Wireless Global Positioning System Fleet Tracking System at the University at Albany

Final Report

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New York State
Department of Transportation

Wireless Global Positioning System
Fleet Tracking System
at the University at Albany

Final Report

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16. Abstract

This report provides an overview of the project undertaken at the University at Albany to make alternative transportation a more viable option by implementing a GPS Tracking System on the University bus fleet and broadcasting the bus locations to commuters via the internet and a "smart phone" application. According to a survey administered by the University, students and faculty identified convenience as the number one barrier to taking the bus. In line with its commitment to environmental sustainability, University at Albany wished to increase mass transit ridership by making it more convenient and predictable, thus favorably impacting commuting patterns. This report details the successes and challenges of the project, focusing on lessons learned and suggestions for future projects of a similar nature.

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Abstract

This report provides an overview of the project undertaken at the University at Albany to make alternative transportation a more viable option by implementing a GPS Tracking System on the University bus fleet and broadcasting the bus locations to commuters via the internet and a "smart phone" application. According to a survey administered by the University, students and faculty identified convenience as the number one barrier to taking the bus. In line with its commitment to environmental sustainability, University at Albany wished to increase mass transit ridership by making it more convenient and predictable, thus favorably impacting commuting patterns. This report details the successes and challenges of the project, focusing on lessons learned and suggestions for future projects of a similar nature.

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Executive Summary

This report provides an overview of the project undertaken to make the University of Albany (UAlbany) bus service a more viable option by implementing a global positioning system (GPS) Tracking System on the fleet and broadcasting the bus locations to riders via the Internet, campus monitors, and smart phone applications. According to a 2009 survey administered by the university, students, faculty, and staff identified convenience as a main barrier to taking Capital District Transportation Authority (CDTA) or UAlbany buses. In line with its commitment to environmental sustainability, the University at Albany aims to increase mass transit ridership by making it more convenient and predictable, thus favorably impacting commuting patterns.

The university faced several obstacles in implementing the system including the complicated nature of writing a bid solicitation without being proficient with information technology (IT). Other challenges included procuring a vendor, installing monitors and arrival signs, and protecting the university from the threat of a patent lawsuit. The process proved to be more complex than anticipated with several barriers to entry including limited knowledge of GPS and broadcasting technology as well as IT security and wiring needs when installing monitors and arrival signs. Campus survey results showed low awareness and usage of the program during the first semester, but is expected to improve as the monitors and signs become fully operational and word-of-mouth about the program takes hold. Bus counts did indicate a 5% increase in UAlbany shuttle use this year, resulting in an estimated reduction of 91,715 vehicle miles travelled; 3,903 gallons of gas; and 76,455 pounds (38 tons) of carbon dioxide emissions.

Several methods of communication and marketing were used to promote the program. Early indications show that the most effective of these methods were the highly visible and interactive monitors placed in key locations around campus. Quick Response (QR) codes placed at bus stops and sign on the buses also generated more interest in the program than other forms of communication such as a website, fliers on campus, or articles in campus publications. A smartphone application was developed in March 2014 that was downloaded 142 times in the two months of operation. The delayed implementation hindered the university from performing a full marketing surge in the fall of 2013 as well as a comprehensive assessment of the system and marketing strategies. These activities are planned for the upcoming academic year.

It is recommended that transit authorities or colleges and universities looking to initiate a similar program use a vendor-managed system and develop a comprehensive implementation team that includes representatives from transportation, purchasing, telecommunications, IT, information security, facilities, sustainability, and marketing. Despite the added complexity, the use of monitors and/or arrival signs is highly encouraged. The threat of patent infringement lawsuits has dissipated with the resolution negotiated between ArrivalStar and the American Public Transportation Association.

1   Introduction

1.1   Background

The University at Albany is a large educational and employment center on the western edge of the City of Albany. With a student population of more than 17,000 and hundreds of employees, the university is the destination for thousands of trips a day. UAlbany has a transit fleet consisting of 15 shuttle buses that operate along six different shuttle routes during the academic year. The routes connect the main campus of UAlbany to its two satellite campuses along major arterial roadways. The university also manages two smaller routes: one provides weekday service to the Health and Counseling Center that is located off campus and a shopping shuttle that operates two evenings per week.

The schedules over the lines vary, but generally operate from 7 a.m. to 9:30 p.m., running every 24-30 minutes between the Downtown Campus (larger satellite) and the Uptown Campus (main campus). On breaks during the academic year as well as over the summer, five routes operate and run approximately every 30 minutes between 8 a.m. and 5 p.m.

In 2009, the university administered a transportation survey of students and employees. The results showed that 73% of faculty and staff and 39% of students travelled to the university mainly by personal vehicle. Only 18% of students and 2% of employees used the UAlbany shuttle bus on a daily basis. Respondents to the survey cited convenience as the number one barrier to using the UAlbany shuttle buses. Factoring into this response is the perceived anxiety of taking the bus. Even with published schedules, there is a level of uncertainty as to the timing of arrivals and departures from stops. This uncertainty is compounded by factors outside of the UAlbany shuttle operator's control, such as traffic congestion, accidents, and weather conditions. Previous avenues of communication offered no effective way to communicate such as unforeseen delays to riders.

Typically commuting patterns are set in the first few weeks of class and are more difficult to change once established. If the UAlbany shuttle buses are perceived as an unreliable source of transportation in the beginning of the semester, it is unlikely that a second effort will be made to utilize them at a later time. To help provide more confidence for riders and reduce confusion on when a particular bus will arrive, UAlbany undertook a project to equip all UAlbany shuttle buses with GPS tracking units that broadcast the bus location to commuters via the Internet and smartphone application.

After installation of the GPS real-time tracking, there was a slight increase in the percentage of students and employees that utilized University at Albany shuttle buses. In the fall of 2013, 20% of students and 5% of employees reported utilizing the University at Albany shuttle buses on a daily basis for commuting, compared to 18% and 2%, respectively, in the fall of 2009. Additionally, the UAlbany bus passenger count during the 2013-2014 academic year indicated a 5% increase in ridership over last academic year.

The process of implementing the tracking system, installing monitors and signs, and communicating the program is described in the following section along with lessons learned and recommended courses of action for those interested in implementing a similar system.

2   Project Implementation

The first step in implementing the project was the formation of a Technical Advisory Committee (TAC) to review the bid solicitation, give advice on technical and operational issues and provide general guidance throughout the project. The following individuals served on the TAC during the duration of the project: Ross Farrell, Tom Guggisberg and Mike Williams from CDTA, and Jennifer Ceponis and Sandy Misiewicz from CDTC. Joe Tario from NYSERDA and Ellwood Hanrahan from DOT served as project managers.

2.1   Vendor Selection

Members of the UAlbany implementation team including Charlene Madia (Purchasing), Rose Dorsman (Parking and Mass Transit), and Mary Ellen Mallia (Environmental Sustainability) met frequently to craft a bid solicitation for the project. Both Ellwood Hanrahan and Tom Guggisberg were consulted extensively to discuss the possibilities for software implementation as well as in house options. Charlene Madia worked with the UAlbany legal department to craft language in order to protect the university in the event of a lawsuit filed as a result of implementing GPS technology. Guidance was received from Tom Guggisberg on the language of the bid solicitation in order to procure a quality vendor with the ability to interface with the CDTA system. State finance law made the university beholden to accept the lowest bidder on the project so it was vital that the bid solicitation incorporated all the university's needs since other considerations, such as references or experiences working with universities, could not be weighed more heavily than cost.

A request for proposals (RFP) was issued at the end of June 2012 with responses due at the end of July. Two vendors responded to the RFP: Alpine Systems and Route Match. Alpine submitted a bid of $138,340 and Route Match's bid was $223,631. Both were reviewed by UAlbany personnel. Despite Alpine having the lowest bid, there was significant concern that the company would not be able to meet the requirements in the solicitation. As a result, Alpine was asked to clarify and expound on several responses. Vendor responses were shared with Tom Guggisberg and Ellwood Hanrahan. They both expressed concerns about the quality of Alpine's response, and Alpine was sent an extensive list of clarifying questions. The process of vendor review and clarification of responses continued for several months with letters of clarification being sent out and responses reviewed from both vendors by TAC members. As a result of this process, Alpine was thoroughly vetted and the awarded the contract in April 2013.

2.1.1 GPS Installation and Implementation

George Cone from Alpine Systems worked with Mike Koch (UAlbany Parking and Mass Transit) to install and test GPS tracking units on a few of the UAlbany buses over the summer of 2013 for testing, and a new portal for the data was established. A pilot web page displaying the data and the installation of all GPS units were targeted for completion at the end of July. The system went live on the first day of classes on August 26 with a web page displaying the arrival times for the buses and an accompanying Quick Response (QR) code to access the information via smartphone. The system was not fully vetted for user functionality therefore, refinement of operational procedures and route display were made during the semester. Specifically, a link to a live time map was added to the original web site and along with a scrolling message that the CDTA route information was not based on real time data. The process of refining the system display to make it user friendly continued throughout the spring of 2014. In March 2014, a smartphone application was made available via Google Play and the iTunes store under the name "UAlbany Campus Bus Schedule."

The university operated the GPS system using two different methods. At first, the units were installed and assigned to a specific bus. However, because buses were not assigned the same route every day, the GPS unit needed to be reprogrammed on a daily basis to reflect the accurate schedule information on the website. To avoid this process, the university experimented with programming the GPS units for one specific route and having the drivers pick up that unit along with the bus keys each morning prior to starting the route. While this practice eliminated the need to reprogram the units, it caused a lot of wear and tear on the equipment and the university began to experience an unusually high failure rate on the units, causing the vendor to have to replace them quite often. In addition, drivers often forgot the pick up the GPS units. As a result, the university switched back to having the unit permanently fixed in the buses and an administrator in the Parking and Mass Transit office assumed the role of re-programming the units each morning.

2.1.2 Monitor and LED Sign Installation

An implementation team was formed regarding the monitors and LED arrival signs to be placed at high profile locations. The team met in June 2013 and the vendor conducted a presentation to the building managers to assess the best locations for the monitors. These areas were determined and a work order was submitted to the facilities office to begin installation. Personnel from the UAlbany IT department were brought into the project due to the technical requirements needed to broadcast the GPS information on the monitors and signs. Field work needed to complete this task included:

- Cabling.
- Electrical wiring.
- Providing access to data closets for PC's connected to each monitor.
- Creating an IP subnet for Alpine.
- Registering computers in UAlbany Netreg service.
- Obtaining permission to get Alpine VPN access to the UAlbany network by the Internet Security Officer.

Alpine oversaw the installation of the control computers and UAlbany IT activated the jacks. Monitor installations were completed and operational in early December.

Two LED arrival signs were planned as part of the project. The arrival sign's installation faced several obstacles including extensive wiring, IT security requirements and firewall establishment and construction on campus, which temporarily eliminated the location of one of the arrival signs. One sign was installed at the busy Collins Circle bus stop off of Washington Avenue. Preliminary cabling and wiring was completed by UAlbany facility and IT staff. The university obtained quotes from an outside vendor to complete necessary IT work, which was completed in June 2014. The sign will begin operation at the start of the fall 2014 semester. The second sign will be placed at the Science Library stop, on the Western Avenue side of campus. This installation was delayed due to the commencement of the construction of the campus center expansion, which caused the temporary relocation of the bus stop. The sign installation will be included in the renovation of the Science Library as part of the campus center expansion project and it expected to be complete during the fall of 2014.

2.1.3 System Training and Data Reporting

Alpine Systems conducted a training session for UAlbany Parking and Mass Transit personnel in February 2014 on editing the announcement scroll and reviewing available system reports. At that point, a punch list of items related to training needs and data sharing was developed for the vendor to complete. Training, access to system data, and use of reports is still an open issue.

2.2 Project Communication

The implementation of the GPS bus tracking system was communicated in a variety of ways to the UAlbany and surrounding community. A flier incorporating the QR code was posted in prominent areas on campus, at several off campus businesses where students frequent, and distributed throughout the residence halls. In addition, signs were posted at all the bus stops. A magnet with the QR code was distributed at major campus events. Students also tabled in the campus center to raise awareness about the service and hand out the magnets. Electronic methods employed included the development of a website and postings to the Green Scene and UAlbany Facebook pages and Twitter feeds. The arrival of the program was featured in the online Sustainability Bulletin, which is emailed out to the entire campus. In addition, emails about the service were sent to several campus Listservs. Presentations and announcements about the system were made to the Res Life Professional Staff & Sustainability Committee, the Student Sustainability Council, the Sustainability Coordinators, and the University's Department of Communications and Marketing. Several of these items are displayed in Appendix A.

A second wave of communication about the program was done during UAlbany Sustainability Week between November 11 and 15. Specifically, students passed out the magnets with the QR code, and the slogan "Don't Guess, Use GPS" was created and used to market the system. In addition, the UAlbany Communications and Marketing department issued a press release that included information about the GPS system (see Appendix A). The UAlbany and Green Scene Facebook and Twitter accounts were used again to send out the code and a notice about the system.

The university conducted another round of communication during the spring semester, building upon previous work as well as recommendations received from Kate Brangaccio, a transportation demand management program marketing and communications manager for ICF International. Signs about the system were included on all UAlbany buses and the vendor developed an IPhone and Android smartphone application for the system. A public service video was developed by one of UAlbany's bus drivers and students from the Environmental Sustainability Living, Learning Community and Sustainability Council and is available on YouTube (https://www.youtube.com/watch?v=3CwmCwC1T3c). A poster about the system will be presented at the annual conference of the national professional sustainability organization of the Association for the Advancement of Sustainability in Higher Education) in October 2014 in Portland, OR.

A new wave of communication and outreach has been planned by a communications intern hired by the Office of Environmental Sustainability in conjunction with Parking and Mass Transit. This rollout will take place in the fall of 2014 as the system is fully operational.

2.3   Project Budget

Up to $190,661 in project funding was budgeted for this effort. Because the Alpine Systems bid came in under this amount, the total amount of resources allocated were not used in the project. Fifteen shuttle buses were equipped with GPS tracking and communication devices covering the UAlbany bus routes. Ten monitoring stations were purchased and installed in high visibility areas such as the campus center, athletics complex, and the libraries. Two LED arrival time signs were purchased to be installed at the main campus bus stops. Project bids received by the university ranged from $138,000 to $400,000. A reasonable estimated total cost for a similarly sized system and monitor/sign package is between $225,000 and 250,000 depending on the cost of wireless services in the area of implementation. Details are provided in Table 1 and Table 2.

Table 1. Reimbursable Costs Incurred

Item	Amount
10 GPS Trackers	$ 8,365
10 installations for above	$ 3,400
Software and computers	$30,986
Three 55-inch monitors and accessories	$ 8,058
3 installations for above	$ 1,440
Seven 32" monitors and accessories and mounts	$ 13,419
5 Portable trackers	$ 1,625
1 First year support charge – hardware and software	$ 4,500
1 wireless cellular subscription for 10 trackers	$ 3,600
Materials for monitor installation	$1,082
LED signs	$29,400
Alpine Project management	$11,050
Alpine systems software	$10,329
Graduate student work	$1,050
IT vendor for LED installation	$1,744
Total	**$130,048**

Table 2. In-Kind and Nonreimbursable Costs

Item	Amount
UAlbany facility services related to monitor installation	$11,981
IT vendor to complete second bus stop LED installation	$1,750
Continuing service and support charge ($8,100 annually for 4 years)	$32,400
Marketing materials	$ 250
Report printing	$ 50
UAlbany in-kind labor, project management and service support (to date only, projected amount not included)	$26,337
Conference travel/presentations	$3,000
Total	**$75,768**

3 Research Method

Three main sources were employed to provide data illustrating the awareness and use of the GPS system. These include a comprehensive transportation survey, the passenger counts from the UAlbany shuttle buses, and the number of times the smartphone application was downloaded from Google and iTunes Store.

To determine the transportation patterns of students and employees at UAlbany, two comprehensive transportation surveys were administered. Both surveys were Web-based, with a percentage of university email addresses being selected and sent a request to complete the survey. The first survey was sent out in the fall of 2009 and represents the commuting patterns on the UAlbany shuttle buses prior to the installation of the GPS Tracking System. The survey asked detailed questions about the individual's commuting patterns, including the time of day, the distance, the mode choice, why they chose the mode they did, if they would consider taking transit if it were easier if they did not already, along with many other questions.

A research team was established to modify the questionnaire before the second survey was administered. An initial distribution was targeted for October 2012, but it was pushed back one year (with approval from project managers) due to the delay of the GPS implementation. The group added questions to reflect current programs and crafted questions relevant to the GPS project. Questions specific to the GPS system included information on the level of awareness of the system, the use of the monitors as a means of information, whether the website was working properly or if their phone had crashed when accessing the website and whether the GPS system made it easier to use the buses and decreased their wait time. UAlbany Institutional Review Board approval was granted and the survey was distributed by the Institutional Research department at the end of October 2013.

Other data collected included the counts of passengers riding the UAlbany shuttle bus routes from last year and this academic year that is collected by Parking and Mass Transit on the buses through its card swipe system. Alpine Systems provided information on the number of times the bus schedule smartphone application was downloaded from Google and the iTunes store. A summary of the findings from the data is included in the next section.

4   Findings

4.1   Data Analysis

The 2009 survey demonstrated that only 18% of students and 2% of employees utilized the free UAlbany shuttle buses on a regular basis for commuting to and from campus. Reducing the number of vehicles used to commute to campus was a goal of the university. Based on responses from the transportation survey, commuters were willing to take transit if it were a more convenient option. The second survey distributed in late October/early November 2013 gauged changes in ridership and assessed the early impact of the system.

After installation of the GPS Tracking System, there was a slight increase in the ridership from fall of 2013 to fall of 2009. Students (20%) and employees (5%) utilized UAlbany shuttle buses on a daily basis for commuting to the university, compared to 18% and 2% respectively in the fall of 2009, thus yielding a 2% increase in student use and a 3% increase in employee use.

According to the 2013 survey results, 25% of students knew about the system and 3% use the GPS tracking system frequently. For employees, 20% were aware of the system and 2% used it on a regular basis. Only 5% of students and 2% of employees reported using the monitors for information. Of those that used the GPS tracking system, few (less than 5%) reported trouble with it including accessing the website or having the download crash their phone. Of those that used the system, 53% of students reported that it made it easier to use the UAlbany shuttles. Although 38% reported that the GPS system allowed them to use the buses more frequently, 42% reported that it did not. Additionally, 44% reported the system decreased their wait time, but 46% said it did not. Half of the students reported that the system did not cause them to use shuttle buses in situations where they had not before. While the system appears to have an impact on the ease of use of the shuttles, it did not appear to cause the students to use the shuttles more frequently than in the past.

The 2013 survey showed that the impact on employees was more definitive and positive. Nearly three-quarters (74%) of employees reported that it was easier to use the shuttles with the GPS tracking system. Nearly two-thirds (63%) of employees reported that the system allowed them to use shuttles more frequently, half reported that they used the shuttles where they had not before, and 53% reported a decrease in wait time.

Many issues helped to explain why so many people did not know that the GPS Tracking System existed. Given that the system went online the day before the start of the fall semester and with no time for field testing and review, bugs and glitches were unavoidable. Not having access to a website or smartphone app prior to the start of classes hindered the ability to properly promote and communicate the system during the critical university orientation and move-in time when new programs and services are heavily promoted and communicated to students. There was also a concern about promoting the system when it was not working properly or user-friendly, as it was feared that students and staff would be unlikely to use the system again. The monitors created a buzz about the system, but because they were not fully installed and implemented until after the survey, their effect was not recorded accurately by the survey.

Another issue that hindered use in the early part of the project was that only a QR code was provided as opposed to a smartphone app. To access the GPS information, people first had to have a QR reader downloaded on their smartphone. Then the person needed to take a picture of the square QR code, and they were directed to a mobile web page with bus information. Officials at UAlbany envisioned a downloadable smartphone app where users would be able to access shuttle bus locations and estimated arrival times without having to scan a piece of paper. According to the 2013 survey, 80% of students and 70% of staff reported that they owned a smartphone, which shows the great potential such an app could have. In response, an app was made available for iPhone and Android users in March 2014. As of June, the iPhone app was downloaded 90 times and the Android app via Google was downloaded 52 times.

As shown previously, after installation of the GPS tracking system for the fall 2013, there was a slight increase in the percentage of students and employees that used the UAlbany shuttle buses. It is difficult to attribute the entire shift to the implementation of the GPS system because several other developments in transit services were implemented since 2009 including the advent of universal access to CDTA buses, the push toward more environmentally sustainable choices, and the declining trend of students bringing cars to campus.

A better indicator of the effect of the GPS tracking system would be comparing the 2013-2014 UAlbany bus passenger counts to the previous year. Overall 383,855 people took the UAlbany buses over this academic year, compared to 365,512 in 2012-2013. These numbers indicate a 5% increase in bus use over this time period. Again, Although the entire change cannot be attributed to the GPS tracking system, there have been no other program changes over last year so these numbers can serve as a better indicator of the effect of the GPS system than survey responses. This increase in ridership represents an additional 18,343 passengers over the academic year. Most of these gains occurred on the Uptown/Apartment route with an 18% or 22,866 increase in passengers. (Note, a few of the routes saw a decrease in ridership such as the Western Avenue and East Campus shuttle which accounts for an lower number on the overall increase than the increase experienced on the Uptown route.)

Using the 18,343 figure and assuming this trip would be replacing one by a single-occupancy vehicle, the reduction in vehicle miles travelled as a result of the GPS tracking system can be determined. In general, the average UAlbany shuttle trip is 5 miles. Given that, the increased bus usage can be said to have replaced 91,715 vehicle miles travelled. Using the average fuel efficiency of light duty vehicles as 23.5 mpg from the US DOT website, this figure equates into 3,903 gallons of gas and 76,455 pounds or 38 tons (conversion factor from the Capital Moves website) of carbon dioxide emissions. These figures represent the maximum reduction that can be attributable to the use of a GPS system, assuming that all of the passengers were using the bus as a result of the GPS tracking system and were replacing trips by single-occupancy vehicles.

If one were to extrapolate to this to Capital Region community, the impact is even greater. In Albany, the average one-way commute is 22 minutes and roughly 20 miles, according to the Area Vibes website. Therefore, an increase in ridership of 18,343 people would reduce vehicle miles travelled by 366,860 which is a reduction of 15,611 gallons of gas and 305,821 pounds (153 tons) of carbon dioxide emissions.

Although further surveys will be needed to measure the effect that the GPS tracking system has upon ridership when it is fully operational and well-marketed, initial effects on student and employee commuting patterns at the UAlbany have been positive. While the project did not follow the timeline first envisioned, the incoming fall of 2014 class will have full access to a university bus fleet that has real-time tracking information. With the system up and working, fears of directing students to a resource that does not work correctly are gone, allowing greater marketing so that a larger portion of the campus population will know about the service than did in the fall of 2013.

4.2 Patent Issues

When drafting the initial RFP, the authors had to take into account ongoing patent issues surrounding real-time transit information services. Two foreign companies, ArrivalStar, based in Luxembourg, and Melvino Technologies Limited, based in the British Virgin Islands, claimed they owned or were the exclusive licensee of patents relating to arrival and status messaging systems used by transit systems. At the time that the initial RFP was being sent out by the UAlbany, multiple transit agencies across the United States were either in court with ArrivalStar and Melvino or paying settlements ranging from $50,000-250,000 to avoid costlier legal battles.

To attempt to protect the university, the UAlbany legal department designed language in the RFP to absolve the campus of any liability under a claim by either of the two companies. The patent claims added to the already complex technical nature of the project causing the RFP writing process to take longer than was anticipated. The threat of a lawsuit has since dissipated as a result of a settlement between ArrivalStar and the American Public Transit Association (APTA). In this agreement, the company agreed to not pursue lawsuits with public transit

authorities in the future. In the suit, the APTA claimed that public transit agencies were arms of the states themselves and therefore the 11th Amendment giving state sovereign immunity protected such agencies from these lawsuits. These so-called "patent trolls" are also receiving push back from private institutions as well, thus eliminating a potential barrier to entry.

4.3   Future Research

The university will continue to work with Alpine Systems to refine the display of the GPS information over the summer and expand on promotional efforts of the app during orientation and opening weekend. This plan, coupled with the campus monitors broadcasting the bus locations, should greatly enhance the awareness of the project. The university will seek to conduct a follow up survey gauging the effectiveness of the program and communication efforts during the 2014-2015 academic year, using work conducted by the University of Washington's OneBusAway analysis as a template. As these data are collected and compiled, future conference presentations and publications will be pursued.

5 Statement On Implementation

5.1 Technical Aspects of the Project

The implementation of a GPS tracking system involves understanding complex technical elements that the average person managing transit would probably not possess. These elements included issues in creating a system, crafting a contract, and installing the monitor and arrival signs. The university struggled to get up to speed on the technical language and considerations in obtaining a vendor. A bid solicitation was sent out prior to the contract being finalized with NYSERDA in the hopes of having a vendor on board in the spring. Unfortunately, upon review of the vendor responses by members of the Technical Advisory Committee (TAC), it was recommended that a new solicitation be drafted to address concerns about the quality of the vendors. As a result, the bid process was re-started and the solicitation was edited to address concerns. Advice from NYSDOT project manager Ellwood Hanrahan and TAC member Tom Guggisberg was invaluable in this arena. Despite the university's best attempts to craft careful language and field reasonable bid proposals, the selection still got bogged down in a very lengthy clarification process that caused a long delay in the project. University personnel had difficulty in adequately evaluating responses in an arena where they had limited knowledge. Hanrahan and Guggisberg were asked to thoroughly examine the bids to ensure that each vendor would be able to meet the technical requirements of the bid. Without such assistance from the TAC, the project could have easily been scrapped.

The university also struggled with understanding the technological options available. Several graduate students and a professor made a proposal for the development of a software system internally. The students submitted a proposal that was reviewed by TAC members Mary Ellen Mallia, Rose Dorsman, and Tom Guggisberg. They had concerns about the continuity of the maintenance of such a system and the availability of UAlbany personnel to support it internally.

It was further determined to keep the hardware piece from the software piece of the GPS system in one bid and not pursue an in-house option. While internal software development may have led to a more customized system, the university needed a vendor that could provide the hardware and technical knowledge for the installation of display monitors and arrival signs. In addition, based on feedback from other universities that pursued this track, the amount of time it could take to develop such a system internally is quite lengthy and would require a large amount of in-kind management from the UAlbany's transportation office. Finally, very often the internally produced systems are not transferrable to other transit systems because the student developers graduate and are not in the business of providing a GPS tracking service.

Any transit authority or service considering a similar system must fully understand the heavy IT component and involvement in implementing a GPS tracking system. It is important to identify key people in telecommunications, information security, and IT early in the project. They also need to be part of the team that meets regularly as the project takes shape. Time lags should be expected as vendor's models may not do not fit with an institution's environment and details need to be identified and sorted out. Ideally, on-staff knowledge and expertise of the system is preferred so continuing maintenance and improvements can be made. A group might consider devising a technical contract in conjunction with the vendor before proceeding with a project. A transit manager needs access to or have a relationship with colleagues in IT, telecommunications, and information security that have this type of knowledge. Not having those connections could present a significant barrier to entry to adopting GPS technology on a large scale.

5.2   Marketing Strategies Recommended

While the university employed several types of marketing strategies from fliers to videos to signs to in-person presentations, the most visible, interactive, and recurring forms of marketing were most effective. These forms included posting signs on the bus, putting the QR code on signs at the bus stops, and installing the monitors around campus. In particular, the monitors created quite a buzz about their purpose and highlighted the existence of the program to a whole group of the campus population that had missed the emails, newsletters, and stories on the GPS tracking system. Despite the complexities involved with installing the monitors and LED signs, they serve as the best forms of marketing for the program and are highly recommended.

5.3   Implementation Strategies

The university chose to go with a vendor-managed system. Although the vendor did not necessarily deliver on their obligations, it is still an advisable strategy for a transit authority or other institution. The vendor-managed system provided a structured, turnkey approach by someone with experience in the field and well-versed in the technical aspects that would probably not be found in-house.

These recommendations for creating a successful program were derived from dealing with a vendor. First, develop a very structured contract with deadlines and deliverables. Second, assign someone in-house who has strong vendor management skills to oversee the implementation of the contract. Third, training and GPS tracking system tests must be conducted months prior to activation. Fourth, be sure that training requirements and deadlines are embedded into the contract.

In addition, there needs to be buy-in from many departments and strong leadership to champion the project. It is essential to build relationships internally to create an implementation team that can work well together to bring a system on board and craft a methodology for its management and monitoring. This team would include individuals from the following offices: transportation, IT, telecommunications, information security, finance, legal, facilities, purchasing, sustainability, marketing, and residential life (if a college or university campus).

5.4   Challenges Unique to UAlbany

The university was most hindered by a requirement to adhere to New York State financing rules. More specifically, UAlbany was beholden to accept the lowest bidder. Despite the attempts to craft a bid solicitation that would ensure a quality vendor, the university found itself having to accept the bid of a vendor who was not adequately experienced for the task. This issue resulted not only in delays in getting a contract in place but also delays in getting the system fully functional, training for university personnel to alter system announcements, receiving reports, and getting the monitors and signs installed.

Vendor responsiveness has been an issue. The vendor has not been proactive on the system management and training and a lot of follow up is required to get deliverables. A lack of information on the system made it difficult to develop detailed scopes of work, thus contributing to the delay in the monitor and sign installation. There were also issues with the vendor's equipment; for example, several GPS units became non-operational and had to be replaced and the motherboard of the system failed, which caused an outage of the monitors. The university continues to work with the vendor to get further training on the system in order to obtain reports and data generated by the GPS transmissions.

A final obstacle faced by the university was a leadership transition in the Parking and Mass Transit Office. Rose Dorsman, the office's director and champion for the GPS project, retired in the spring of 2012 and a replacement was not hired to take over her duties. This issue led to weak oversight and management of the GPS vendor and the implementation of the system. A new director has been hired and is anticipated to take over the management of the initiative after a start date in summer of 2014.

6   Conclusion

Although the initiative had its implementation challenges, the process of developing a GPS system has enjoyed great support from the campus population. The fully operational GPS tracking system will provide high value to the campus community and will make the use of UAlbany bus shuttles safer and more convenient. As the system becomes more ingrained with the mass transit options, the benefits will increase. The university will continue to study and assess the program as it evolves and will promote the use of GPS, thereby helping to push the industry to adopt this technology as the norm for transit operations.

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Appendix A

Screen shot Campus Bus Schedule website

Select a Location for Times

Alumni	**Liberty**
Collins Circle	**Patroon Creek**
Draper	**PE/SEFCU**
East Campus	**Social Science**
Empire	**Grocery Shuttle**
Freedom	

Real-Time Map
(UAlbany Buses Only)

COLLINS CIRCLE

BUS	RT	DEPARTING TO	TIME	REMARKS
CDTA	Route 114 - East	Crossgates	9:28A	
CDTA	Route 12 - East	Downtown	9:28A	
CDTA	Route 12 - West	Crossgates	9:33A	
UAlbany	Patroon Creek Shuttle	Patroon Creek	9:35A	
CDTA	Route 190 - West	Crossgates	9:47A	
CDTA	Route 114 - West	Downtown	9:55A	

Marketing Magnet and Video on You Tube

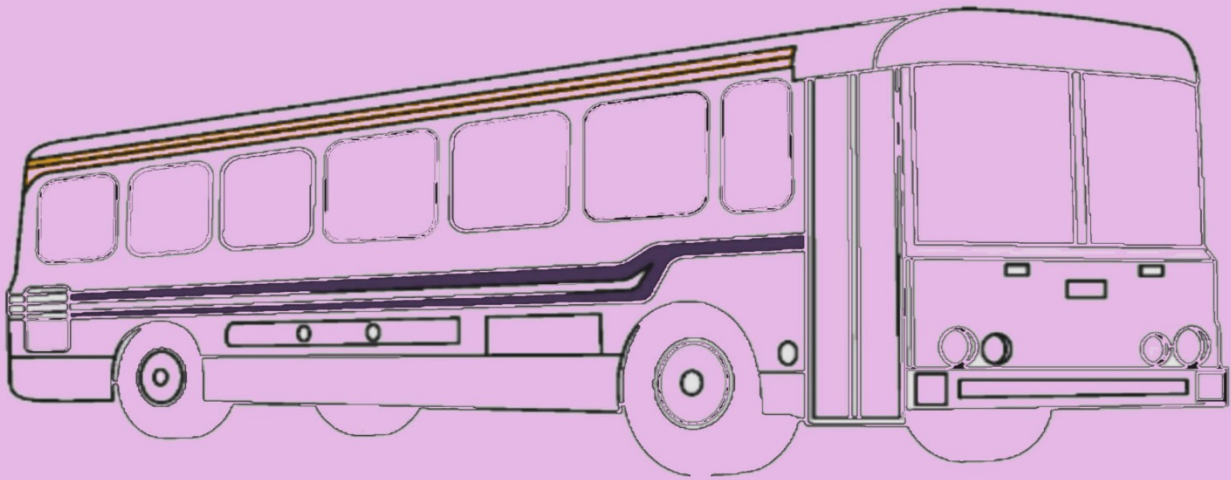You Tube link:

https://www.youtube.com/watch?v=3CwmCwC1T3c&list=UUP1vj3KjCMKKDfR sD8uzjjA

Don't Guess, Use GPS!

Now you can scan a QR code to get up-to-the-minute info about the location of UAlbany buses.

UAlbany
Green
Scene

More at www.albany.edu/gogreen

**Does not apply to CDTA buses

http://www.albany.edu/news/44481.php

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UAlbany Environmental Initiatives Target Reducing Carbon Footprint, Enhancing Educational Opportunities

Sustainability minor provides career pathways for undergraduates

ALBANY, N.Y. (November 7, 2013) -- In recognition of Sustainability Week (Nov. 11-15), the University at Albany is launching a series of environmental initiatives aimed at reducing its carbon footprint and enhancing career opportunities for students. Most notably, beginning in the fall of 2013, undergraduates are able to enroll in a sustainability minor, a multidisciplinary program designed to provide students with a solid foundation in the environmental, geopolitical and social aspects of sustainability.

UAlbany students, faculty and staff are taking steps to reduce the University's carbon footprint.

