Project Proposal

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Introduction

- **Title**: WildcatWays
- **Goal**: Develop a software (app) that displays the quickest and most efficient route to get from point A to point B on the Davidson College campus.
- **Motivation**: To help users order their tasks depending on the location and suggest the most efficient route that traverses through all the locations.
- **Customers/Users:** Davidson Students, Faculty, Staff, Visiting Students and Families.

Novelty

The novelty of our project WildcatWays lies in its specific focus on optimizing routes for users on the Davidson College campus. By taking into account various factors unique to the campus environment unlike generic mapping or navigation apps, this software aims to provide tailored solutions that cater to the specific needs and challenges faced by the campus community. Compared to existing path optimization software, our app will take into account:

- Campus-Specific Factors: Our software will integrate campus-specific factors such as class schedules, major event locations, and pedestrian traffic patterns to suggest the most efficient routes. This level of customization is typically not available in standard navigation apps like Google Maps or Apple Maps, especially on a more specific campus focus level.
- Multi-Point Optimization: Our software will offer route optimization for users with multiple destinations, helping them to plan their day more effectively. We suspect that this feature would be particularly useful for students and faculty who need to navigate between different buildings for classes or meetings.

Distinction from Existing Route optimization apps:

- Google Maps: Provide efficient routes for general navigation, these applications likely do not account for specific campus pathways or consider the timing of classes and events. WildcatWalks will offer more personalized route suggestions based on the user's schedule and campus events.
- Waze: Relies heavily on real-time data and updates from its user community. Users can report traffic incidents, road closures, speed traps, and other alerts, which are then reflected in the app for other users. This community-driven approach can provide more up-to-date and localized information compared to Google Maps.

Our application and approach has the potential to significantly enhance the efficiency and convenience of navigating the Davidson College campus for students, faculty, staff, and visitors.

Customer Need

Who is the primary customer outside the team?

- Davidson Students, Faculty, Staff
- Prospective Students and Families
- Residents of the Town of Davidson

Who are the secondary stakeholders?

- Davidson Admissions Team

What do the stakeholders want? Why?

- Optimized routes across campus so that tour time is not exceeded yet target points across campus are still visited.

What is their desired overall experience?

- A easily accessible, understandable and quick display of the path users should take across campus

User Requirements

1. As a Davidson student, I want to input multiple destinations on campus so that I can plan the most efficient route for my classes.
2. As a visiting family, I want to see the estimated walking time between points so that I can plan our campus tour accordingly.
3. As a faculty member, I want to integrate my class schedule into the app so that I can receive suggestions for the quickest routes between my classes and meetings.
4. As a prospective student, I want to access information about key landmarks and buildings on my route so that I can learn more about the campus during my visit.
5. As a Davidson staff member, I want to receive real-time updates on pedestrian traffic and events so that I can adjust my route to avoid delays.

Acceptance Tests

1. Given a list of class locations for the day, when the student inputs these into the app, then the app should display the most efficient route covering all locations.
2. Given a set time frame for a campus tour, when the visiting family inputs their start and end points, then the app should provide a route that can be completed within the allotted time.
3. Given a faculty member's class schedule, when they integrate this schedule into the app, then the app should suggest optimal routes based on the timing and locations of their classes and meetings.
4. Given a prospective student's interest in specific campus landmarks, when they select these landmarks in the app, then the app should provide a route that includes these points and offers information about each landmark.
5. Given an unexpected event or high pedestrian traffic on a usual route, when the staff member checks the app, then the app should suggest an alternative route to avoid delays.

