Transcript

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Loia, Dayna 2:27

All right.
Welcome everyone to today's webinar on leveraging innovative Technologies to enhance transportation and tolling operations.
My name is Dayna and I will be your webinar host today.
We're thrilled to have you join us today before we dive into our agenda, there are a few housekeeping reminders for our attendees.
We are recording today's session and you will receive a link to the recording and a transcription post.
Webinar all attendees have the option to enable a transcription through teams and you should see this option in your team settings.
At the end of the webinar we will prompt you to take a very short feedback survey.
Responses are very much appreciated.
They help us improve our attendee experience for future webinars and because we have placed everyone in listen only mode, we encourage you to please submit questions through the Q&A at anytime during the presentation.
And we will all get to as many questions as possible.
I'm going to kick off today's webinar by reviewing our agenda.
To start, we will be discussing the current state of tolling operations.
We'll provide an overview of where things stand today and touch on some of the common challenges faced in tolling.
Next, we'll explore opportunities for improvement.
We'll identify potential areas where enhancements can be made.
And introduce some innovative solutions and technologies that address these challenges.
Following that, we'll dive into a case study on the Golden Gate Bridge.
Our speakers will describe specific innovations that have been implemented and the outcomes and impact of these innovations on tolling operations and overall efficiency after the case study, we'll outline the practical steps required to implement similar innovations in other tolling operations.
Then we'll open the floor for Q&A and we encourage you to ask questions and

engage in this discussion.
Finally, we'll wrap up with key takeaways from today's webinar.
We'll recap the main points discussed and provide actionable insights and recommendations.
You can take away and apply in your own tolling operations. OK, before I take it, move it over to our speakers.
I'd like to introduce them and let them take the floor.
So first we have Francis Tang, who is a principal consul in Rs and H with 20 years of experience in transportation engineering, specializing in transportation systems integration, including toll systems.
Francis has worked on projects involving all electronic tolling, managed lanes, public safety and weight in motion systems.
Notably, he contributed to the research and development of a photo enforcement in an automated occupancy detection system.
Is deployed globally.
Francis is also an active member of the IBTTA and TRB communities.
Tony Ahmad is a veteran systems engineer and transportation technologist with over 25 years of experience in tolling, modernization and intelligent transportation systems.
As the Co founder of its Rhodes, Tony leads innovation and toll operations and infrastructure. Tony's career includes key roles at Lockheed.
IMS, ACS, Xerox, SAIC and Ledos where he contributed to major toll system deployments and advanced transportation research.
Currently, he overseas its roads emerging technologies, including an AI powered video analytics pilot at the Golden Gate Bridge.
I'm really excited for our speakers to take over and I'm gonna pass it over to Francis.

Tang, Francis 6:20
Thanks, Dana.
So welcome everybody again.
I want to take the time to thank everyone for taking time out of their day.
I know everyone's busy today, but definitely want to welcome you and let's get started here.
So today's discussion, I wanted to start off with kind of looking at just the current state of our tolling operations and couple points I've I've added here on the screen

are kind of more relevant to our discussion today.
Revolving around 2 new technologies.
As well, I wanna encourage everyone here.
Feel free to jump on the chat and kind of as we talk through our our discussion today.
List some challenges that you and maybe you know running into with with your day-to-day operations or your interactions with industry folks as well.
So you know, with that, why don't we get started with some of the initial challenges that you you may face?
Being limited budgets, we we all kind of.
Run under this one day or another.
You know, we have transportation agencies that are have competing priorities, could be ranging from trying to address aging infrastructure at their facilities or even just trying to figure out how to allocate revenues.
You know, either coming from tolls or from other revenue sources to to fund some other public transit services that may be tied into all other operations.
As well, want to look at kind of increasing operational demands, you know, combined with the budget constraints, we kind of noted above there, you know agencies, you know they have to find ways to adopt and evolve.
And operating their facilities, you know the demands are seeing today compared to kind of yesteryear, for example in the tolling space, you know we we went from manual toll collectors collecting cash and just kind of doing daily deposits to.
Moving to more of a electronic tolling operations where now we got to keep an eye on you know our different subsystems and and they're collecting more and more transactions per hour that we used to handle from a manual perspective.
So we need to be able to, you know, adopt these new hardwares and software approaches and and allow that to kind of meet with the growing demands.
And next, you know I mentioned that moving over to electronic tolling and I was also brought new challenges where we need to kind of develop additional fair and measurable performance metrics. You know we want to make sure that all this technology we're implementing and and utilizing is Capt.
The data we need and and accurately, especially in the tolling atmosphere, you know those transactions you know.
Report to revenues that we collect and.
Kind of what we mentioned earlier of our challenges of, you know help funding other

initiatives they may have.
So as well with this technology, we get to kind of leverage today is we're now getting the ability to capture more and more data points that we were not able to do in the past or found it difficult.
To to do previously.
So we want to take this data and be able to capture more and more of these points and and help our agencies get a better customer experience, understand a little bit more dynamically what the customers are up to as well. This data can allow agencies and transportation groups.
Provide provide further insights. You know everyone gets involved with long range planning or.
Planning initiatives in general?
So now that they're able to get some of these additional points.
So we want to kind of be able to plan for better tomorrow for our customers and as well as the folks that need to operate the systems day in and day out.
So as we looked at the kind of those challenges we we touched on and we looked at these opportunities for improvement, I kind of threw up some words here. I touched on some of them just previously here.
But you know, as we're talking today of more of emerging technologies and how to how we can integrate technologies in our operations today, you know, we wanted to kind of also look.
At some of the other areas, as we go into.
Just modern age, you know, I mentioned earlier. We're going from from more of a manual collection process in our tolling worlds to more of an automated process.
So some of those those items we want to improve kind of go around.
Maybe cost effective approaches you know can can we standardize some of the hardware?
We're utilizing.
Can we implement, you know items that can be interchangeable?
Can can we look at hardware A and maybe in the future be able to quickly implement hardware B or have them work work hand in hand?
And with each other.
You know as well we want to look at.
It's kind of one of the main words I kind of have on the chart here.
In in big letters, is future growth everyone's really concerned with?

The future alignment of of our systems and and the technologies you know everyone wants to be able to adapt what they put in today.
To be used further down the line, you know we want to be able to have that.
Equipment.
And and solutions kind of be utilized for a good length of time. You want to be a take advantage of that.
And as well, we want to pull back from kind of the hardware and software side of things and look at, you know, improvement sides of coordination between your groups and stakeholders. You know, with every new technology, you know, you want to make sure everyone's on the same.
Page on where you're trying to go with that technology.
You know how you want to implement it, how you want to utilize it and make sure that the objectives that everyone's agreed on.
Are going to are going to be met.
And as well acknowledge.
The constraints you may need to work under.
When implementing this technology.
So a technology that may be implemented for agency a over here may have a different set of constraints or or objectives to agency B that may want to implement a similar technology that they're looking into.
As well, we want to kind of touch on areas of improvement under utilization of AI and cloud integration.
Ation.
You know, looking back historically and and our our tolling industry, a lot of our systems were on Prem. A lot of our data were collecting and process were all on Prem.
And.
Introducing AI and cloud now provides opportunities to be a scalable solution to allow us to get more accurate data and in a more real time.
Kind of setting previously you know there was quite a lag of when we can acquire data, get it process and analyze and and start looking at maybe operational inefficiencies or.
Potential equipment failures that we wanted to identify quickly.
Now going into more of AI and cloud integration, you're getting more of that real time analytics that that can provide that and really anywhere remotely or on Prem,

you get that access to that data pretty, pretty instantaneously.
So looking at kind of the AI in cloud and on what we kinda just touched on here, I wanted to kind of turn it over to Tony as well. You know, Tony brings many years of hands on implementation and integration experiences.
I just want to high get his viewpoint on some of the improvement areas from a technology perspective.

Tony Ahmad 14:31
Thank you, Francis.
You know, that was a great insight on, I guess looking at the future of tolling.
And giving that history of tolling and where we're headed.
Yeah. Like that's the question we're constantly asking ourselves.
Like, what does all the cloud mean?
What are all these SaaS models that are coming into our industry and how do we?
Utilize some of those tools that are being used by other industries or you know being.
Being adopted by other industries and and we don't see a lot of that in tolling now and some of the latest RFPs that come out, they do want you to touch on cloud computing. Some of the SaaS tools that exist out there.
Kind of trying to, you know, leap or bridge it into this, you know, New Horizons.
So with cloud computing like you touched on.
It it's scalable. You can stand up tools.
Where traditionally when we had to provide a on Prem server or do some customization for data analytics, that is all in the cloud and it's easy to stand up. It's easy to roll out, it's easy to implement and those are all the tools that are available in the.
Cloud.
And tolling is a little bit behind adopting a lot of that and that's where we're coming in and saying here are a few applications that we're experimenting with and here are the results.
And what efficiencies they're bringing to you and what advantage advantages your agency can, you know, have or benefit from? Yeah.


Tang, Francis 16:13
Thanks Tony.

So with that kind of being able to kind of get a general view of of what our industry's been up to kind of want to bring up next, our our case study and kind of hone in specifically on on a unique case here with the Golden G.
Bridge.
So we partnered with the Golden Gate Bridge and its roads to to help bring some innovations to some of their operations there.
For those that aren't familiar with the Golden Gate Bridge, it's a iconic bridge.
That claims many visitors every year.
It's also a told facility, as you can see here.
They're currently tolling in the southbound direction at the bottom of the screen, and that's going into downtown San Francisco and then just above it are the northbound lanes going north onto the Golden Gate Bridge and heading up north in Des Moines County.
So for the going gate bridge, there are currently implementing a third party in ground.
Traffic.
Detection system.
And this system's providing their leadership with traffic counts on a on a daily, monthly manner.
This is important for them because they take this information and and use this for planning purposes and and as well give kind of insights from a daily, weekly perspective on on how the traffic's been operating in the facility.
So fortunately for them, you know, with the toll system in the southbound direction, they do have a secondary source to help kind of verify what this in ground system's been been up to. But in the northbound side, they have no other basis.
So this kind of brought a concern to them as they're using this for planning purposes and and some of these key decisions that they're going to make.
Kind of rely on this data. They approached the the Rs and H team and and kind of.
Wanted to ask if there is something out there that can kind of help verify that the system is in fact counting accurately as it as it needed to be.
So as we met with their leadership, we kind of got their criteria what they were looking for.
And in this kind of solution, they wanted to put in and and what duration they were kind of doing this case study for and with that we kind of took that all back and and with its Rd.

Rs and H.
We had provided a solution to the Golden Gate Bridge, which consisted of a camera system that employed a video feed over multiple lanes piping back to a cloud based AI analytics server.
Golden Gate Bridge.
With their technologies, they wanted to introduce us first as a pilot.
Again, they wanted their leadership to get a hands on feel of.
What new technologies are out there?
What were the capabilities?
And as well kind of some of the other items in their solution they wanted to address was something that was budget friendly, quick to deploy.
Fortunately, the Golden Gate Bridge had some existing power and communication infrastructure where we were able to utilize and allow us to quickly get the hardware installed and up and running and and piping that data back to the analytics server to to start getting some counts for them.
As well, they want them, you know.
See what technology provided a scalability.
They initialized this pilot for the northbound direction. As we mentioned, didn't really have another baseline, but since they were able to experience that, they wanted to keep the auction open to expand it. Maybe in the southbound or other areas of their facility.
This kind of led to the last point I here with additional data intelligence. So traditional accounting systems you know are good at one thing.
They're they're able to count the vehicles in the lane when we kinda show them like the camera based solution and with the advancements in AI technology and and learning.
We we told them that.
Show them that the system is capable to actually grab additional data points that could be useful. One in particular was along with vehicle traffic counts. The system was able to kinda give them classification data.
We were able to determine, you know, the number of cars, trucks, buses, even motorcycles, right down the pedestrians and and bicycles.
Could be counted as well as additional data intelligent points that they weren't having access to previously.
So that was another feature that we were quick to to add on. It was it wasn't adding

additional cost to them. It was just a matter of training the system to also capture those different objects.
And we were able to kind of set this up for them very quickly, get it up and running and start pulling in that data.
So this one of the kind of start giving you a view of the initial pilot and here you're seeing kind of a screenshot of of the northbound camera.
I wanted to kind of give the folks an idea of of where we were kind of capturing the the traffic count.
So I kind of highlighted in the image there the the detection region where we were looking to count and this was in this general area where their existing counting system was that they were looking the baseline.
So it seemed logical that we wanted to get.
Our counts as as close as we could to where they were and give us more of an apples to apples comparison.
So over the next couple slides, I'm gonna turn it back to Tony and and kind of give us more of a under the hood look of of the AI solution and and kind of what features and capabilities we were able to provide Golden Gate Bridge.

TA **Tony Ahmad** 22:13
Yeah. Thank you, Francis.
And and I do want to emphasize and point out that there is nothing actually wrong with traditional systems out there.
Yeah, that are doing the vehicle counting and the traffic counts, especially when it comes to magnetic sensors and you know, radar.
There's lidar.
There's many, many systems out there that does this, but we do know that everybody is, you know, headed the direction of AI.
And video analytics.
In bringing in those live feeds, I mean, we have cameras everywhere.
Why not utilize it?
Why not use it? What you see with your eye? The system can see the same thing in, you know, not only. As Francis mentioned, you know, we're not only doing counting, but we are identifying objects by identifying or classifying objects.
In this scene, this is all under the hood for you know, the system.
From once we establish communication at the site and we bring in those video feeds,

there are many different formats of the video feeds that we bring in and feed into our back end data analytics system in the cloud. And by the way, this can be also on Prem.
Yeah, because we know some agencies might not like to export that data.
So it's possible to do it on Prem, but we go with the cloud feature because it's easier, it's quicker to deploy.
And you see in the scene.
Most of these vehicles that you see a green bounding box around, we are recognizer classifying them at 100%.
All of these vehicles in the scene, and once we identify that object and we say that's a car, truck, whatever it is that we wanted in our under the hood to identify. In other words, if we didn't want bicycles to be identified, we remove that. But if we.
Wanted to add bicycles be tracked and those objects be classified.
We will put him in the scene and add it to our analytics when we're doing the system configuration and then another thing that we built here, once we start tracking the vehicles.
You know we have.
Different applications at the scene, so we know the behaviors of the vehicles. Either we are counting the vehicles, for example, that one vehicle you guys see it with a red bounding box around it.
That's all you know, a sudden lane change because the lane is closed and vehicles are moving at.
High speeds, you know, coming down and that vehicle just jumped in front of them and it could be a safety concern.
Yeah, maybe the agency wants to see that data where before they wouldn't see that data.
Francis, we can maybe go to the next slide.
So once we start cracking these well identifying the objects, then we track these objects.
And just like your traditional loops like you know we draw barrier lines.
And as vehicles go through these barrier lines, we counting, we count them in now in this scene on the Golden Gate.
Northbound, you guys see lane one all the way.
There is N is 0.
Well, that's.

Elaine, that either gets moved to the northbound or southbound where with your traditional magnetic sensors, you know you would have to go out there and kind of implement.
And then figure out like you know what direction the vehicle is going. You might need two magnetic sensors, so you can, you know, figure out direction with this. We just simply drop another line. And now we know, you know, we're tracking vehicles in that lane as well.
And these are lane counts. As you can see.
And then we do a barrier line, so we can check.
Count Lane counts against the Big barrier line, so it's multiple checks, so we have more confidence in the data that we are collecting.
And then, for example, that ramp that's oncoming at the last minute, we're counting vehicles there too.
So there's multiple points of data that we can collect in the scene and, you know, provide it to the agency.
Francis, maybe we can. Yeah.
So here again we have another vehicle jumping at the last minute in front of fastmoving traffic.
And and that's a that's a safety concern.
That could be a near mess, but that we provide that data.
We provide a timestamp for that data.
We send a warning and alert of that data to the agency.
So that's another data point that we are collecting.
Here again, this is a night shot.
One of the things you know when it comes to object detection and counting, you know, how do you deal with objects at night.
Different lighting conditions, different environmental conditions.
Well, we constantly improve the object detection models on the back end.
This is under the hood.
This is not something that the client sees.
This is our cloud.
And we go back and this is what we did actually.
When we were doing the pilot in the at Golden Gate southbound, we were training our models for nighttime, for fog, for rainy weather, to improve those models, and maybe in later slides you'll see when we once we had the model.

Working efficiently and it was improved. You know, we started collecting data and the system was locked down.
We weren't making any changes.
We collected data for a few months and data was.
Being downloaded and compared to the traditional systems that are installed there to, you know, feel out the accuracy of the system.
Uh.

