AI System review:

The Department of Technology is overseeing the Central Transit Signal Priority project, which provides signal priority for VTA bus routes 66 & 68 for all intersections along the route within City of San José jurisdiction. Transit signal priority gives buses priority at an intersection and creates less idle time waiting for a green light. Ultimately, the goal is to reduce travel time and alleviate traffic congestion.

The project uses the "LYT.transit" system to implement transit signal priority. The LYT.transit system tracks transit vehicles in real-time and communicates with downstream intersections to optimize signal timing, reducing transit vehicle travel time. It is built using a supervised machine learning model. A study done on a pilot project in San Jose during 2019 demonstrated that the LYT.transit system may reduce travel times by more than 15%.

The LYT.transit system performs best when the vehicle position data is highly accurate and frequently updated. Performance of the system will likely be poorer if a vehicle's GPS equipment loses accuracy over time or there is poor cellular communication between onboard vehicle equipment and the transit agency data center. The primary consequence of poor performance is lengthier travel times and traffic congestion.

Since the LYT.transit system predicts bus arrival time based on GPS data, there is relatively minimal human bias in the training data. The effectiveness of the system can be measured by comparing the travel time before implementing LYT.transit to the travel time using LYT.transit. With a new software update from LYT.ai expected in 2023, City staff will be able to see this performance metric in real-time.

Given the demonstrated reduction in travel times, minimal bias of the training data, and ability to view real-time performance metrics, this AI system is approved for usage in the City. The City should continue to monitor the effectiveness of the system as defined by bus travel time before and after LYT.transit implementation. If the system continues to show benefit, the City should explore applying the project to other routes.

Project objective

1. Please clearly describe the project use case, the current process, and the desired outcome. *

The Central Transit Signal Priority (CTSP) project provides signal priority for VTA bus routes 66 & 68 with all intersections along the route within City of San Jose jurisdiction. TSP allows buses to get priority at an intersection and provides less idle time waiting for a green light. At this stage of the project, we have implemented TSP at 121 of the 122 intersections along both routes with additional fine-tuning/optimization of the transit signal timing parameters scheduled for late January-early February.

The desired outcome of the project is to optimize traffic flow by providing automated signal timing for buses, prioritize traffic related to transit services to improve viability of using public transportation by reducing bus travel time and alleviation traffic congestion, and reduce air pollution.

2. Which department is owning this system? *

Department of Transportation

3. Why does your department choose automation as an approach to this problem? What other approaches to solving this problem were considered (if any) and what led to choosing automation? *

There has always been some sort of automation with TSP. One method involves physical equipment in the traffic signal cabinet and antenna on the signal pole to communicate to a GPS device in the bus to provide a "zone" when to send a call to the controller to provide priority call. Everything for this project is done with no physical equipment required and only requires communication to our traffic signal controllers which is something we had in place already. TSP calls are done through LYT's cloud which can then send a remote call to the controller based on past estimated arrival times to the intersection and tracking of VTA buses within the system.

Only other approach is to manually place TSP calls when buses approach the intersection which would require more staffing to monitor and observe buses real-time which is unfeasible.

Vendor details

4. Will the algorithm be designed, developed, deployed, or maintained by vendors or third parties? *

- ( ) No
- (•) Yes, solely by vendors/third parties
- ( ) Yes, by both vendors/third parties and City staff

5. How can the City test the vendor's algorithm before it is put into use? *

We did several test runs by riding the bus and comparing how LYT's system is aggregating the estimated arrival times to an intersection compared to when we see the bus arrives at an intersection. This way we can make sure LYT's system is accurately determining when the bus will arrive to provide TSP at the correct time.

Transparency

6. How do individuals receive a notice in advance of interacting with the system? For example, if a user is interacting with a chatbot, the system lets the user know they are talking to a chat bot instead of a human. *

Users of the system is mainly City staff, LYT, and VTA. While there is no advance notice of interacting with the system, City staff can monitor when TSP calls are being placed by using our Advanced Traffic Management System Transcore TCS, logging into the LYT portal to check when buses provide a TSP call to the intersection, or monitoring the controller at the intersection. System runs independently so any interaction with humans would be done by contacting LYT and setting up meetings for troubleshooting.

7. How can third-party auditors easily view the system's data in order to perform evaluations? *

Auditors can get a login to the LYT portal to access the system which provides real-time bus location, signal status for TSP, and estimated arrival time when bus will arrive at the next intersection.

8. How will system operators or residents know if the system outputs an error? What ability will they have to correct or appeal an error? *

While system operators or residents won't know when something is not working with the system, they will be able to tell something is wrong if buses are waiting at an intersection for a long time or an intersection is out of normal operation (signal flash).

Equity

9. What individuals and communities will interact with the system? For example, is the algorithm used on the general City population (technology used in many public areas) or a specific group (e.g., children in a school program, a single neighborhood)? *

The end user of the VTA bus route will be residents of San Jose that live and work and use the two bus routes. Individuals will not interact with the LYT system or traffic signal.

10. How likely is it that the system impacts children under the age of 18? *

Many schools are along the route so children under the age of 18 will use the bus route for school and/or work.

11. How is this use case, and the information/decisions provided by the algorithm, related to an individual's right or freedoms (e.g., if the algorithm helps determine if a suspect can be put on bail or must remain in jail)? *

N/A

12. How is this use case, and the information/decisions provided by the algorithm, related to an individual's economic status (e.g., if the algorithm helps determine if an individual can apply to affordable housing)? *

N/A

13. How is this use case, and the information/decisions provided by the algorithm, related to an individual's health, healthcare, well-being (e.g., if the algorithm helps determine an individual's likeliness for colon cancer) *

N/A

14. How do decisions from the system impact the environment, if at all? (e.g., potential impact to carbon emissions, high tech waste) *

The project will have a positive impact to the environment. The project will optimize traffic flow by automating optimal signal timing, proactively prioritize traffic related to transit services to improve the viability of using
public transportation by reducing bus travel times and alleviating traffic congestion of single occupancy vehicles, and reduce air pollution.

15. What issues could arise if the algorithmic system is inaccurate? *

Signal timing will cause longer delays for vehicles waiting along side streets the do not benefit TSP. Also, no communication to the traffic signal controller will cause the bus to get no TSP which will mess up the ultimate goals of the project.

Human oversight

16. Please describe the level of autonomy of the system. *

- ○ System operates automatically with no human intervention
- ◉ System operates automatically with occasional retrospective reviews by humans
- ○ System operates automatically with opportunity for human to override any individual action
- ○ System produces recommendations but cannot act without human intervention
- ○ Other

17. If there is human intervention in the system, is it by the vendor, City department/office, or both? *

- ( ) Vendor
- ( ) City department/office
- (•) Both

18. Please list the roles/divisions that will be “touching” the system, or managing the deployment and use of the system. *

LYT - Overall management of the system
ITS - Monitoring communications to traffic signals
Signal Operations - Overall management of signal timing, optimization, and performance of the system

19. How does the Department provide training and resources to personnel to help them develop the skills they need to effectively operate the system? *

Part of the contract includes a couple of training sessions with LYT to allow City staff to understand the system and day-to-dat settings to monitor.

20. In the event that the system does not work or is deemed to be inaccurate, what back-up measures are in place to ensure that the Department can continue to deliver services? *

TSP can be turned off and buses will perform the same as was done before the project started. There would be no TSP calls and buses would wait at a signal similar to how signals with no TSP is used.