Project Goals

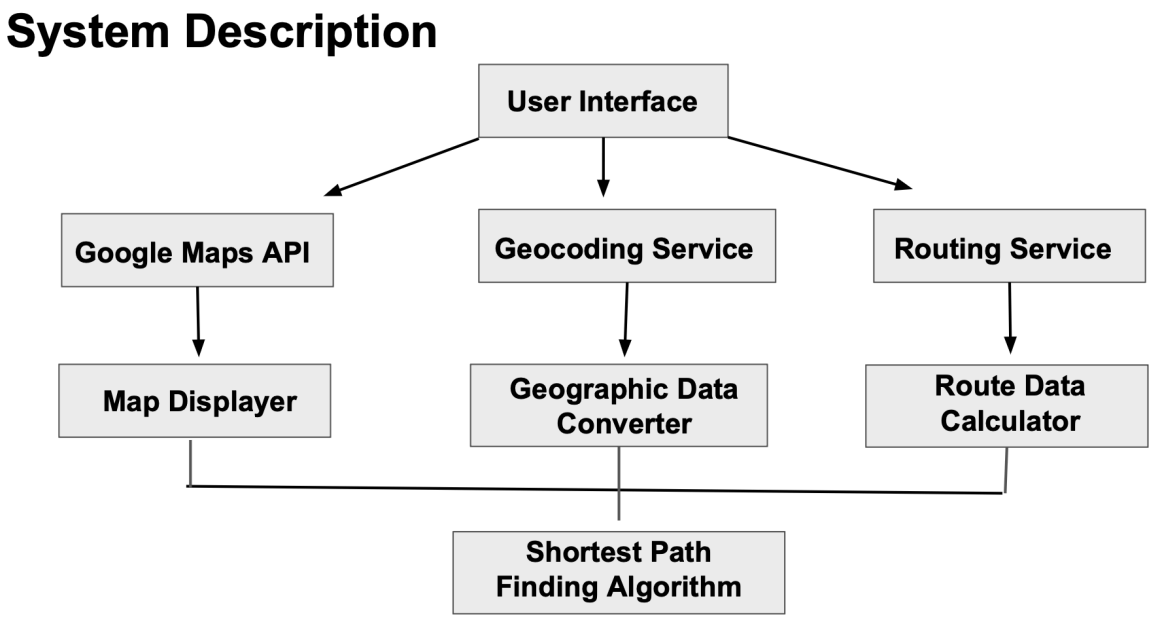
Customer Problems and Benefits

- **Customer Problem:** Students, faculty, staff, and visitors at Davidson College often struggle to find the most efficient routes across campus, especially when they have multiple destinations or specific time constraints.
- **User Benefit:** WildcatWays will provide a tailored navigation experience that considers campus-specific factors, multiple destinations, and real-time updates, enhancing the overall efficiency and convenience of moving around the campus.
- **Support for Desired Experience:** The app will support the customer's desired experience by offering an easily accessible, understandable, and quick display of the optimal path across campus, ensuring that users can manage their time effectively and reach their destinations without unnecessary delays.

Measure of Success

- **Testing:** The idea has been tested with a group of Davidson students, faculty, and staff who frequently navigate the campus. However, because we have not actually created anything, actual implementation of the idea has not been tested.
- **Measures of Success:** Success will be measured by user feedback on the app's accuracy, efficiency, and ease of use. Additionally, the reduction in time taken to travel between destinations and increased user satisfaction will be key indicators.

System Description



What is Dijkstra's Algorithm?

- A graph search algorithm used to find the shortest path between nodes in a weighted graph.
- Operates by iteratively selecting the node with the smallest distance from a set of unvisited nodes and updating the distances to its neighboring nodes.
- Continues until all nodes have been visited, resulting in the shortest path from a specified starting node to all other nodes in the graph.

Key Features:

- Suitable for finding the shortest path in graphs with non-negative edge weights.
- Efficient for finding single-source shortest paths in graphs with low edge density.

Applications:

- Network routing protocols.
- Geographic information systems (GIS) for route planning.
- Transportation and logistics for optimizing travel routes.

Solution Approach

System Operation:

- Users input starting point and destination.
- Google Maps API calculates shortest route
- Geocoding services convert inputs to coordinates.
- Shortest path finding algorithm optimizes routes.
- Users view calculated route on map with details.

Technologies:

- Platform: Web-based (HTML, CSS, JavaScript).
- Tools: Google Maps API, geocoding (AWS Location Service), routing (AWS).
- Languages: JavaScript for frontend and Python or Node.js for backend.
- Libraries: Use for UI design and data visualization.

Testing Strategy

- Unit Testing: Ensure individual components function correctly.
- Integration Testing: Verify interactions between different modules.
- End-to-End Testing: Validate the entire system's functionality, including route calculation and display.
- Performance Testing: Assess the system's performance under different conditions, such as varying user loads and network speeds, to ensure it meets performance requirements and remains responsive.
- Measurement of Adequacy: Utilize test coverage metrics, user acceptance testing, and feedback to ensure thorough testing and quality assurance.

Project Management

Development Process

What development process will you use (Scrum, XP, Scrum+XP, etc.)? What are the reasons behind your choice?

Scrum:

- Iterative and Incremental Development: Facilitates continuous improvement and adaptation to changing requirements.
- Flexibility and Adaptability: Allows for adjustment of priorities and requirements based on stakeholder feedback.
- Transparency and Collaboration: Encourages open communication and collaboration among team members and stakeholders.
- Early and Continuous Delivery: Ensures early and continuous delivery of value to stakeholders.

Proposal-Report 1:

- Define project scope, objectives, and requirements.
- Conduct initial research and analysis.
- Develop wireframes and design mockups.

Report 1 - Report 2:

- Implement basic functionality.
- Integrate geocoding services.
- Conduct initial testing and gather feedback.

Report 2 - Final:

- Enhance functionality with advanced features.
- Improve user interface design.
- Perform extensive testing and finalize documentation.

Team Management

Roles

- Taylor: Scrum Master / Developer
- Davin: Product Owner / Developer
- Oliver: Developer
- Kiko: Developer

What are the reasons for your decision?

Taylor is very organized and has a good relationship with all of us. Will be good at keeping us all on track and up to date.

Davin has a good understanding of the scope of the project and contacted the admissions team who will be one of our customers. Will create product backlog.

Scheduling

- We plan to meet twice-three times a week, always in person. Time and Location TBD.

Background

Write brief introductions of each team member related to the experience and background of the project. For example, student A has experience developing Android mobile applications using Java. Simply having an experience in certain programming languages is fine as well. Consider this section an opportunity to determine who

can be responsible for what part of the system (e.g., experience in JavaScript can do a front-end development while Java can do a back-end, etc.)

Constraints and Risks

• Are there any social, ethical, policy, or legal constraints?
• Will you have access to the data, services, and resources you need? • Is there anything else you might need?

Social and Ethical Constraints

- Privacy considerations: handle user data securely and comply with data protection regulations.
- Accessibility: Design for inclusivity and ensure accessibility for users with disabilities.

Policy and Legal Constraints

- Compliance with terms of service: Adhere to Google Maps API terms and other third-party service agreements.
- Copyright: Respect copyright laws when using map data and third-party content.

GitHub