Tang, Francis 28:11
Thanks Tony.
So now that you kind of got a visual of kind of under the hood of the system, kind of one of the summarize a little bit on on the analysis side of for what we did for Golden Gate Bridge.
So also wanted to show here. As Tony mentioned the slides previous was kind of what we kinda do behind the scenes and here is kind of more of the user interface.
This is kind of the dashboard system that.
Golden Gate and and other users would have access to.
This is a fully configurable dashboard.
Primarily for Golden Gate Bridge.
They were looking to get, you know, hourly counts and daily daily counts.
So a lot of the portals you're seeing here are kind of referencing that. And then as we mentioned, you know for the pilot primarily counts were the main objective, but we also kind of map for them the different vehicle types that we were able to count for them.
And show that represented on their dashboard.
So this kind of gives them that that nice quick view that near near real time view.
That someone, maybe their executive leadership every morning wanted to log in, get a, get a quick view of how historically the the traffic was moving for them and and help them kind of give that picture to maybe into other meetings may have walking into that day or or.
That week. So this was definitely a great benefit for them. Just being able to get this kind of information at their fingertips.
Tips.

Tony Ahmad 29:40
Yeah. I mean. Oh, sorry, Francis, I want to add to that.


Tang, Francis 29:42
Yep.

Tony Ahmad 29:44
And this is all customizable.
Yeah. So you have all your data points.
You know what we showed in the previous slides, you know from under the hood, it all gets into a database and it's in near real time.
I I hate to use real time.
Yeah, there is no such thing.
But in near real time and that data is being pulled on these dashboards, the end results to the customers, they can go in and download if they want.
Any of these performance metrics metrics or the metrics?
Downloaded in CSV and Jason and and other formats because you know they wanna take it and and feed it to other tools and and they can do further analysis if they like.
But this is the dashboard is customizable.
You can add many more graphs and charts to it and look at different metrics that the agency in particular is interested in.


Tang, Francis 30:35
So as well I just wanted to quickly show the the kind of some of the results we're providing, goingate bridge kind of meet their primary objective was to verify was their system current they're currently using accurately counting.
So this was just kind of part of part of our results pages that we would provide for them and this kind of helps show kind of between the camera system and the their baseline system.
From an hourly perspective, what the counts were doing, and as you can kind of see generally for the daily count we were, you know within definitely less than a 1% variance.
Do you want to note though, some of the variances?
Kind of attribute to. We weren't synchronizing our time time buckets with their

system versus the camera system. So as counts maybe reached around the top of the hour, we may may add a couple vehicles, sneak in in the previous hours count versus the next hours count on each.
System that could have led to some of these variances.
So these are just small things, but in general in general, you know the district was quite pleased with the results.
You know seeing.
Something more like a greater percentage variance, you know 510% probably would have more alarming kind of this.
Show them more, more confidence that what they're what they've been receiving in the past is, is good to make the planning decisions that they were looking to do with with this information.
So we kind of went through our kind of case study and and I want to start trying to tie things all together from from what we kind of initially discussed in the beginning of our challenges and our kind of improvements in the beginning and how we got to. Apply it with Golden Gate and kind of start tying it all with some of the walk key points that we may want to walk away as we're looking at implementing new technologies.
Into our kind of day-to-day operations.
So in the first first area here we kind of steps to implementing some. Some new technologies is kind of giving some guidance from a budget perspective. You know these these are kind of four items that as we ran through this case study with Golden Gate Bridge we kind.
Of took a step back and kind of realized, you know, here are some of the things that you know for future projects and and and others that are looking to kind of get in the same area.
Where we want to kind of focus ourselves on so.
First one here is you want to kind of identify the issues you're looking to address and solve. You know from a from a budget perspective, you know you definitely want to ensure that you're addressing the issues, but you don't want to make get yourself in that pigeon hole.
Where you're trying to address those one off scenarios or those kind of 1% scenarios that that could happen, but it's a rarity. You know those kind of scenarios quickly add cost to your solution and.
Although.

