

- **FIT History Tours Project Plan - Spring 2023**
- **Team Members**
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- **Faculty Advisor**
  - Dr. Fitzroy Nembhard , [fnembhard@fit.edu](mailto:fnembhard@fit.edu)
- **Faculty Client**
  - Dr. Ryan Stansifer , Florida Institute of Technology
- **Meetings in Preparation of this Plan**
  - Client: 1-18-2023
  - Advisor: 1-17-2023
- **Goal and Motivation**
  - The goal of this project is to create a web-based application that can guide or allow free roam of users across the Florida Tech campus while providing engagement with written, pictorial, and interactive historical content.
  - This project is motivated by the lack of historical engagement that the Florida Tech campus currently offers to students and visitors. The tours of campus offered by admissions serve the purpose of introducing prospective students and families to the university, but cannot accommodate history content due to that purpose. The library houses historical content, but requires a visitor to be on campus and only view the information while present in the library. Our project will eliminate the tedium of navigating the library and allow off-campus users to engage with the history of Florida Tech in a virtual environment.
- **Key System Features**
  - Explore the beautiful campus of Florida Tech at your own pace with our guided walking tours, housed completely within the app! Navigate to your desired point of interest with ease as the map shows which paths to take in real time! Select from a small (2+) set of routing options with varying travel times and en-route stops.
  - Discover the landmarks of Florida Tech without setting foot on campus! Select locations on the map to display their history! Immerse yourself in the culture and legacy of our university through the screen of your device and get a remote start on the Panther Experience!
  - Connect with the university through games that test your knowledge. Bridge the gap between education and fun with our Jeopardy-style trivia during your tour and rack up points while you learn about each landmark! Make your own path as you search for points of interest in a scavenger hunt! Our games will help you remember your discoveries about Florida Tech.

- Scroll through facts and pictures of the campus on the active timeline! Watch as the most relevant information scrolls automatically into view as you reach each point of interest on your tour! Easily see more detailed views of images on timeline cards with a tap.
- **Algorithms and Tools/Integrations**
  - MapboxGL API: This API will be used to ensure the client is able to have the desired navigation features along with accurate tracking of the users location. The MapboxGL library and API are licensed under a free tier that will provide the necessary pieces to allow the application to function as intended. The implementation for the map and location tracking has been implemented following Mapbox's best practices while there is still the need to build out the walking routes to properly use the routing API from Mapbox to navigate users around the campus on all paths that are scanned in the Mapbox map.
  - Chrono Timeline Library: This NodeJS package will be used to enable the dynamic timeline that is presented to the user. This package has been implemented and we will be working on importing the backend data of the historical facts into the provided guidelines. The library provides clear documentation of how to set up each card on the timeline and the dynamic loading of elements allows us to keep only what information is loaded into the time.
- **Novel Features**
  - Automated Content Timeline: While timelines are commonly used to display historical events chronologically, and the ability to scroll manually is easily integrated, the implementation of a timeline that scrolls or filters automatically to the most relevant historical context for the closest point of interest has not been seen in museums where the timeline display of information sees most common usage.
- **Technical Challenges**
  - Reactive Content Timeline: We have an integration for a scrollable timeline that will hold the historical data for our project, but implementing automatic scrolling based on the geofencing that will be defined around campus buildings is going to need experimentation and testing to verify.
  - GPS Precision Differences: Due to the differences in the precision of GPS in different user's devices, 2 users may be put on different paths, even if they are walking side by side. This is an interesting problem, because this deals with the hardware of the user, rather than the software itself.
- **Design of the System**
  - **Components:** The software communicates between several modules, including React, NodeJS, and MongoDB. React provides a framework for the frontend of

the application and its UI, while NodeJS allows for installation of packages that communicate with React and other components, including the database running in MongoDB. This allows the app to remain lightweight and responsive while still containing comprehensive functionality to serve the user.

