

URBus Proposal

Wilfred Wallis, Matt Levin, Jean-Marc Boullianne, Sam Leeman, Adam Kravitz

Name	Field(s) of Study	Role	Skills
Wilfred Wallis	<i>Computer Science B.A.</i>	Web Developer	<i>HTML5, CSS3, PHP, mySQL, JavaScript</i>
Matt Levin	<i>Computer Science B.S.</i>	Backend Developer	<i>HTML, CSS, Python, Javascript, mySQL, Adobe Photoshop</i>
Jean-Marc Boullianne	<i>Computer Science B.S.</i>	Backend Developer	<i>Javascript, C,C++ PostgreSQL, Unix</i>
Sam Leeman	<i>Economics B.A., Computer Science Minor, Pre-Med</i>	Timeline Manager, Web Developer, Statistics, Surveying/Interviewing	<i>Videos, Statistics, HTML, CSS, Python</i>
Adam Kravitz	<i>Computer Science B.S.</i>	Surveyor , Interviewer, Statistics Interpreter, Designer, Web Developer (If needed)	<i>Statistics, HTML5, CSS3, C</i>

Problem Statement:

The University of Rochester has an expansive shuttle and bus system to better connect its students and employees to the University, it even offers occasional rides to malls, supermarkets, and Cinemas in the area. People have two main ways to find out when and where their buses are coming, all of which are either flawed or inconvenient to the user.

The first way is looking up the bus schedule on the U of R website (<http://www.rochester.edu/parking/shuttles/>). This is inconvenient for the user for a couple of reasons. Firstly he or she has to know what line they need to use, and where the stop is. All of the times for each line are stored in a separate pdf file so finding the bus stop you are at, which is not always obvious, can be very inefficient especially when the user has a small screen.

The second way is to download an application called 'rider' which can tell you where the buses are. This is an improvement on the first method but still has its drawbacks. One you have to download a separate application rather than just viewing it on a website. The Rider application uses an api which does fail from time to time leaving students with no information. Our bus app will use both the use both the schedule and the api times to give the best times, so if the api fails we can fall back on the static data already given(<http://www.rochester.edu/parking/shuttles/>). The application UI can be confusing, it takes a while to get accustomed to the interface. You have to know to click stops to get their times, we think a better idea would be to enter where you want to go then the app takes you there. In addition, Rider sometimes tells the user that the bus is out of service, when actually it has 30 min till the services starts. The application also does not allow you to link two routes you would have to plan when you should get off the first route and onto the next bus. Lastly rider does not tell you which line you should take to get to your destination, it assumes you just want to know when buses are coming.

Need Finding:

The need finding techniques that we intend to use are surveys and interviews. We plan on using Expert interviews, to ask the bus drives what they think about the transloc app and about what they think about how often they don't run on schedule. It does not matter if the bus drivers are lead users of the transloc rider app, but since they use the bus the most (since they drive the bus) and interact with enough people who use the rider app makes them experts whose input would be very helpful and useful to us. We also intend to have a user survey and interviews which we will do by interviewing and surveying people who take the buses frequently. We are planning on giving our surveys and interviews at destinations that uses the buses are used most often, like South Sides silver line, Riverview's gold line, and the bus hub at ITS . From the user survey and interview which we plan to put on facebook, we are planning on asking a question about if the people who took the survey would be interested in being a beta tester for our website. Lastly once our website has the majority of the functionality done and working, we will give access to our beta testers who we will then take a survey and interview which will help us see what they thought of some feature and what they thought of some confusing parts of the website.

