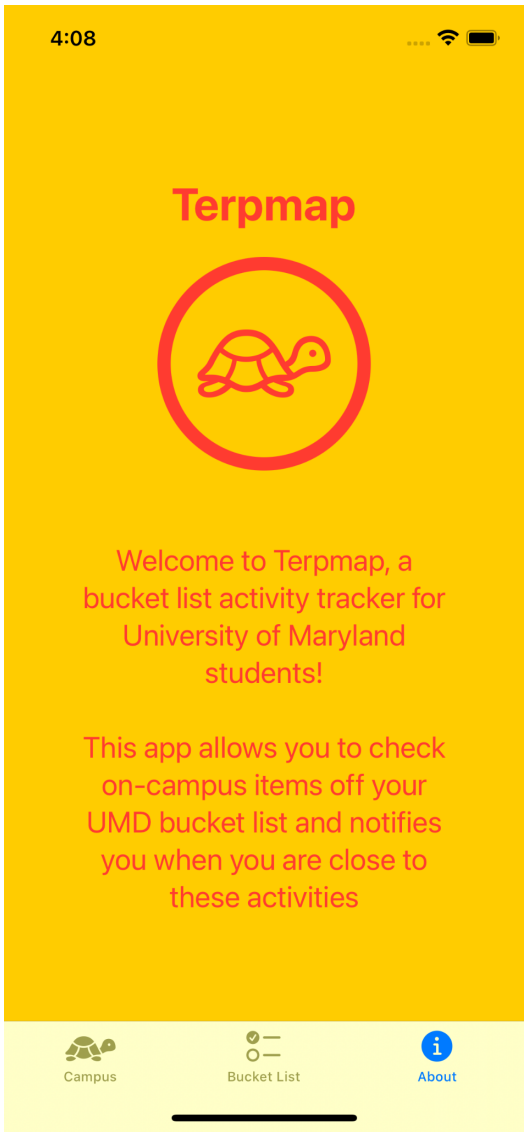
Bucket List screen:



The bucket list view reflects the current status of the task for the user (completed or not completed), as well as provides a description of the activity as well as an additional legend at the top of the view. The icons that serve as check marks match the map annotations for the

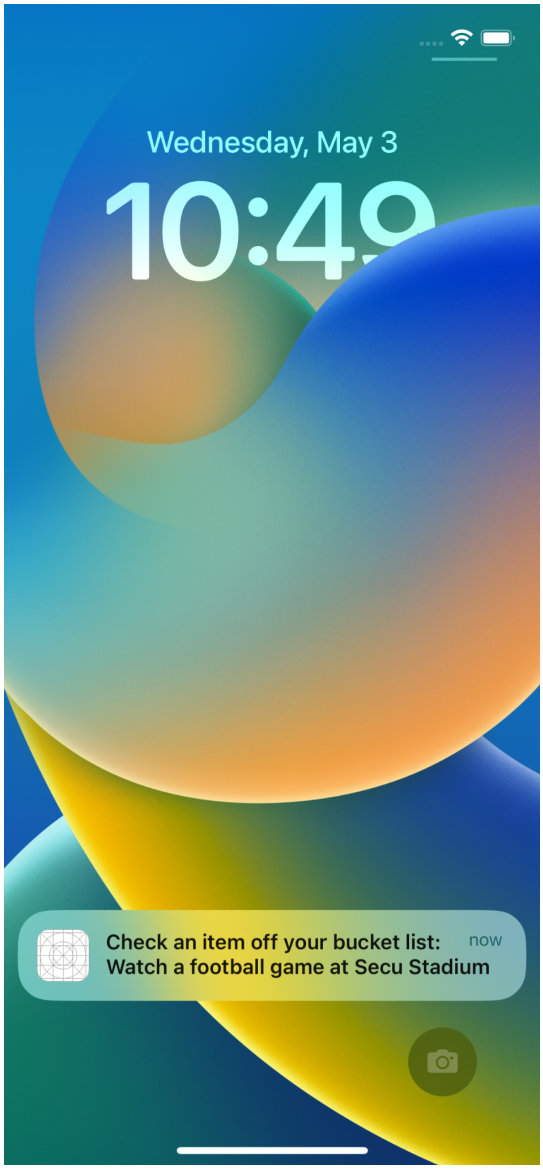
same bucket list activities as well as the correct color corresponding to whether or not the bucket list activity is marked as completed.

About Screen:



The about screen provides the users with information about the application! Future updates could add version numbers, related products, and developer contact information on this view.

Notifications:



Terpmap offers live tracking of the user while Terpmap is open, and permissions are granted, and can provide the user with notifications of when they are near a bucket list item. These notifications are triggered within a geo-fenced area of each bucket list item, and the user will be notified as they enter each of these areas. The triggering of a notification also causes a badge to appear on the app's icon in the home screen. Both the alert banner and the badge will disappear when the user opens the app, since there is likely no need for further notification of the particular bucket list activity.

Development Process

We formed our group fairly early on in the semester and agreed to work on the project at a regular pace throughout the semester. We also agreed to follow the nominal timeline suggested in the assignments listed on ELMs. Even though this class is self-paced, we decided that we wanted to follow the proposed schedule to give us a chance to fully develop our project and avoid a stressful crunch at the end of the semester.

