Improving the Parking at Towson University

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Executive Summary

Our objective for the project is to analyze the current parking process and to hopefully find solutions to the current parking problems during busy hours. Parking at Towson University is a major concern for many commuters. Because of the limited parking spots, commuters spend a lot of time driving around campus looking for parking. As a result, students are late to class. The purpose of the project is to develop solutions that could alleviate the stress of finding a parking spot on campus. After examining all the solutions, one solution will be chosen as the most effective solution. Our goal is to narrow down the solution to one that is cost effective and practical to implement.

Before proposing a solution, our group members collected data from students using a survey. This allowed us to gather a clear understanding of the timing as well as the concerns others were having with the parking problem. We also reached out to the Office of Parking and Transportation Services at Towson University to help us with this project. After we collected our data, we came up with three alternatives to the parking issue. The first one is to have shuttles that goes back and forth from West Village and Secu Arena to the main campus. The second alternative is to have ground loop sensors at the entrance of the garage to keep track of the number of cars going in and out of the garage. The last alternative is to use RFID sensors to keep track of incoming cars. We explore the current process and make our suggestion for improvements for the parking garage in the following papers.

Overview of the Organization and Objective of the Project

Towson University is a public university situated at Towson, Maryland. It was founded in 1866 as a training school for teachers, but has transformed into a four-year degree-granting institution. It employs over 1,600 academic staff and over 20,000 students are enrolled at the school. The university and its growth has led development of new facilities and employment. With positive, must come some problems. With towson, the growth in student population has caused problems for students to find parking during certain period of the day. Currently, the students attending the university, specifically around 10am-12pm are having difficulty finding a parking spot. . We understand that not everyone is facing the parking problem. There are about 400 parking spot available in the garage. The problem is that the classes next to the garage have well over the garage limit. This causes the students to park in a garage thats father away from class. The objective of this project is to confirm some of the problems with parking at Towson University by conducting a student survey and interviewing the transportation department. Then we will devise some solutions to these problems

Methodologies and Findings

- Survey Monkey: an online service that allows you to create surveys and share them with others

- Interview with Towson Department of Transportation: Assistant Director of Administration and Finance, Miss Adrianne Spann
- Driving test between lots 13 and 14 and the CLA building

We conducted a survey of 83 Towson students on Survey Monkey where we asked them a series of 8 questions. The questions were either multiple choice or open-ended. Here is a list of the questions:

1. What type of student are you? Choice: commuter, on campus.
2. Which year are you? Choice: freshmen, sophomore, junior, senior, graduate student.
3. On a scale of 1 to 5, how satisfied are you with campus parking?
4. What time do you think the garage is the busiest? Choice: various times.
5. What is your biggest concern about campus parking? Choice: a) It takes too long to find a spot. b) Parking spots are never available. c) Parking passes are too expensive. d) Parking is too far from classes.
6. In a few words, what would you recommend as a solution to the parking problem on campus, other than creating new parking spaces? Choice: Open ended.
7. Out of the following choices, what would you recommend as a solution to the parking problem? Choice: a) An app that tells you what spots are available in the garage. b) An app that lets you make parking reservations in certain parts of the garage. c) An electronic sign that lets you know how many spots are available on each level of the garage.
8. Please include any other suggestions about parking on campus below. Choice: Open ended.

The results of the survey are as follows. All percentages are rounded to the nearest percent:

1. Commuter - 77%. On campus resident: 23%.
2. Senior - 40%. Junior - 34%. Sophomore - 19%. Freshmen - 4%. Graduate student - 4%.
3. A rating of 1.89/5
4. 10 am to 12 pm - 82%. 12 pm to 2 pm - 66%. 8 am to 10 am - 31%. 2 pm to 4 pm - 29%. 4 pm to 6 pm - 7%. 6 pm to 8 pm - 4%.
5. Parking spots are never available - 53%. It takes too long to find a spot - 24%. Parking passes are too expensive - 23%. Parking is too far from classes - 0%.
6. Summarized below.
7. An electronic sign that lets you know how many spots are available on each level of the garage - 70%. An app that tells you what spots are available in the garage - 45%. An app that lets you make parking reservations in certain parts of the garage - 24%.

Summary.

Most of the people we surveyed were seniors who were commuter students. They thought that the garage was busiest between the hours of 10am and 2pm, with more emphasis on the earlier hours. They were very unsatisfied with parking, rating it a 2 out of 5, with at least 50% of them saying that parking spots were never available. The remainder said that parking was too expensive and parking spots took too long to find.