You know, it may happen.
It's more of an anomaly that you can kind of address and and kind of sticking to your core issues at hand will help kind of keep you more within budget.
Next, you want to kind of understand your end users and their expectations.
You know, is this new technology?
Going to be a solution for them that's more user friendly and summarizes the results that you're capturing, or your or your end users.
More technical in a kind of want to do more deeper dive and and get some more analytics out of that data.
So those are the kind of the items and expectations you kind of want to keep in mind as well as you're kind of planning this new technology.
Out.
And as well you want to understand what's the service life expectation of this of this technology and the solution you're looking to implement is this more of a temporary kind of solution or temporary?
Say it's something you're looking to implement for a matter of months, or maybe up to a year or two.
Or is this more of a permanent solution where you got to understand?
If you're looking to integrate it with your current system, you know what are the other items you need to take care of from a maintenance perspective, perspective, or other items that need to get that longevity you're looking for out of the solution.
And then also you want to be more of a strategic technology adopter when we're approaching this from a from more of a budget view. You know, we all don't need to be the first ones jumping in to get the latest and greatest solution out there.
You know you you want to kind of jump in when your agency is at a comfort level with this technology or you know, the maybe one or two have concerns?
Jumping into this technology right away, we need to get those addressed first before we kind of move forward with it. And with that, that kind of brings to the last point too is.
Don't be afraid to run a pilot.
You know when when you have people in your group stakeholders.
Or group members are kind of on the fence there of, you know, is this really going to work for us?
Is this going to be, you know, this is quite an investment we need to make.
Maybe a pilot's another option to help you know, address those concerns or get over

those fears for them.
You know, so don't be afraid to kind of work with with your solution provider as your vendors and and your team to maybe run that kind of scenario as well.
So in the end, everybody's comfortable and it does meet the needs and objectives. You're looking for.
So from another perspective as well, I wanted to kind of leave with you guys is is from kind of a technology perspective of, you know implementing something today into your current operations and and seeing how we can also make that compatible for future growth?
So here.
Kind of through a couple of areas where you may want to consider from a technology perspective, you know, first one being you know can we utilize kind of a technology agnostic?
Approach you know, is there hardware?
Can I mention earlier?
Is there hardware from vendor A that we can start with and maybe integrate hardware B or or use them separately or integrate them together to to get the results were looking for you know and it kind of leads to the scalability perspectives you know. Can we can we?
Plan for scalability.
Can we also you know?
Look at items that when we look at growth are the foundations.
There for us to to add on to that, a good example is a simple network assessment. You know our our case with Golden Gate.
You know they use a IP based system.
We were going to the cloud, you know is is the benefit of scalability of can we get the infrastructure for the network system in place today where we can easily add on additional components and solutions without having to overhaul that that portion. You know, you know keeping that.
Approach of starting small and kind of going bigger, starting with that, that core use case we had you know and then looking at the investment port of you strategically kind of that scalability of starting small you know we we don't have to put as much of an init.
Investment in or funds were available for this fiscal year to handle this portion, and then we can scale bigger when funds get available in the next fiscal year perhaps.

Those are kind of the items you to help harness that technology and get it in and help expand it at a later date.
So and kind of building on to that, that initial use case I mentioned before, you know, going gates primarily use of this pilot was to count the vehicles and verify with their existing system.
You know, they soon discover that there are other items that were able to to utilize the oddj accounting for for the vehicle types or looking at bicycles or pedestrians.
So that that allowed them to.
Kind of keep that in mind of now that we have the system in, we can easily add more cameras if we needed.
To different areas of our facility and get these different use cases and get this different information to help kind of get that bigger picture of the utilization of the facility.
So at this point I I wanted to kind of open up Dana, I know you've probably been tracking the the chats and the QA as I've been presenting here.
Wanted to open up for any any questions or discussions that the good of the group to benefit from?

Loia, Dayna 39:28
Yeah. So we have received a couple of questions.
I'm gonna start with the first one that's in the chat from Antonio and his first one is Rs and H and its roads roadside.
Revisit the classification models that were developed as more data is collected.

TA

Tony Ahmad 39:46
I can answer that yes, we're constantly looking at data as we're collecting it.
We're keeping an eye on those metrics and if we see that the counts are off or we're not classifying certain things, you know, maybe we're mixing a truck with a bus, we go back and retrain the model.
So as more data is being collected, we're improving the model constantly, as Francis showed that trend line, you know that we were comparing it to the traditional magnetic sensors.
Now again, that wasn't for classification, but even counting those.
Objects. Yeah, we were neck to neck with the traditional systems.
Another thing I do want to point out, you know, when it comes down to, you know,

vehicle classifications, originally the system was just for vehicles.
Yeah. And then we said we got to go away from that model. And what we're doing is we're doing object recognition because it's not just vehicles that we're trying to obviously recognize or classify.
There are many other objects that agencies are interested.
And and there's other parts of the industry that don't that are not interested in vehicles, but maybe they wanna look at my how many coffee people walked in with a coffee mug into an office?
That's a different application, so we're using object detection as the model.