In our meeting to decide on the concept for our app, we entertained several options for types of apps to pursue. We quickly came to a consensus that we would make a map-based app. From there, we tossed around a few angles to take the project. After brainstorming for a while, the idea to make something useful to UMD students led to incorporating a list of activities to do around campus that are essential to getting the full Terrapin experience into the map-app base. The last task was to name our app, and “Terpmap,” a map for UMD Terrapins, seemed like the perfect solution.

To keep the development of the project flowing, we implemented a steady-strain and regimented process of creating, assigning, and working on tickets. For the most part - this process was accomplished via our use of Gitlab Issues tickets, close-knit Discord communications, and honest and approachable critique from teammates.

We readily met the proposed deadlines for both the Initial Proposal and Milestone 1. Our goals for Milestone 2 included incorporating persistence into the Bucket List tab, which proved to need more time to accomplish, partly because one of the weeks allotted included Spring Break. We only needed one more week to finish the goals set for Milestone 2, so we were still making good progress.

Unfortunately, we had some setbacks and issues with a teammate who is no longer enrolled in the class. An initial disagreement resulted in their radio silence and later withdrawal from the team and class, but not before they promised to complete the Notifications feature and then ghosted us. This was a challenge for us as we had to reallocate workloads, but we overcame this challenge and implemented the feature for which this teammate was responsible.

Consequently, we were unable to meet the nominal deadline for Milestone 3, which mainly needed to include implementing location-based user notifications as the last feature from our list of minimal goals as outlined in our Initial Proposal. We decided to spread the work for this feature among the three of us to ease the burden of a teammate leaving the group. We tag-teamed the tasks to implement the notification and were still able to complete this work within 2 weeks of the soft deadline for Milestone 3.

After reallocating workloads due to our teammate leaving the group, we also had to reevaluate our proposed stretch goals. We decided to abandon the idea of working on implementing a feature to notify users of parking lot availability changes due to sporting events on campus. This feature ended up being the only stretch goal from our Initial Proposal that we did not complete for our app. One feature that we added that was not in the original plan is the About tab, which gives the user a little background information on what the app is about.

We anticipate finishing this Final Report and the Demo Video by approximately one week after the suggested deadline. Considering our setbacks as outlined above, this feels like an ideal outcome and only a minor deviation from our original plans. The 75% of us that stuck it out through the whole project kept making steady progress on our tasks, adapted to changes in plans and workloads, and in the end accomplished our project goals.

Throughout the course of working on the project we pushed code by creating a dev branch separate from the master branch. Although we initially had some trouble coordinating pushing code to the dev branch and merging the dev branch into the master branch when appropriate, we learned how to actively communicate and let each other know when one of us was working on code to push. We assigned tasks as issues to ourselves and sometimes each other using a Kanban board on Gitlab. When any one of us was having trouble with their respective issue/task, they would let the rest of the group know and we would help them complete the task. This collaboration was key in organizing our workflows to not step on each others' toes and code as well as keeping us working together at a steady pace on the project.

Overall, as a team we stayed in communication regularly, held each other accountable to our respective tickets, and completed tasks in a timely manner. We decided to have weekly meetings every Thursday to discuss progress for the week, set timelines for future tasks, and allow each member to express their opinion regarding the direction that the development of our app was taking. These regular check-ins were essential in keeping us on track with meeting deadlines as well as adjusting them when we needed to change course. We also developed a rapport during these meetings that helped us build trust in each other to make contributions to the project. Sometimes our meeting time needed to change or move from in-person to virtual due to the shifting schedules and priorities of three people. But by remaining flexible and accommodating some schedule changes, we were able to consistently check in with each other.

One lesson learned from working in a group on this project is the importance of communication. Communicating effectively is essential to working with others, and a lack of communication or miscommunication can hinder progress even among motivated individuals. Once we were able to communicate regularly and effectively, we were able to make the most progress as a team and was one of the keys to our success on this project.

An interesting challenge was implementing location proximity notifications. Since this was a feature that was not covered in any lectures for this class, it required outside resources to find needed information and guidance in how to tackle implementing this feature. We also relied on each other to complete the work instead of shouldering one person with the responsibility of

creating this feature that didn't have any background support from the class material. Another related issue that arose was trying to get the notifications to pop up in the XCode Simulator. This eluded us for some time when the code was likely correct due to some idiosyncrasies with the simulator that, once discovered, allowed us to see the notifications appear.

Despite some far from ideal setbacks and changes in the initial plan, we were successful in steadily developing this app according to our vision. By keeping track of our targets with the milestone goals and continuing to work on the project during times when our team was not all communicating, we were able to continuously make progress throughout our development process.

Future Directions

There are many directions Terpmap could go to expand its functionality in ways that would benefit University of Maryland students. It could expand to include dynamic bucket-list updates that could come from a variety of sources including submissions by users. There could be a feature where users add their own activities to the bucket-list, which would present an interesting challenge in how to assign the locations on the map in real time. Other ideas include allowing users to add annotations to activities like a rating system, make notes about plans to complete an activity, and attach photos commemorating completion of bucket-list activities. Another suggestion is to add a social-media aspect providing functionality for users to interact with each other through leaving comments on others' profiles, seeing the status of completion of friends' bucket-list items, and coordinate completing tasks together, such as attending a basketball or football game. There are also a large number of clubs on campus, so tapping into the events and recruiting efforts could further expand the reach of Terpmap.

Additional image of notifications: