Season 2, Episode 4 The Power of Acoustic Intelligence in Critical Infrastructure

Summary of episode:

In this episode of the Haivision Podcast, host Dustin Bilthouse is joined by Tim English, Managing Director of Acoem Security, and Mike Arnold, Product Manager for Acoustic Threat Detection (ATD), to discuss how acoustic intelligence is helping organizations strengthen security and improve situational awareness across critical infrastructure and public safety environments.

The conversation explores how acoustic threat detection complements video by providing real-time alerts that can automatically direct PTZ cameras toward the source of a gunshot within seconds. Tim and Mike explain how edge AI, decades of defense expertise, and seamless integration with existing video management systems enable organizations to respond more quickly while reducing false alarms and improving operational workflows.

From protecting electrical substations and pipelines to supporting law enforcement at campuses, festivals, and large public events, the episode highlights how combining audio and video intelligence creates a more complete operational picture. The discussion also examines practical considerations for deploying new technologies, emphasizing the importance of understanding operational workflows and ensuring technology enhances, rather than complicates, decision-making when every second counts.

Intro (00:00)
Welcome to the Haivision Podcast, where we take a deep dive into the innovations and challenges shaping video technology. In each episode, we'll bring you insights from experts behind cutting edge video networking, visual collaboration, and video wall solutions. So whether you're professional navigating the complexities of video wall technology, working in live production, or someone who's simply curious about new tech, this podcast is for you. Join us as we explore the latest trends, share success stories, and discuss the technology shaping the future of mission-critical video environments.

Dustin (00:37)
Hi, I'm Dustin Bilthouse with Haivision and we're on the Haivision Podcast. Today we have guests from Acoem. I've got Timothy English and Mike Arnold on the line. Tim and Mike, if

you guys want to do a quick brief introduction and maybe a little bit about your background.

Tim (00:53)
Sure, thanks. My name's Tim English. I'm the managing director for Acoem Security. Acoem's a global company. We're making precision instrumentation across a number of industries, environmental, industrial applications, and where we are organized is defense and security. And primarily we're here to talk about acoustic threat detection, which is a gunshot detection sensor. And yeah, I think that's kind of the background for us. So I'm stationed here near Philadelphia.

Mike (01:23)
Mike Arnold with Acoem ATD, based out of New Orleans. Been with Acoem for almost 17 years, working on some of the different divisions that Tim mentioned earlier, mainly in the industrial reliability division and launching new technologies that Acoem has developed. Started with the ATD team almost five years ago, bringing this product to life and helping deploy it in different applications from critical infrastructures to first responders and bringing the technology out into the real world.

Dustin (01:51)
Awesome. Acoem's been doing a lot of critical infrastructure monitoring for some time now. So the ATD, and I think we'll probably have that acronym come up a few times, is the Acoustic Threat Detection Division of your organization. What was the catalyst that sort of drove that technology or the need for that technology in your eyes?

Mike (02:12)
In the critical infrastructure space, bringing the acoustic threat detection, like you mentioned, Dustin, that technology out, we developed that for military use almost 30 years ago to detect snipers and different shooters and different theaters of war. And we kind of changed the form factor, scaled it down, and made it available for deployment in public sectors and in private industries. And in the critical infrastructure space, there is a threat in the US and all over the globe for bad actors that want to shoot up transformers or take out pipelines or different applications that fall under that critical infrastructure space. So it's not only about catching these bad actors, it's about saving that equipment that might cost millions of dollars, have a really long lead time to replace, keep power and other infrastructure facilities up and running. So just being aware of that, being able to act in real time to save those pieces of equipment or catch those bad actors while they're doing these things.

Dustin (03:10)
Nice. Yeah, and I want to circle back on something you mentioned there a little bit, and we should probably recap what we mean by critical infrastructure as well, but a lot of these assets might be in places that are not easily accessible. You mentioned a pipeline and a pipeline's not going to generally be run into a city, it's going to be running maybe perhaps a rural area, right?

Tim (03:33)
Yeah. So I mean, one of the advantages that we have with ATD is that a single sensor acts as its own isolated unit. It's doing all the processing on the edge and it's monitoring an area around that sensor of 500 feet. So it gives customers a lot of flexibility about where they can put the sensor. So you have some of these remote sites. If you were bound by having to put sensors around the site in order to monitor what's inside of there, you'd have some struggles like you mentioned, but we give people the opportunity to be able to put it inside of a perimeter where they control the property, where they control power and they control data and they can monitor areas outside of that. So an example, like an electric substation that could be in a very remote spot, the utility generally has some control over just the area right around the equipment and that's where they can fall the sensors.

Mike (04:30)
Nice. And having the ability to, from our tech, the scalability of it, most of the other technologies out there, like Tim mentioned, need that large coverage area, need at least three because they need to triangulate a location where we can deploy one if it's a smaller substation or a smaller footprint in critical infrastructure and deploy one sensor that covers what it needs for that area, be able to localize a threat and pass that information on to the customer in real time.

Dustin (04:56)
Gotcha. And when we talk about critical infrastructure, I do want to back up a little bit for the lay folks that may jump onto this podcast, that critical infrastructure can sound maybe a little bit abstract. So I kind of want to just throw some definition out there from what I did, little internet research. Critical infrastructure refers to the essential physical and cyber systems, assets and networks such as power grids, water supplies, transportation and communication networks whose destruction or disruption would have a debilitating impact on national security, economic stability, public health and safety. That is a pretty high bar I think when you talk about when you're developing a product for something. It's not just consumer grade product, but we're talking about national security. There's

potential economic impact, there's potential public health impact, and certainly most importantly, there's also a safety impact. So I guess from your guys' perspective, do you have any real world examples where sensor data may have directly impacted an operational decision in real time when we're talking about water systems or electrical grids or you mentioned transformer stations?

Mike (06:08)
Yeah, so we have one of our large utility customers that has our technology deployed in hundreds of substations, getting that real-time information back. So one story is there wasn't damage, there wasn't a real threat, but the awareness of they got a gunshot alert, camera pulls up immediately, they can see a father and a son that are hunting next to a substation. So they did get a gunshot alert. They were aware of it immediately went to take action, realized this is not a threat. This is a family out hunting in a rural property next to a substation. So there was no action there needed. But the main thing is the fact that they got the real-time information as it was happening to take action if they needed to.

Tim (06:50)
That ability to slew that camera is another unique advantage for us in this particular space because like Mike said, where these substations are, we get hundreds of gunshot alerts from hunting. So having the ability to instantly look right at the source of where that sound came from and determine whether or not you have a real threat makes this much more usable for them. Yeah,

Dustin (07:13)
And I'm sure it can go from a hunter out for the day with their family, like you said, to something more nefarious in an instant. I mean, at the end of the day, a gunshot's a gunshot and you want to have awareness on that. We often think about video and from a Haivision perspective, we certainly think about video as the primary real-time input when we're talking about operation centers. If we're going to security operations center or real-time intelligence center, video is certainly what we see and what decision makers are looking at. But how do you guys see environmental intelligence between I guess things that you're measuring like sound, vibration, air quality as a whole? How does that compliment or even enhance video-based situational awareness?

Tim (07:55)
In the case of the gunshot detection, we utilize the video as the secondary indication in every case. So because we're doing that processing on the edge, we're able to move the

camera very quickly. So the first command that actually leaves the sensor is the one that's going to reposition the PTZ camera. Our end user is just as interested in that piece as the audio. And in the end, he's got them both to correlate the time and date and what happened and how many shots. In that real-time instant, having that instant video feed is kind of critical to the whole system.

Mike (08:28)
And video is one of those technologies that a majority of the people have. It's usually the first layer they'll add to something. And all those other technologies you mentioned, Justin, there's all force multipliers for knowing the more you know. So just like our five senses, if I take away your hearing, your touch and your taste and you just have vision, it changes your whole world. So the more we can put into it to give more information if something is happening, it is critical to dealing with something if it were a bad actor or a threat.

Dustin (09:00)
Nice. And I know you mentioned something key there, Tim, was about processing at the edge. So AI at the edge, Haivision has products that is doing video analytics at the edge. What pushed you guys at Acoem to look at that? Was it just because of network reliability or distance or is it just because that's where a lot of, you mentioned PTZ, it's just a lot easier to simplify that process versus going from the edge to the cloud and then back to wherever that demand needed to be sent.

Tim (09:31)
Yeah, I would say there's two reasons for that. The first and most important is the speed of the response. We want to alert someone of a go, whether it's critical infrastructure or a public safety customer, their primary concern is being alerted that a gun was discharged as quickly as possible. So by doing the processing on the edge, we're able to push those alerts out in seconds and reposition the camera in seconds. So if there is somebody taking a second shot, we'll capture them on video and we'll frequently even be looking at the video before the weapon is even lowered. The speed of the alert would be the primary factor. And then another key advantage is that we don't need any secondary hardware. So you hang the sensor and that's all the hardware that you need to get the system up and running in that position.

So you don't need to talk to a critical infrastructure customer, for example, about putting another server somewhere on each one of those sites, which quickly escalates the costs, the complexity, how quickly you can deploy the system. So those are just two key advantages of doing it that way.

Nice.

Mike (10:41)
Yeah, time is a big factor. A lot of the legacy systems have kind of a middleman where they send that information back to a cloud and let even humans sometimes get it in the mix of verifying an alert or not. So us being able to deploy, work our AI at the edge in a second or less than two seconds provide that alert real time is huge. So it really comes down to the time there, Dustin.