User Survey Questions	User Interview Questions	Expert Questions (Bus Driver)
How often do you use the bus in a month? 1. 0 times 2. 1-3 times 3. 4-10 times	Would you use a bus location app if it was more accurate at timing the buses and had more relevant features?	How often are the buses not on schedule? (can be for any reason)

<p>4. 10-20 times 5. More than 20 times</p>		
<p>If you use the Transloc app, how often do you use it in a week?</p> <ol style="list-style-type: none"> 1. Never 2. 1-2 times 3. 3-5 time 4. 6-9 times 5. More than 10 times 	<p>Are there any features of the transloc app that you like?</p>	<p>If you're on a quick break is there a bus still running for the bus line that you drive?</p>
<p>If you use the Transloc app, do you like the app?</p> <ol style="list-style-type: none"> 1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree 	<p>What irritates you the most about the Transloc app?</p>	<p>Is there anything you would change about how the busses are organized?</p>
<p>How many times a month have you missed the Bus because of the app?</p> <ol style="list-style-type: none"> 1. Never 2. 1-2 times 3. 3-5 time 4. 6-8 times 5. More than 9 times 	<p>What irritates you the most about the Buses?</p>	<p>Do you hear students complaining about busses a lot?</p>
<p>Would you find it helpful if the app notifies you when you got to leave to catch a bus?</p> <ol style="list-style-type: none"> 1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree 	<p>If you could change anything about the bus system what would it be and why?</p>	<p>What problems do you have with the current system?</p>
<p>Do you transfer from a bus to another bus?</p> <ol style="list-style-type: none"> 1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree 	<p>How often do you use the University's busses?</p>	<p>How often do students run after the bus when the bus hits a stop on the route a little early?</p>
<p>Is the Transloc app Reliable?</p> <ol style="list-style-type: none"> 1. Strongly disagree 	<p>How often do you use the Transloc website?</p>	<p>Do the Bus drivers update the status of the bus? (for</p>

<ul style="list-style-type: none"> 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree 		example when it is out of service)
<p>Do the Buses run right on time to the school schedule?</p> <ul style="list-style-type: none"> 1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree 		Do you think an app that will give better bus arrival estimations and even bus arrival notifications will lower the amount of people who come late for the bus?
<p>Are you satisfied with how the bus system runs and how Transloc tells you info about the buses?</p> <ul style="list-style-type: none"> 1. Dissatisfied 2. Somewhat Dissatisfied 3. Neutral 4. Somewhat Satisfied 5. Satisfied 		
<p>(Open ended:) What suggestions do you have for making a better application?</p>		
<p>Would you be interested in being part of the beta tester group?</p> <ul style="list-style-type: none"> 1. Yes 2. No 		
<p>(Open ended:) How do you find out when the buses are coming to your stop?</p>		

Beta Tester Survey	Beta Tester Interview
<p>Do you find the texting useful to catching the bus?</p> <ul style="list-style-type: none"> 1. Strongly disagree 2. Disagree 	<p>Have you found any bugs?</p>

<ul style="list-style-type: none"> 3. Neutral 4. Agree 5. Strongly Agree 	
<p>Do you find the bus estimation time to be accurate?</p> <ul style="list-style-type: none"> 1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree 	<p>How often have you used the website?</p>
<p>Would you use this Website over the Transloc app?</p> <ul style="list-style-type: none"> 1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree 	<p>How long did it take you to learn how to use the features of the website</p>
<p>Open ended Question: What were the bugs you have experience with the website</p>	<p>What feature did you enjoy the most?</p>
<p>Was it confusing to get the website to send you notifications?</p> <ul style="list-style-type: none"> 1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree 	<p>What feature did you use the least?</p>
<p>Was It confusing to learn how to uses this website overall?</p> <ul style="list-style-type: none"> 1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree 	<p>Was there a reason why you use that feature the least (like was it confusing or did you not even notice that you could do some of those things)?</p>
<p>Open ended Question: Are there any other features you would like to have for this website to have?</p>	<p>Would you throw away any features on the website?</p>
<p>Open ended Question: Are you using the more as a time reference or as a bus tracker (in other words do you just like at the time estimation or do you look and follow the movement of the buses)?</p>	

Prototyping:

For Prototyping we are planning on using 2 prototyping techniques. The first technique that we are going to use is a paper prototype. The paper prototype will show us what feature our app might need if it is a need that our participants seem to want. The paper prototype will also show us how the website will flow. The website should be simple, but not overly simplistic. Sometimes overly simplistic things can become confusing since they assume too many things about how the user will use the application. The paper prototype will be made to catch any confusion in how to use/access our website's functionalities. The other prototype technique that we will be using is the wireframe prototype. The purpose of the wireframe prototype is to get an idea of the layout of the website before we program the look of the website using HTML and CSS3. Converting the paper prototype design to a wireframe will make it easier for use to code the design of the website because all of the planning of the page with all of the buttons and input boxes will already be done and it is like seeing the in-between stage of converting a hand-drawn picture of a website to actually creating the website. The wireframe will be used for helping us decide the style/look of the website.

Type:	Testing	Evaluation
<i>Paper Prototype:</i> Low fidelity with great breadth	At least 2 Testers are going to try to explore features using the paper prototype and be asked what they think.	<ul style="list-style-type: none">-Ask about navigation confusions-Clear up about how to use some features-ask about anything surprising about the paper prototype-Ask if something seems to be missing-interview and survey tester
<i>WireFrame Prototype:</i> Low fidelity	Testers will be tested on how they navigate the website only (no features). Users by interacting with the wireframe will show us how intuitive, simple, and easy it is to use the website.	<ul style="list-style-type: none">-Ask about navigation confusions-Ask about placement of features/controls
<i>Interactive Wireframe website:</i> Higher fidelity with more depth	Tester will interact with a simple-looking and partly functioning website. The testers will test certain features and show us how easy and simple it is to use our features on the wireframe.	<ul style="list-style-type: none">-Functionality- Designing the website-control complexity
<i>Fully Coded Program:</i>	Testers given the website	- Overall Performance

Finished Product	and will play around with the features given no advice. This will show the easy of use of our website	<ul style="list-style-type: none"> - Design - interview and survey tester.
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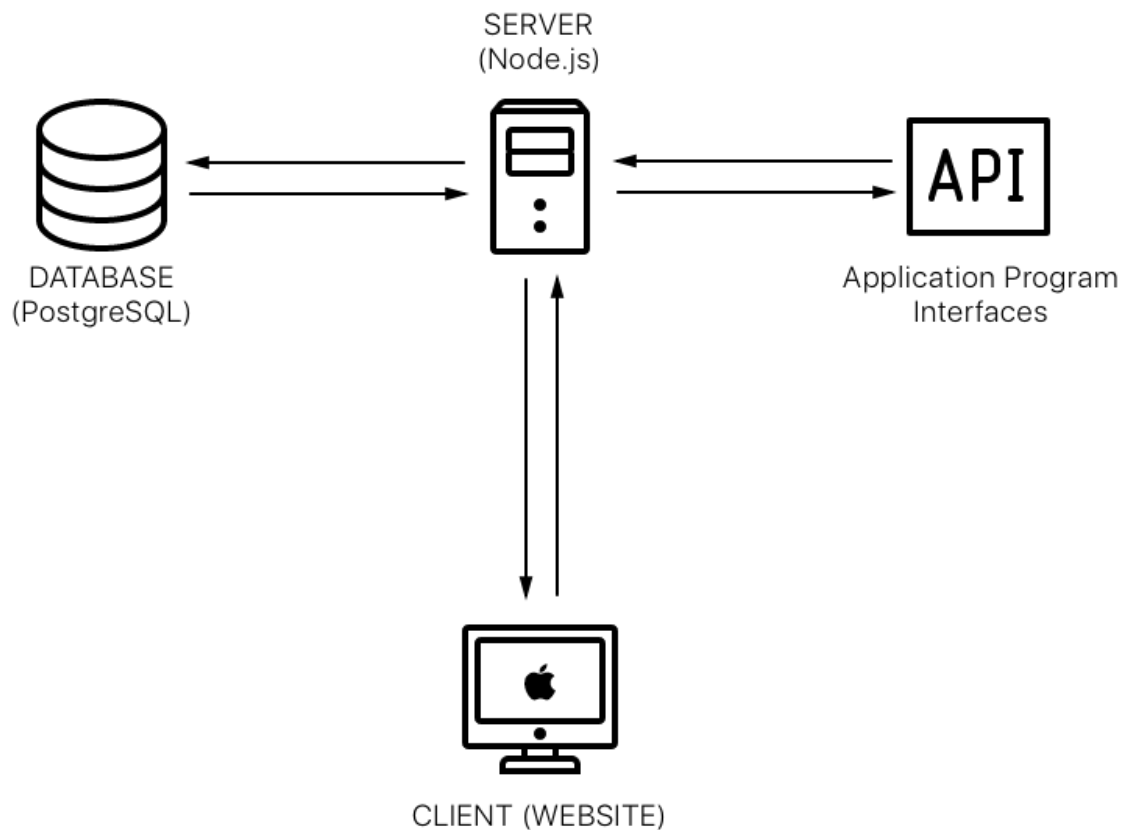
Implementation:

What technology stack are you going to use to implement your final product?

The basis for our final product is a web server. On the back-end the web server utilizes a basic Node.js + Express.js setup to deliver web content to our users. To store data crucial to the web application we will be using a PostgreSQL database. We will program the basis for our front-end in HTML5, CSS3, and Javascript. Additionally, our server will make use of various APIs such as the TransLoc and Google Maps API to pull data onto our server. Interfacing with these APIs will be done in Javascript using RESTful web calls.

When a user accesses our website, they will pull transportation data stored on the server. From there they are able to find ride estimates as well as directions between locations. By interfacing with the client side application, the user receives custom information generated by our server. This data is kept up-to-date continually by interfacing with the various APIs and our database.

A schematic of your technical solution



What are the list of your features?

- **Real-Time Tracking:** View live bus locations and monitor its progress towards you or your destination.
- **Arrival predictions:** View precise predictions on bus arrivals up to the minute.
- **Alerts:** Receive alerts in your browser or sent to your phone (via SMS) to know when your bus will be arriving.
- **Customized Route-Finding:** Don't ever worry about finding the right bus to catch. Enter a start and end address and receive customized directions to get you to your destination.
- **Multi-Bus Route-Finding:** Let us do the hard work of trip planning. Our customized directions can utilize multiple bus routes in order to get you to your destination faster and easier.

Identify the technical challenges

Technical challenges may arise in communicating with the APIs we are using to pull information into our web application; specifically in the TransLoc API. The TransLoc API will

provide our web application with transit data (bus locations and route information). Unfortunately, the API does not provide bus information on routes that are offline or “off-the-clock”. This may become troublesome for users who would like to plan their trip in advance utilizing buses that are not currently active.

Identify the possible solutions.

We believe that in order to mitigate the lack of transit information during offline hours, we will merge readily available transit schedules with the information the TransLoc API provides. Doing so will create a more accurate picture to our users of when buses should be arriving.

Will you have a backend? How will you develop your front end?

We will utilize the backend described above. The front end will be developed utilizing the endpoints provided by our backend server. This will connect the two in order to provide live updates to our web application.

Are you building a mobile app? Desktop app? Tradeoffs?

The reasoning behind building a website rather than a desktop app or mobile application is mainly for the portability advantages. When designing mobile applications or desktop apps, you have to worry about the architecture and proprietary software needed to develop these applications. Utilizing a website that is available to all who have access to a browser is a huge benefit. Users may use whatever device is easiest and most convenient for them.

User Study & Evaluation:

Our hypothesis for evaluation is that our Web application will have more accurate data than the Transloc rider app and that it will be more enjoyable to use than the Transloc rider app. Our baseline of control will be the bus schedule sheet that the school gives us. We will compare the paper sheet, Transloc rider app, and our web application. We will then test the data of how enjoyable the experience was and how useful it was catch the bus. We will be testing our app with people who will volunteer to be our beta testers for our application, mostly to be recruited through facebook. We will run a within subject design experiment where we will make 3 different groups that will, in different orders, go through the different ways to catch the buses. We will try to get at least 12 people and we will recruit more people through facebook. Thus 1 group of 4 will use the paper schedule that the University gives us, the second group of 4 people will use the Transloc rider app, and the last group of 4 will use our web application. After the first run using what ever option we gave the groups we will cycle the groups until each group used all 3 options that are available. We will then be using surveys at the end of the experiment to see what people's perception of our web application vs. the other methods that exist to catch the bus.