To solve the problem, students indicated that they had several suggestions to help solve the problem. They are listed below:

1. Don't sell too many passes.

2. Make faculty spots available to students.
3. Make a system or app to keep track of parking availability.
4. Build another garage/more parking and don't construct buildings instead.
5. Spread classes out more.
6. Only let certain groups who need to park on campus be able to park on campus or prioritize parking for students who actually have class.
7. Make a better shuttle service.

We have decided to address some of these suggestions with our solutions, which are similar to these. Our decisions and how we reached them are written in the alternatives and recommendation sections.

After we interviewed students, we conducted an interview with the department of transportation. They said that they are trying to make parking more accessible at the university, but they believe that many of the parking problems on campus occur because students are not using the resources available to them. For example, students should arrive to class early when more parking spaces or available so that they find a spot, or students should be willing to take the buses from overflow parking or ride bicycles more. The department also posts on twitter when certain garages are full at certain times, and students should watch out for these messages.

However, in spite of the ways students could help to make parking easier, the parking and transportation department is looking into other solutions. The department has a limited budget because it is part of the business part of Towson University, which is separate from the academic part. Students tuition pays for the academic part, while parking fees and tickets pay for the business part. This limits the budget for parking solutions. One of the solutions that the

department is evaluating is a parking counter system for the garage. Such a parking system could cost as much as $2,000,000 and this is more than the department can afford, so they are trying to find a solution under $500,000.

The department has also tried to increase the frequency and/or number of buses on the gold and black routes (which travel past the overflow parking on campus) bus this has not had much of an effect on helping commutters with parking.

A driving test, conducted between the overflow parking on lots 13 and 14 and the CLA building, indicated that with minimal traffic (which can be expected between 10 am and 2 pm), a round trip at a somewhat slow pace takes only 8:20. This would be 5:00 from the lots to CLA, and 3:20 from CLA to the lots. This number could be higher in rush hour traffic.

Description and Analysis of Process(es)

Description of the parking process for students:

Below this is defined as the current process for parking on campus.The parking process starts when a commuter student gets into his/her car. That person has to decide which garage they want to park in when they arrive on campus. They have three choices that are closest to most classes: Union Garage, Glen Garage and Towsontown Garage. Usually this route is influenced by their final destination on campus. After they have decided on a garage, they have to take the route that leads them to that garage. Inside the garage, if they find an open spot, they have to check the signs to see if it's available for commuter students, staff, or visitors. If the spot is available for commuter students, then they can park their car in that spot. If it is only available for staff or visitors, then they must continue to look for an open spot. If the garage they selected

is full, they have to drive to another garage and keep looking for commuter student parking spots. As of right now, this is process is time consuming and can lead to students getting to class on late.

Bizagi Model:

See image 1 in appendix.

SWOT Analysis:

1. Strengths
    a. Allows for the early students to find a good parking spot.
    b. Well organized and separates the faculty and students.
    c. Well-built infrastructure.
2. Weaknesses
    a. Students cannot find remaining open spots quickly
    b. When parking is full, students have to walk a long distance from overflow parking to campus.
    c. Students have to pay a lot for parking, but can never find a parking spot near their classrooms.
3. Opportunities
    a. Towson University could make it easier for students to find parking spots in non-overflow parking areas.
    b. Towson University could create more parking spaces.

c. If Towson University is unable to create new parking spaces, the university could make it easier for students to reach campus from overflow parking.

4. Threats
    a. Students might be hesitant to enroll in a school with bad parking, causing enrollment to go down.
    b. Students are parking in alternative locations and walking to the University. The university could lose money in the parking area if students choose to park elsewhere.
    c. Bad parking could dilute the reputation of Towson University.

Redesign Targets and Measures:

We want to make sure the students and faculty are able to easily find a parking space and reach their destinations without the issues that hinder the parking system now. To assess the effectiveness of our actions, we can look into interviewing the students after the new ideas have been implemented and see if the students are satisfied.

