UC Traffic



**Senior Design Team Contract**

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Table of Contents

[Intent 3](#_Toc183624047)

[Senior Design Contract 4](#_Toc183624048)

[Project Summary 4](#_Toc183624049)

[Problem Statement 4](#_Toc183624050)

[Solution 4](#_Toc183624051)

[Contact Information 4](#_Toc183624052)

[Project Source 5](#_Toc183624053)

[Project Objectives/Goals 5](#_Toc183624054)

[Team Members and Responsibilities 6](#_Toc183624055)

[Project Scope 6](#_Toc183624056)

[Quick Project Timeline 7](#_Toc183624057)

[Technologies Used 7](#_Toc183624058)

[Ethical Considerations 8](#_Toc183624059)

[Team Rules 9](#_Toc183624060)

[Team Signatures: 10](#_Toc183624061)

[References 11](#_Toc183624062)

# Intent

The following contract was written and agreed upon by Tre De La Rosa, Brian Miller, Brady Feldhaus, Djenaba Ba and Brandon Robinson. The contract provides expectations, objectives, and results for developing the UC Traffic platform.

The contract is effective for all team members participating in the Senior Design Capstone class series in the 2025-2026 academic year.

# Senior Design Contract

## Project Summary

As a team, we will design and develop a mobile application called UC Traffic, providing real-time traffic updates and accident reports. The application will enable users to make informed decisions about their travel routes, reducing delays, enhancing road safety, and contributing to a more efficient and enjoyable commuting experience.

## Problem Statement

Traffic jams happen at times we least expect as they severely extend travel times and disrupt plans that we may have for the day. According to the Texas A&M Transportation Institute, “Rush-hour traffic jams are expected in big cities”. When a large percentage of workers are on an 8 a.m. or 9 a.m. to 5 p.m. schedule, there will be travel delays on freeways, streets, and even public transportation. This results in several “rush hours” in the morning and afternoon” (Schrank, Eisele, Jha, & Albert, 2023). Due to the unpredictability of when a rush can start, this results in commuters and employees spending time on the road instead of at their destination. Being in heavy traffic because of traffic jams can lead to a multitude of emotions that can lead to many accidents that can be fatal. Due to people having different careers, each day can be very draining, and being put in heavy traffic due to traffic jams would leave them exhausted once they reach their destination. The impact of traffic jams destroys many people's quality of life but causes economic and social consequences due to productivity losses and accidents. According to the American Transportation Research Institute, “his $20.1 billion increase in trucking industry congestion costs equates to a 27.0 percent increase. This percentage increase is more than twice that of inflation during the same time. Additionally, the 2021 national congestion figure of 1.27 billion hours of delay is the equivalent of more than 460,000 truck drivers sitting idle for one year.” (Short, Ph.D. ,2023) Traffic jams alter daily routines that become disruptive and cause fluctuation of emotions while impacting social and economic results as delays cause a loss of productivity, safety risks, and increased costs of needs around the world.

## Solution

We will develop a real-time traffic and accident reporting app that leverages GPS data, user inputs, and information from traffic monitoring systems to provide live updates on road conditions. Key features will include live traffic updates, route optimization, user reporting, accident alerts, and safety warnings. By addressing these key issues, the app will reduce commute times, improve road safety, and provide a stress-free travel experience for users.

## Contact Information

|  |  |  |  |
| --- | --- | --- | --- |
| Team Member | Degree + Track  Track N/A for BSCyber | Email | Phone Number OR Other Contact Info |
| Brady Feldhaus | BSCYBER | feldhabl@mail.uc.edu | 513-720-9178 |
| Brian Miller | Software Development Major | mille6rb@mail.uc.edu | 513-426-2309 |
| Tre De La Rosa | BSCYBER | Delaroma@mail.uc.edu | 513-223-8939 |
| Brandon Robinson | IT – Software Development | robin2br@mail.uc.edu | 937-430-3444 |
| Djenaba Ba | BSCYBER | Bada@mail.uc.edu | 614-313-5766 |

## Project Source

The inspiration for this project came from our group member Brady Feldhaus. Brady considered turning traffic jams into an IT solution during our brainstorming process. He believed that we could create a platform that outlines to users where traffic jams are occurring and how to circumvent them. When the idea was brought to the group, we discussed it together as we thought it was brilliant. The required analysis for this project was conducted as a group after everyone discussed how the project could be done and presented in a realistic format. The project team was formed through the random selection of our professor who brought us together and allowed us to create this project.