Alternative Solutions:

If we are unable to implement our planned solution, we could design the system differently in order to rely less on external APIs. For example, if the Google Maps API is causing trouble for us, we could instead use the scheduled times from the University and use the Transloc API to get the GPS locations to track whether the busses are arriving late or early. Using machine learning, we could give better estimates over time. For example, if the Blue Line arrives at Rush Rhees at 8:26 am every Tuesday instead of 8:22 am, our server technology would recognize this over time and eventually give an estimate much closer to the actual time of arrival. Factors like weather, time of the day, day of the week, and even possibly the bus driver, could all be included in the algorithm that determines the estimate returned to the user.

This alternate implementation could in fact prove more difficult than our original plan, so we have another alternative solution as a backup plan for these two. Instead of using the TransLoc API, which can be buggy, we could use the scheduled times provided by the University. Although this will not produce very accurate estimates, it would still allow us to build a platform better than the one that already exists. Features such as searching for an address, autocompleting the names of buildings on campus, and concatenating multiple bus lines would all be improvements upon the service that is already available.

Timeline & Deliverable:

Feature	Description	Deadline	Member(s)
1st Draft of Project Proposal	Draft about our plan of this project.	February 27	Everyone
User Survey	Surveying the users who take the bus and those who use the transloc app	March 6	Adam
Final Project Proposal	final plan for all the steps going to be used to make this project.	March 6	Everyone
User Survey	Surveying the users who take the bus and those who use the transloc app	March 6	Adam
Create Static HTML	HTML and CSS for the	March 8	Wilfred, Adam

Page	webpage/Webpages		
Web Server	Web Server Running	March 8	Jean-Marc, Wilfred
Website Live	Website will be live	March 8	Wilfred, Matt, Jean-Marc
User Interview	Interviewing the users who take the bus and those who use the transloc app	March 8	Sam, Adam
Expert Interview	Interviewing the Bus Drivers	March 8	Sam, Adam
Paper Prototype	A paper Prototype to show the functionality we would like for our application to do and to see what is confusing about our design and features.	March 13	Adam, Wilfred
Database Created	PostgreSQL installed on server and database created for application	March 15	Jean-Marc
Product Logo	Aesthetic logo	March 20	Matt, Sam
WireFrame Prototype	A wireframe to show what the website design will look like before programming the design.	March 20	Adam, Wilfred
TransLoc API	API connection made with Transloc	March 25	Matt, Jean-Marc
Google Maps API	API connection made with Google Maps	March 25	Matt, Jean-Marc
Client-Side Endpoints Created On Server	Endpoints for website usage created	March 30	Matt, Jean-Marc
Time Tracker	Accurate time tracking of the buses	April 5	Matt, Jean-Marc

	show up for buses 1 is interested in		
Texting Notification	When a Bus is at a select destination user will get a text to catch the bus	April 5	Matt, Jean-Marc
Multi Connections	Picking 2 points on a map and 2 bus lines are recommend and show how to get to a destination	April 10	Matt, Jean-Marc
Beta Testers Access Date	The date that the web application is working and we have almost full functionality but the design may not be finish	April 12	Wilfred, Adam
Beta Tester Surveying	Surveying the beta tester after using the app for a day or 2	April 15	Adam, Wilfred
Beta Tester Interviews	Interviewing the beta tester after using the app for a day or 2	April 15	Adam, Wilfred
Statistical Analysis	Statistical analysis that will show if our website is more liked than the other bus tracking options that exist at this moment in time.	April 17	Adam, Sam

Concept Video:

<http://wilfredwallis.com/personal/My%20Movie.mp4>