Loia, Dayna 41:06
OK.
Another question we received, how many cameras were utilized for the pilot and what was the timeline for the system set up?

Tang, Francis 41:16
So for the initial pilot we we focus on the northbound direction and actually we we had utilized only one one camera.
In that that direction.
So we are capturing.
I believe it was up to five lanes there, depending on that switchable lane as well that Tony had had shown us earlier.
But yeah, we were able to capture that with a single camera.
Installation itself just even. We had the fortunate ability of having power and counts available to us.
Those are typical long lead items to coordinate when you're trying to get a system like this up, but having that availability really shorten the time frame to get it up and running.
I think it was just a matter of of weeks really between coronation and getting every all the equipment out to the facility to get it up and power it on and started really tuning the system at that point.
So very, very quick turn around. Again, I think I think our partners for for the coordination efforts and and utilizing what we had to really get that up and running.

Tony Ahmad 42:18
Yeah. Another thing to touch on that, sorry.


Tang, Francis 42:21
Mm hmm.

Tony Ahmad 42:22
Is you know if if you have your own existing cameras and they meet some of our criterias for that you know stream link we can utilize whatever you have out there.
So we look at that before we even say let's install this camera, like Francis said, once we have that video feed and it makes sense and meets our specifications, it's matter of hours and days to to get the dashboards going.
And then and start counting vehicles for you and classifying.


Loia, Dayna 42:54
All right. I'm gonna ask you another question.
You had some discussions around the high speeds you saw on the southbound direction at the Plaza. Does the system capture that type of information or was that strictly through speed detection devices?

Tony Ahmad 43:11
Currently we are not doing speed detection, although we can.
We feel like the accuracy might not be there plus or minus. You know a little bit of error, but we're working on that and I think in the new releases of our application coming up in by fall this year, we're gonna be focusing on providing speed like again.
We we can provide speed, but we don't feel confident.
In, you know, at least in the 99 or above 95%.
Sent toll on the exact speed.
So we're holding it back and trying to perfect the model before we give it to our clients.
We focus on quality in that sense.


Loia, Dayna 43:53
OK. We got another question in the chat that I'm gonna ask.

Does the wireless technology exist for tolling operations or only the traditional systems that utilize overhead gantries and cable and conduit to power?

Tang, Francis 44:08

If I understand that correctly, I think actually we we aren't limited to a gantry size.
The solution?
That Tony has here and it was just we were fortunate enough with going gate to have that infrastructure in place, but.
Thinking other scenarios I know from from a traffic perspective, and I mentioned earlier, more of a temporary basis, there is capabilities of using wireless technology as a cellular or even as Tony mentioned.
Doing a localized capture and then bringing that back and then further processing it through through the AI system.
So yeah, we're not limited to kind of infrastructure that's there, but it does help depending on the timelines to get stuff up and running or kind of like I mentioned before, is it a temporary setup or is it more of a permanent setup?
The system is flexible to kinda handle those scenarios, so definitely.
Definitely not out of the realm to kind of use this in different applications.

Loia, Dayna 45:14

There's lots of questions coming in, so I hope you're ready for some more.
Have you considered using a combination of glidar and camera using sensor fusion for better object detection for when it's raining or foggy?

Tony Ahmad 45:27

Absolutely we we we're always looking at LIDAR.
Actually, we have partners that bring in not only 2D liders, but 3D lidars to do some of that detection. Because of the, you know, and you're not going to have those weather issues.
In all regions, some environments are different than than other client sites.
So we we can do a combination of LIDAR and video.
Right now, we're focused on video, but.
Definitely our algorithms and our back end is designed to bring in lighter data, infuse it with our video to improve that performance.

Loia, Dayna 46:08

OK.

Another question for you, was there any intro parability of the system you discussed with the tolling system at the Plaza? And if not, could that be something that could be done?

TA

Tony Ahmad 46:22

Francis.

We we did not do any integration with the existing toll system, but the system has rich APIs and we can do that integration with any tolling system. For example, if there's transactions you guys wanna tie into and sync up with this, just like the standard, I guess, AUD.

Video audit systems that currently are deployed and, and and tolling applications or or tolling agencies.

This is fully capable of that, so we have APIs that can do that.

Loia, Dayna 46:58

OK.