## Project Objectives/Goals

* *Increase Road Safety*
  + *Notify all users nearby of accidents or hazardous road conditions to reduce risks and improve awareness.*
* *Reduce Delays*
  + *Provide real-time traffic data to help nearby users avoid congested areas to improve travel time while relieving any stress on the road and improving road efficiency*
* *Promote Community Reporting*
  + *Encourage users to report incidents like accidents constructions, or hazards, fostering a community-driven pool of reliable information.*
* *Enhance User Experience*
  + *Offer an intuitive interface, easy navigation, and visually appealing design to ensure a seamless user experience.*
* *Encourage Sustainable Travel*
  + *Promote carpooling or public transit options during high-traffic times to minimize congestion, and environmental impact and encourage alternative commuting routes.*
* *Analyze traffic trends*
  + *Use data analysis to identify and report patterns like rush hours or seasonal traffic surges, helping users plan their trips more effectively.*
* *Support Accessibility* 
  + *Design the app to accommodate users with disabilities, ensuring it is inclusive and usable by all.*

## Team Members and Responsibilities

|  |  |  |
| --- | --- | --- |
| Team Member | Role | Scope |
| Brian Miller | UI/UX Design | Design an appealing, user-friendly, and functional website. |
| Tre De La Rosa | API Integration | Integrating APIs for traffic flows, including but not limited to Waze, Azure maps, Google maps, etc. |
| Brady Feldhaus | Tester/Security architect | Testing the UC traffic while applying CCPA and NIST security standards to make sure all user information is safe and protected through our services |
| Brandon Robinson | Tester/Security architect & UI/UX | Testing the UC traffic while applying CCPA and NIST security standards to make sure all user information is safe and protected through our services |
| Djenaba Ba | Frontend Web Developer / Visualization | Builds the functional website based on design, implements interactive map displays, and ensures that real-time traffic data and route optimization are clearly shown to users. |

## Project Scope

UC Traffic provides real-time traffic updates, accident reports, and proper route optimization for any user in the UC area. The application uses GPS data, local traffic monitoring, and user inputs. UC Traffics' goal is to ensure users have an efficient way of travel while reducing delays and promoting traffic safety. The goal is to have a functional prototype by the end of Spring 2026. We plan to use proper UI design to make our application user-friendly and easy to use. We plan to use Waze API with Azure licenses to gather live updates around the UC area.

We will enable users to report accidents to make sure everyone is notified and can take proper precautions while developing an algorithm for alternative routes for all users. We plan on using user acceptance testing to ensure that our product is functional and performs in all weather and traffic conditions. We will examine trends to create functional data highlighting heavy traffic like rush hour or when the roads will have less traffic and are easier to navigate.

## Quick Project Timeline

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Task #* | *Task Name* | *Duration* | *Start Date* | *End Date* |
| *1* | *Project Planning & Research* | *2 weeks* | *8/26/2025* | *9/9/2025* |
| *2* | *Gathering Information & Assessing Technology* | *2 weeks* | *9/9/2025* | *9/23/2025* |
| *3* | *UI Designing* | *2 weeks* | *9/23/2025* | *10/7/2025* |
| *4* | *Prototyping* | *2 weeks* | *10/7/2025* | *10/21/2025* |
| *5* | *Developing Features* | *4 weeks* | *10/21/2025* | *11/18/2025* |
| *6* | *Implementing UI* | *3 weeks* | *11/18/2025* | *12/9/2025* |
| *7* | *Network Topology* | *2 weeks* | *12/9/2025* | *12/23/2025* |
| *8* | *API integration* | *3 weeks* | *12/23/2025* | *1/13/2025* |
| *9* | *User Acceptance Testing* | *3 weeks* | *1/13/2025* | *2/3/2026* |
| *10* | *User Feeback & Final Development* | *4 weeks* | *2/3/2026* | *3/3/2026* |
| *11* | *Deployment Preparation & Launch* | *4 weeks* | *3/3/2026* | *3/31/2026* |

## Technologies Used

* **SQL Server Management Studio** 
  + The backend of the application/web app, storing user information.
* **Microsoft Azure**
  + Virtual Machines and Azure Maps/Geospatial Mapping API.
* **Wix**
  + The front end of the application/web app displays a real-time traffic map. Our website can include a landing, feedback, and support page. These pages will provide customers with more information and a support portal to ensure an easy experience. The feedback page will provide us with valuable information on how we can improve our project.
* **Postman**
  + Assist with API integration testing, setting up continuous JavaScript scripts, collaborating with team members, debugging API issues, and documenting API.
* **Waze Data**
  + Provides geospatial/location data and real-time traffic insights, route optimization, and safety enhancements.
* **OKI Regional Council of Governments**
  + Helps collect information on traffic patterns, accidents, road constructions, and closures useful to our application. Additionally, OKI works with local governments giving us exceptional connections for feedback and support.
* **Workato**
  + This can be utilized for business process automation, such as sending notifications to users about traffic jams and accidents. Workato can also be employed to integrate API maps into our website seamlessly. Furthermore, Workato can establish connections and synchronize data with our SQL database.