Additional highlights include the installation of a new GPS system to provide arrival times for the University's shuttle and bus service. Students, faculty and staff can now follow the real-time route of buses online. UAlbany's bus fleet includes five electric-hybrid buses. UAlbany now has two operating electric vehicle (EV) charging stations. The stations are available free of charge through a NYSERDA-funded joint venture with National Grid. One is located on the downtown campus in the Thurlow Lot and the other is on Collins Circle.

UAlbany will also host a series of discussions and events around the themes of climate change, food, alternative transportation, energy and recycling. The first event will be a discussion on the National Climate Assessment report, which will be held on Monday, Nov. 11, at 7:30 p.m., in Campus Center room 375. These initiatives are part of UAlbany's "Green Scene" efforts to promote responsible environmental programs, including recycling, education, communication, procurement and policies.

The Sustainability Minor

The new UAlbany minor in sustainability creates a multidisciplinary curriculum that will help students understand what sustainability is and how it is perceived within various disciplines. Students will take courses that specifically address the environmental, geopolitical or social aspects of sustainability. Students from any discipline may pursue the sustainability minor. Undergraduates will take at least three credits from each of these categories: Natural/Physical Science (includes Atmospheric Science, Biology, Environmental Science), Social Sciences/History (includes Geography, History, Philosophy), and Planning. Careers in sustainability include positions within the energy industry, government, education, or a host of other fields.

UAlbany Bus Fleet

The UAlbany Bus Fleet services all of UAlbany's campuses, including the uptown, downtown, and East campuses. The fleet alsoservices Freedom Apartments, MSC/UAB, Western Avenue, Madison Avenue, and the Patroon Creek Complex, which includes the UAlbany Health Center. A shopping shuttle runs to Walmart and Price Chopper on Monday and Thursday evenings. Through an American Recovery and Reinvestment Act project managed by NYSERDA and submitted as part of the Capital District Clean Communities Coalition, UAlbany has upgraded the fleet to include five electric-hybrid buses.

During fall 2013, the UAlbany bus service is making it more convenient for riders to arrive at their destination. Each campus bus is now outfitted with a GPS tracker, which will allow students, faculty and staff to anticipate if the bus is running ahead or behind schedule. The real-time route information is available online, and can be accessed either via a website or QR code. Several display screens providing route information will also be installed in high traffic areas across campus by December 2013.

Sustainability Week

In celebration of Sustainability Week, UAlbany will host a discussion on the National Climate Assessment report, which will be held on Monday, Nov. 11, at 7:30 p.m. in Campus Center room 375. The presentation is by UAlbany Research Associate Professor of Atmospheric Science Oliver Elison Timm and Post Doctoral Research Associate Elinor Martin. The National Climate Change Assessment report, which is prepared by the U.S. Global Change Research Program (USGCRP), informs the nation about

already observed changes, the current status of the climate, and anticipated trends for the future, and provides input to the Federal government, communities, businesses and citizens as they create more sustainable and environmentally sound plans for the nation's future.

The student group "UAlbany Students for Sustainability" will also set up tabling in the fountain area of the Campus Center throughout the week to promote the benefits of 'eating local,' alternative transportation, solar energy and lighting, and recycling. On Friday, Nov. 15, the University will reveal the results of the fall energy campaign on campus. The event, held at 3:30 p.m. in University Hall, provides recognition for groups and individuals who are helping to reduce the University's carbon footprint. UAlbany emits approximately 24,000 metrics tons of carbon dioxide equivalent every year from its electricity use. The goal of the energy campaign is to reduce electrical usage in all campus buildings over a 10-week period by 10 percent as measured against baseline. In 2012, the University saved more than a million kilowatt hours, with cost savings returned in part to the buildings for enhancing green amenities.

Screen shot UAlbany Green Scene website

Mass Transit Schedules and Tracking

You can now easily access UAlbany and CDTA bus schedules from your computer or mobile device. UAlbany buses times are updated based on GPS location to let you know when they will be at the stop you have selected. CDTA bus times are simply the times posted on CDTA's schedules and are not updated in real-time.

Follow this link for the schedules:
http://ualbany.alpinesystemsinc.com/omnitrans/ualbany-schedules.asp

Or scan this QR code

Tracking Transit

By Sarah Helgeson

This fall a more convenient means of transportation will be implemented on the UAlbany buses. Each bus will be outfitted with a GPS tracking device, giving students and staff an exact arrival time. The real-time route information is not only found online; Smartphones will also have access to the up-to-the minute data. By scanning the QR code located at all UAlbany bus stops, students and staff will have an accurate idea of when to expect their four wheeled chariot.

For those who don't carry a smart phone, the university will have placed five display screens at high traffic locations before the semester is over.

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NYSERDA, a public benefit corporation, offers objective information and analysis, innovative programs, technical expertise, and funding to help New Yorkers increase energy efficiency, save money, use renewable energy, and reduce reliance on fossil fuels. NYSERDA professionals work to protect the environment and create clean-energy jobs. NYSERDA has been developing partnerships to advance innovative energy solutions in New York State since 1975.

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Wireless Global Positioning System Fleet Tracking System at the University at Albany

Final Report
July 2014

NYSERDA Report Number 14-27
NYSDOT Task Assignment C-11-12