Alternatives

1. Ground loop sensors at entrance to each floor, an app to keep track of available parking, and a sign at the entrance to each floor of each garage to monitor garage status.
    a. Summary of changes: Ground loop sensors should be installed at the entrance of the garage and at the entrance of every level of the garage. The third party vendor that would come into install would perform monthly service on these devices. The sensors will keep track of the number of cars that entered the garage and the

number of cars on each level of the garage. There will be an app that updates users on the number of available spaces in each garage. The app will contain details about parking availability, as well as suggestions to make students more aware of their transportation options. Both us and the department of transportation feel that students aren't using the tools that are already in place to help them have a good parking experience. In addition, signs will be inside and outside each garage to let commuters know the number of open spots in each garage.

b. Bizagi design:

   See image 2 in appendix.

c. Impact to business: Students will be more satisfied with school parking because they don't have to drive around every garage looking for open spaces. Students are busy and typically in a rush to class in the morning and do not have much time to check the application. Students would be able to set up in the mobile application to notify them which garages have spots available.

d. Problems with implementation: It will cost a lot of money to maintain this system and making sure that it is working properly. If the system breaks, there will be additional costs in fixing it. It will also cost a lot to purchase and install the system in the first place.

2. Express shuttles to transport people from the stadium overflow parking and West Village Garage to the main campus in a more direct and frequent way along the Black or Gold Routes.

a. Summary of changes: Currently the Black Route and Gold Route service these areas of the campus. The Black Route runs every 10-20 minutes and goes to West Village garage, whereas the Gold Route usually runs every 30 minutes around the stadium area and the campus. We would start a new shuttle route with a single bus, called the Green Route, that runs in between stadium parking at lots 13 and 14 to the CLA building. The purpose of this route would be to eliminate the walking distance from the overflow parking lots to the Black Route pickup point, and to eliminate the wait time of the Gold Route. It would also eliminate the time taken by any stops in between the two points, as the bus wouldn't stop anywhere in between the lots and the CLA. The bus would run only between the hours of 9:30 am and 2:30 pm (some of the busiest times according to our student survey) to keep costs low. From my driving test, I determined that it takes about 3-5 minutes to travel in between both points, so I would expect a 10 minutes round trip, with 1.5 minutes on both sides. This short pickup time would be put in place to save time. It could be changed in the future if people needed more time to board. This route would help students to find a place to park with an easy way to get to campus during busy hours.

b. Bizagi design:

   See image 3 in appendix

c. Impact to business: It would cost a bit of money to hire more bus drivers, but it would help students to feel more comfortable parking closer to campus.

d. Problems with implementation: The time it takes to park in the overflow and ride a bus to campus would still take longer than simply parking in one of the garages closer to campus. In some cases, walking to class may be quicker as opposed to taking the shuttle. Students might not want to wait even the short time it takes to ride a bus to campus. The new bus program would be implemented based on how many students sign up for the new route. Depending on the volume of students signed up to take this new route would help the university determine how many busses and drivers they need to supply.

3. RFID passive sensors at entrance to each floor, an app to keep track of available parking, and a sign at the entrance to each floor of each garage to monitor garage status.
    a. Summary of changes. When students purchase their parking permit, they will be given a RFID tag that they can attach to their car's windshield. When they enter a garage, the RFID sensor will scan the tag and keep track of the number of cars entering the garage. Students will need to ensure they have there RFID tag on your windshield, like EZ Pass without that pass drivers have to seek alternative solutions when crossing a toll booth. Students who forget to bring there RFID tag would be able to go the parking office and pick up a temporary tag and the parking department will disable the other tag to prevent students from double parking. Students can use a mobile app that we create to help them find which parking spaces are still available. The app will contain details about parking availability, as well as suggestions to make students more aware of their transportation options. Both us and the department of transportation feel that

students aren't using the tools that are already in place to help them have a good parking experience. Students can also take a look at a dot matrix LED sign at the entrance to each floor of each garage to tell them how many spots are available.

b. Bizagi design:

   See image 4 in appendix.

c. Impact to business: It will cost more money, but improve student satisfaction with parking.

d. Problems with implementation: A gate would have to be set up at the front of the garage to prevent cars without a sensor from entering the garage. This could prevent a smooth flow of traffic from entering the garage. Also, it might be difficult to tell whether a car is simply parked near a sensor or whether it is passing under the sensor for cars parked near the gate.

Recommendation

Even though cost might be an issue, we recommend the ground loop sensors as a solution to the parking problem on campus. This is because we think the ground loop sensors might cause less issues with tracking cars going in and out of the garage than a similar RFID system and wouldn't require a gate.