## Ethical Considerations

*Data Security – “The processing of personally identifiable information is an operation or set of operations that the information system or organization performs with respect to personally identifiable information across the information life cycle. Processing includes but is not limited to creation, collection, use, processing, storage, maintenance, dissemination, disclosure, and disposal. Processing operations also include logging, generation, and transformation, as well as analysis techniques, such as data mining” (NIST 800-53, Rev 5, PT-2). We as a team recognize the importance of data security involved with gathering real-time location data. To protect user privacy, any data collected should be anonymized, and only essential data should be retained.*

*Transparency - “Individuals should have the right to understand how their location data is being collected, processed, and utilized, and they should have the ability to opt-out or revoke consent if desired” (McKevitt, 2024). UC Traffic will be open and transparent with our users regarding data collection and processing. We will state this information in our Terms of Service that users will have the option to accept. As for the ability to opt-out, users will have to opt-out or revoke consent with our data sources, such as Google, Apple, Waze, and Azure since UC Traffic does not and will not collect our geospatial data.*

*Bias – With our application collecting and utilizing geospatial data, we understand the importance of protecting this data to limit bias. Aaron McKevitt states, “Insurance companies could use geospatial data to determine rates based on an individual’s neighborhood or commuting patterns” (**McKevitt, 2024). For this reason, we as a team will implement encryption at rest and in transit to mitigate the risk of a data breach. Additionally, efforts will be made to avoid biases in route suggestions that could unfairly prioritize or disadvantage specific areas or demographics. Our routing capability will be based on the shortest/quickest route. These efforts are designed to ensure the app is ethical, safe, and easy to use.*

*Misuse and Unauthorized Access – “The primary concern with geospatial data is the potential for misuse or unauthorized access” (McKevitt, 2024). Location data is incredibly valuable and can reveal a great deal about an individual and their habits. If this data were to land in the wrong hands, it could be exploited for nefarious purposes. UC Traffic will be encrypting all data in transit and at rest to ensure confidentiality. Additionally, location data will be anonymized by the user, further reducing the risk of misuse or unauthorized access. A final note on misuse and unauthorized access is that UC Traffic will obtain user's geospatial data from public sources such as Waze, Apple, Google, and Azure and UC Traffic will not collect our geospatial data.*

*Accessibility – “Implementing accessibility within your designs not only fulfills a legal requirement but also reflects a deep commitment to inclusion in market research and broader user engagement. It shows diligence in creating experiences that celebrate diversity and promote equal access for all users, regardless of their abilities” (Koch, 2024). UC Traffic is committed to ensuring our platform is accessible to all users regardless of race, culture, or disabilities. UC Traffic will spend a great deal of time designing the user interface with these considerations in mind.*

## Team Rules

1. *Everyone needs to contribute to add value to this project*
2. *Any form of Plagiarism is not tolerated and will result in other team members notifying the instructors of the incident.*
3. *Every member is expected to come to the team meeting and if the member cannot show up, they need to notify the team so that everyone can work accordingly to the change*
4. *Each team member must actively contribute to meetings, discussions, and decision-making practices.*
5. *When conflicts arise, team members must work to resolve them respectfully and professionally. If guidance is needed, team members should reach out to the professor.*
6. *Constructive feedback must be shared regularly to encourage growth and improvement.*
7. *Team members are expected to respond to each other within 24 hours.*
8. *Everyone must equally contribute their workload throughout the project.*

# **Team Signatures:**

Signature: Brady Feldhaus

Date: 8/28/2025

Signature: Tre De La Rosa

Date: 8/28/2025

Signature: Brandon Robinson

Date: 8/28/2025

Signature: Brian Miller

Date: 8/28/2025

Signature: Djenaba Ba

Date: 09/01/2025

Advisor Signature: Vismaya Manchaiah

Date: 09/22/2025

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