Another question, if you were to identify the biggest challenge in the development of a solution like where?

Like what you discussed for Golden Gate Bridge? What would that be?

Tang, Francis 47:10

I think kind of what I kind of mentioned before and kind of as I tie things together, I think one of the big bigger challenges is just getting you know everyone on the same page and get everyone coordinated with this, this technology. You know you kind of when.

You get into a group setting you you kind of get the mixed feelings of, you know, this is great for for us or others that are on the fence and just trying to get everyone again to that comfort level and and understanding its capabilities and and and.

What? What? It's gonna kinda provide data wise for them. I think that was kind of the bigger for our case study with going gate bridge. I think that was more of or less the big thing.

I think technology nowadays is it's able to evolve quicker than it has kind of before.

So I think that's becoming less and less of a of a constraint. I think it's just trying to get everyone comfortable with that like that kind of change.

Loia, Dayna 48:05

All right. I think we have time for maybe one or two more questions before we do our key takeaways.

So the next question I see in the chat is how accurate is this system in detecting and classifying pedestrians, bicycles, scooters and other non motorized traffic?

Tony Ahmad 48:21

You know the models are well trained to do all of that and more we do.

Even you know strollers and and wheelchairs, and we can add more to our model if if a customer came in and said I wanna, I don't.

I just wanna give an example.

I wanna see red walls and and we will train that model to to do that as best as I can, but for.

Pedestrians and bicyclists and scooters, not just our model, but all the AI models that exist today.

You know, custom.

Or open source. They've been really focused on on, you know, pedestrian, bicyclists and and on and on. So those models are well done.

I mean, you're going to get depending on what kind of video you're bringing in, in lighting again, environmental conditions, you're going to be at 9900% most of the time.

And that's what we've been seeing.

Loia, Dayna 49:26

Awesome. OK. I think that's all the questions, but I'm very impressed with the amount of questions that we did receive.

So I'm gonna pass it back to you, Francis, to provide our key takeaways.

Tang, Francis 49:37

Thanks again again.

Yeah, definitely appreciate the the questions and and the points here.

I really, really love it when the community kind of engages and and again this is a

benefit for everyone.
So with that, I want to kind of summarize some of some of the key points here.
Takeaways as we kind of conclude our discussion today.
So first, first and foremost, you know, don't be afraid to start small, you know, and expand your your system later on. You know we continuously talked about.
Comfort level with your stakeholders and your group members. You know, looking at maybe doing a pilot to get that comfort level up.
So those are kind of all-encompassing of starting small and getting everyone comfortable with that solution and and that technology and then later being able to expand it and keeping scalability and other factors in mind that can quickly adapt to to your system and your operations and then.
Kind of what we kinda had in the Q&A here. Just we understand that video AI and.
It's been around for a while.
It's just up and more recently it's becoming more and more cost effective option for for agencies and folks to utilize. And Tony had mentioned you know we he's able to train different objects and we can quickly take that input and and get into the model and start train.
That and start capturing that that data point.
So definitely, definitely A+ to to be able to kind of get that to fruition quicker.
As well.
Be a strategic technology operator adopter.
I really like this.
This take away here is, you know, don't be the first just because it's the latest and greatest. You know, I keep harping on making sure everyone's at a comfort level.
Everything's within budget at you're looking to to address your solutions with, you know, all that strategic planning and all that can in the end benefit everybody.
So and then finally, you know, go at your own pace.
No, I I harp on being at the comfort level. It's been true with with our case study with Golden Gate and just something in general practice.
You want to get accustomed to is. Make sure everyone that's involved is comfortable with what you're looking to to adopt and and bring in and in the end it's just going to benefit everyone in the end and and get that additional data points and information that that you.
Couldn't have done previously and and kind of move forward with.
With better planning and better initiatives and and better operations.

So again, I want to thank everyone.
I definitely wanna take the time to to. If you need to reach out to to Tony or myself, there's also AQR code here.
We're always improving our webinar series. If you want to take the time to fill out a quick survey.
All feedback is very appreciated.
And hopefully you know, we'll definitely see each other soon.
And will like to put on more of these kind of webinars for the group. And really again thank you all for taking the time to join us here today.
And I hope if anything, there's a couple key takeaways you were able to take from this and and go talk to your clients are adapting your own operations.
So again, thanks again for joining.

TA **Tony Ahmad** 53:02
Thank you.

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