At some point, we may want to start another shuttle. Right now we want to focus on simply making the parking that is close to campus work, but in the future we might want to make the parking further from campus more accessible. Obviously, building more parking spaces would be ideal, but with the current situation we think that our chosen solution will suffice.

Through sensors at the entrance of each floor of the garage and through a mobile app and electronic sign system, we want to help students find spots while they're still available.

Appendices

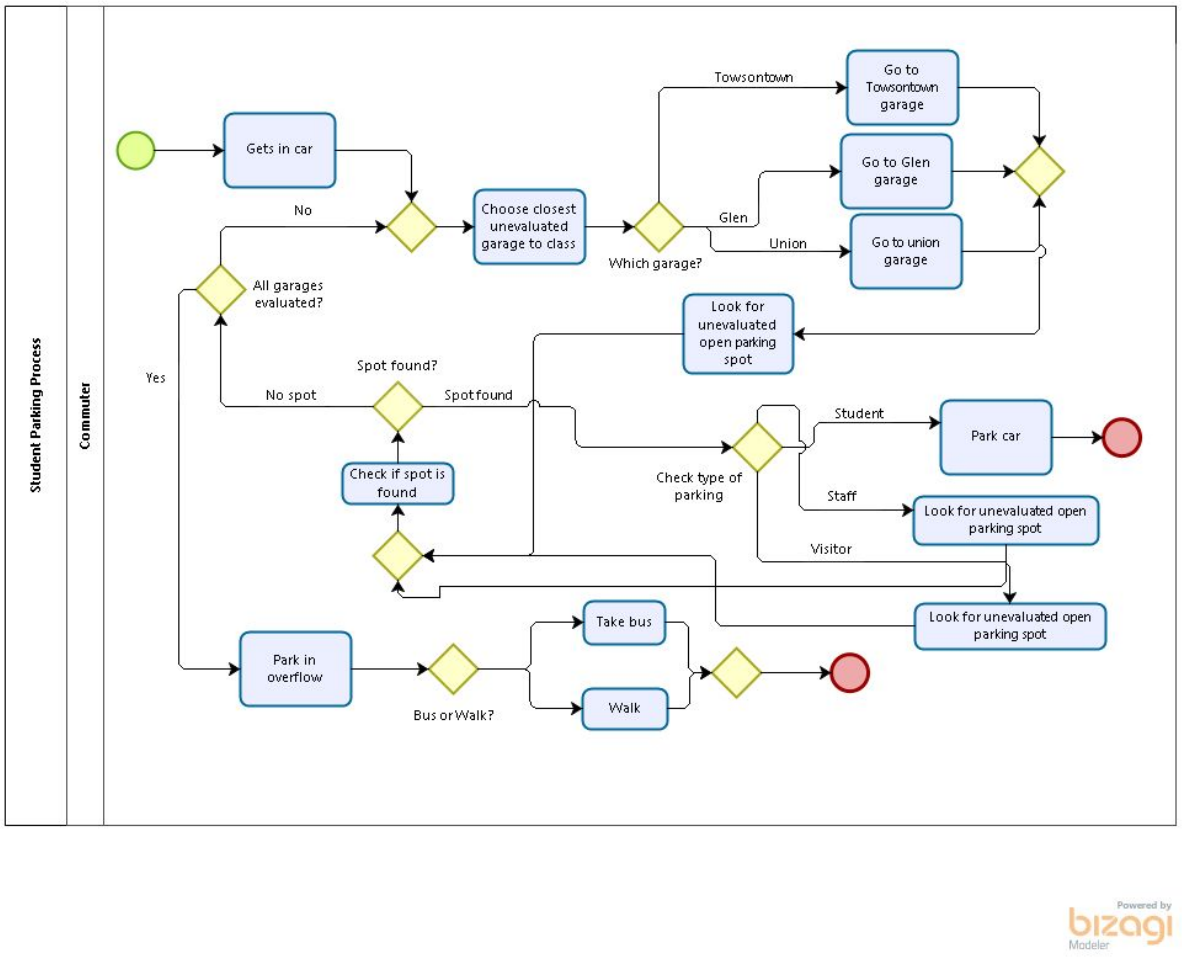

Image 1

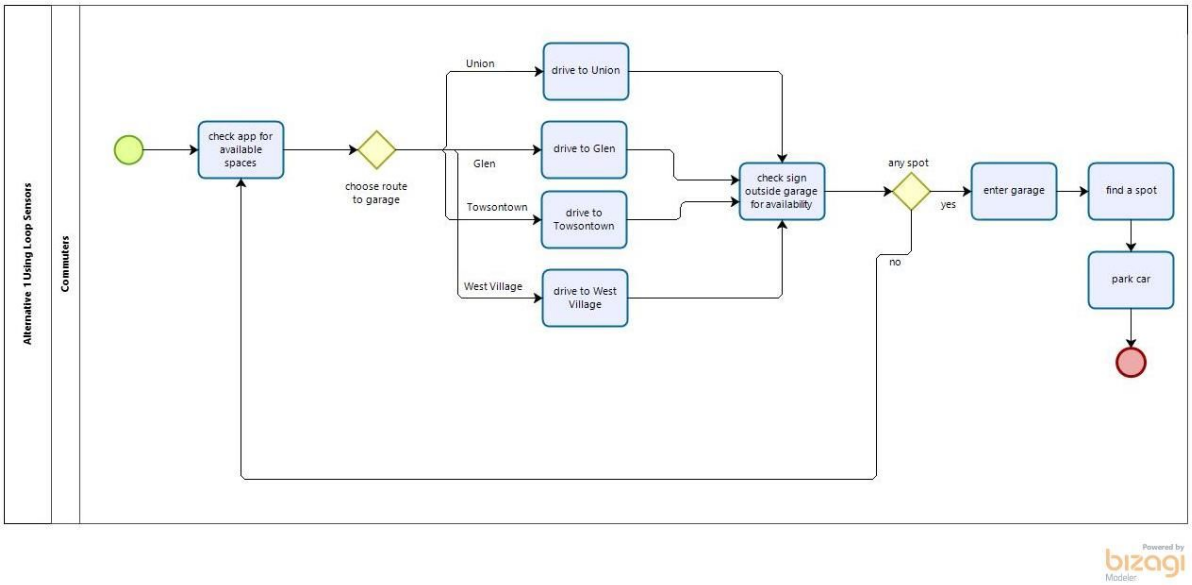
Alternative 1 Using Loop Sensors
Commuters
check app for available spaces