- **Interfacing with Users:** The software systems interact with mainly users who are using the application to tour and learn about the campus, but sometimes as developers, the software's live code is able to be iterated on and redeployed to help fix issues with the User's experience. The system primarily interfaces with Users through their mobile phone or tablet, allowing them to use their touchscreen to use the app.
- **Interfacing with Other Hardware:** The software communicates with the GPS onboard the device that is currently running it through MapBox's API. This is used to determine the geolocation information of the user.
- **System Evaluation Criteria**
  - **Accuracy:** Facts presented to users about Florida Tech and its buildings are correct and up to date. Also, the map displays user location when geolocation is active within a 100ft radius of their actual position.
  - **Speed:** The speed will come from three key metrics of the web application: initial load time, timeline update time, and location service update time. The initial load time will be vital to ensuring the user can load the page in a reasonable amount of time (6 seconds). This will ensure that we can display the users information correctly while not making the user wait while the page loads in. We would like for the timeline updates to occur within five seconds of the user entering a new location, this will help us keep down the number of requests to the database and give us some headway to deal with only a single server carrying out all these requests. Lastly, the location update time should be about one second to keep the user up to date with their current location and the path they are taking so they can make navigation decisions as needed in a timely manner.
  - **Reliability:** Due to the precision of the GPS in a user's device, the reliability of the application should correctly get the user down the correct path eight out of ten times; while the user should still be able to reach the end goal with a new path 9.9 out of 10 times. This reliability comes down to the precision of devices GPS can cause the user to be off by up to 50 feet in some cases, so the path the GPS puts them on may be different then the path the user is currently standing on.
  - **User Survey:** Users can rate different aspects on a scale of 1 to 10. Aspects such as how engaging the trivia is, how easy the app is to navigate and understand, and how interesting the content within the app is to them. This will allow us to tweak the content and UI to ensure users are able to use the app easily and be as engaged as possible with the content that is provided within the app. Users will also be able to tell us which point of interests they find the best, which would allow us to

see what point of interests are the user's favorites and use that information to tweak the lower performing point of interests, the ones that users don't find as engaging or interesting.

- **Progress Summary**

<b>Feature</b>	<b>Completion (%)</b>	<b>To Do</b>
Implement and Deploy Basic Web App	100%	None
Choose GPS/Location Framework/API	100%	None
Integrate Map Container	100%	None
Add GeoLocation Button to Map View	100%	None
Add Historical Facts to App	100%	None
Load Current Content Into Live Demo	100%	Keep updated as more facts are collected
Implement History Trivia	60%	Integrate with home page Randomize game questions
Implement Scavenger Hunt	0%	Begin Coding Scav. Hunt
Collect Coordinates for Building/Locations on Campus	30%	Continue collecting coordinates
Build Out Historical Database	45%	Continue collecting information from Florida Tech Digitize Archival Photos
Game Question Generation	50%	Generate more trivia questions

- **Milestone 4 Tasks**

- Implement initial tour paths for guided navigation
- Design and Integrate Layouts for the Points of Interest across campus

- Begin Implementation of the additional game(s), e.g. scavenger hunt, name game, etc.
- Create Geofences with latitude and longitude values for campus buildings
- **Milestone 5 Tasks**
  - Create full campus tours for the various routes
  - Design and implement settings menu for application settings and social media sharing
  - Begin evaluation of the system for final analysis
  - Create Poster for Senior Design Showcase
- **Milestone 6 Tasks**
  - Clean up the UI and add in debug options for location and other resources
  - Conduct full system test for evaluation and analysis of success
  - Create user/developer manual
  - Create demo video
- **Milestone 4 Responsibility Matrix**

<b>Task</b>	<b>Grant</b>	<b>Cameron</b>	<b>Matthew</b>	<b>Tyler</b>
Add Initial Routing	5%	5%	5%	85%
Add Map Layovers	5%	85%	5%	5%
Begin Other Game Implementation	85%	5%	5%	5%
Build Geofences for Buildings	5%	5%	85%	5%

- **Task Descriptions (Milestone 4)**
  - **Add Initial Routing:** Now the factoids are in the application, the group will begin to lay out the routes and functionality to give the user a guided tour of campus. This initial routing will present a layout to see a tour with directions to the next stop in conjunction with the scrolling timeline at the bottom of the app to ensure that the user can see facts and have a guide on where to go next.
  - **Add Map Layovers:** Each building will have a clickable layover that will provide more depth and a short synopsis of the building clicked. We will need to add a layover to each building so the user can click on them. These layovers will have a designated shape to be distinguishable from other features of the app, allowing the user to know which buildings have clickable layovers to find out more information.
  - **Begin Other Game Implementation:** With the addition of the scavenger hunt (search and find), we will begin adding the option to select this game mode. With

new questions to have the user seek out different things, this game mode will revolve around popups and input from the user to show they have found the correct answer after looking.

- **Build Geofences for Buildings:** Each building will need a geofence to know if the user is close to it or inside it; hence, we will begin laying out these geofences to match with the application's history factoids. Each geofence will cover the building allowing the application to see if the user is inside a dedicated boundary of the building's geofence.

- **Approval from Faculty Advisor**

- **"I have discussed with the team and I approve this project plan. I will evaluate the progress and assign a grade for each of the three milestones."**
- **Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_