choose route to garage
Union
drive to Union
Glen
drive to Glen
Towsontown
drive to Towsontown
West Village
drive to West Village
check sign outside garage for availability
any spot
yes
no
enter garage
find a spot
park car
Powered by
bizagi
Modeler

Image 2

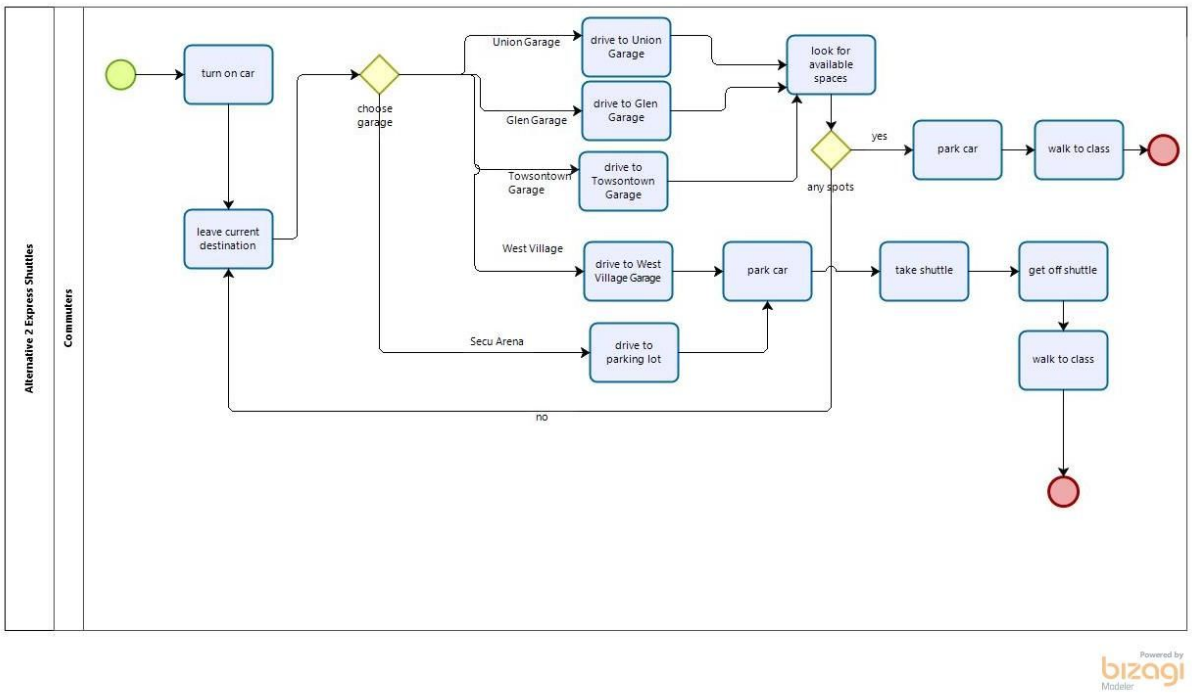
Alternative 2 Express Shuttles
Commuters
turn on car
leave current destination
choose garage
Union Garage
drive to Union Garage
Glen Garage
drive to Glen Garage
Towsontown Garage
drive to Towsontown Garage
West Village
drive to West Village Garage
Secu Arena
drive to parking lot
look for available spaces
any spots
yes
no
park car
take shuttle
get off shuttle
walk to class
park car
walk to class
Powered by
bizagi
Modeler

Image 3

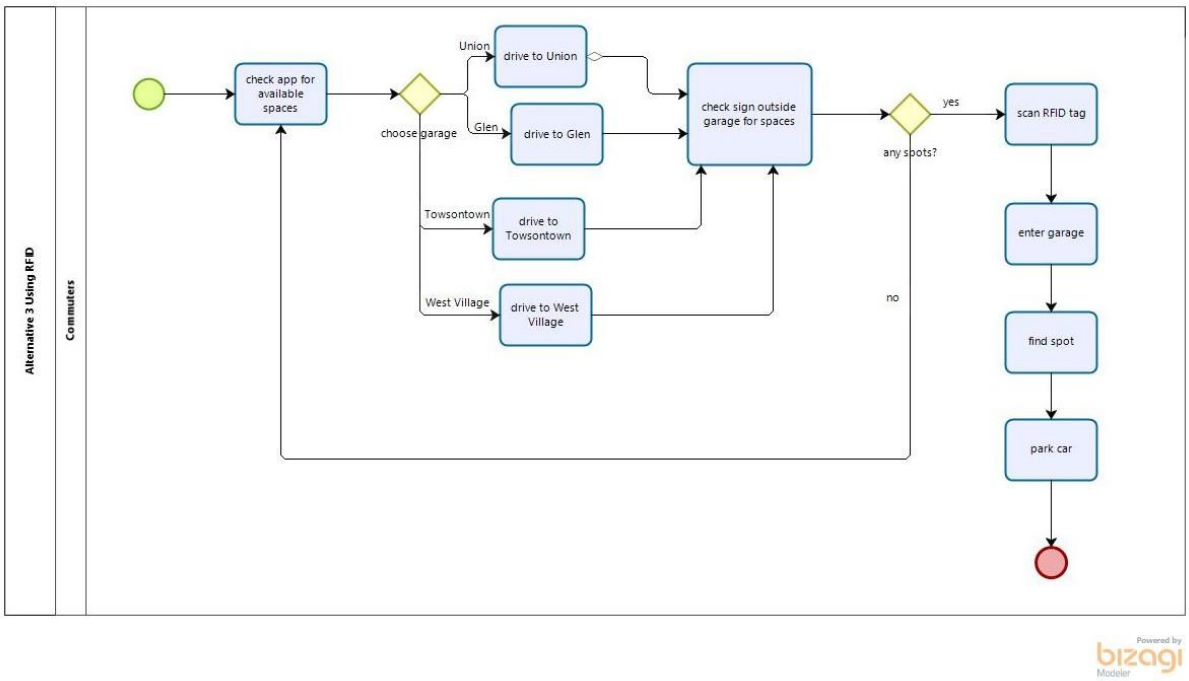
Alternative 3 Using RFID
Commuters
check app for available spaces
choose garage
Union
drive to Union
Glen
drive to Glen
Towsontown
drive to Towsontown
West Village
drive to West Village
check sign outside garage for spaces
any spots?
yes
no
scan RFID tag
enter garage
find spot
park car
Powered by
bizagi
Modeler

Image 4