Tim (11:06)
It alleviates us from having to stream data. So if we had to correlate sensor data from multiple different sensors in order to get our positional information and the validation, whether it's a gunshot or not, we'd have to be streaming that data continuously, which opens up other kinds of cyber risks and risks to privacy. And we can sip that by just conducting all those calculations on the edge so that the only data that has to leave the sensor is an actual alert that somebody needs to pay attention to.

Dustin (11:38)
I do want to switch gears a little bit and dive into some public safety stuff. So I imagine public safety for the ATD team is an area that you guys want to focus on. I'm curious where does acoustic threat detection play a role in maybe larger events like universities, campuses, sporting events? Is there an application there that you guys are seeing for this type of technology?

Mike (12:04)
Yeah, definitely Dustin. Another big advantage of our ATD sensor is the fact that since we can scale it down to one sensor if needed and they work independently at the edge, we can put them on portable trailers so they can be deployed at parades, festivals, sporting events, and of course always be fixed assets if they're at arena or something like that. But being able to deploy on portable trailers when these events are happening and put them where they're needed to not only possibly detect a threat if it happens, but we had an instant university for homecoming last fall where there was big concert, parades, festivals, all that stuff going on. And there was a loud bang and the crowd started to run because they thought it was a gunshot. Well, there was no gunshot alert. The PD at the campus checked cameras and it only took them a minute or so to realize that, hey, A, the ATD sensor never went off so there wasn't a gunshot.

B, the loud bang they heard, they checked the cameras and it was somebody that popped a water bottle twisted together and made it a loud pop. And the crowd thought it was a gunshot, so they realized they didn't have a threat, didn't need to act on it. And that right there was a huge advantage. But parades, Mardi Gras in New Orleans, we've had sensors deployed there and just being able to have that technology where you need it when you need it for large crowds is a huge advantage.

Dustin (13:25)
Yeah, absolutely. And I mean, what can make the argument like, okay, there's an ROI there, not having to dispatch additional officers or SWAT or something like that and react to that. But there's also a significant advantage to public safety and civilian safety because when police come running in, things can happen. People react and you're almost creating this self-fulfilling prophecy agitation. Whereas you can monitor this remotely, whether that's from mobile command vehicle or over the radios, or if there's a real-time crime center where they can assess that situation with the officers that are already in the field, say, "Hey, this wasn't an actual event. There's nothing to respond to. Okay, let's not go ahead and agitate a large mass group of people.

Mike (14:12)
" And then the other thing is from the technology side, if we're all at an event and we all hear a gunshot, we are probably going to point three different directions. So the accuracy of the ATD sensor, knowing where to localize that threat as it happens in real time and not be guessing, "Hey, it came from this way or came from this way." You got a camera view, you got a location and a direction on a map, and that right there is a huge, huge benefit.

Dustin (14:38)
Absolutely.

Tim (14:40)
And outside of the event space or the areas where crowds are going to congregate, we have plenty of customers that are also using ATD for fixed twenty four seven monitoring of just hotspots where they expect to experience crime. And that's another thing that we can offer that we introduced into this market is you have the ability to deploy sensors in strategic positions. So you don't have to commit to being able to cover every square mile of your town because that makes it just out of reach for a lot of towns. So when you talk about a medium-sized city, 50,000, 100,000 people, their budgets are limited. They still have areas of concern and they can buy two or three this year and maybe they can get budget for 10 more next year, but they can immediately start addressing areas where they have high

crime or areas where there's illegal arms dealing activities.

And we've had success stories from around the country of even homicides or illegal arms deals or just nuisances of people shooting guns off into the air for celebration type of reasons. And we're able to offer those police departments a solution where before that they were really priced out of that whole technology.

Dustin (15:58)
Yeah. And I mean that makes total sense. I mean, there's departments that we work with that can't quite afford a full-on operation center, plus the staffing concerns that come with that to even run that hopefully twenty four seven, but if you're looking two or three analysts, it adds up quickly. But a lot of times Haivision will work within the confines of what the customer already has and their capabilities. And that might be something as simple as just a mobile trailer system and say, "Hey, we've got this mobile trailer. It's got two or three cameras on it. We need help getting the video back somewhere maybe to a police station or a sheriff's office or a mobile command center, which we can help with. " But I would have to imagine the ATD solution from Acoem also can pair nicely with existing infrastructure like that where, hey, we've got a mobile trailer that has video capabilities, but we don't have threat detection yet.

I'd imagine you guys could help out with something to that effect, right?

Mike (16:58)
Being able to add on to their existing infrastructure and technology is a huge benefit. We don't sell cameras. We work with people like you guys with Haivision and let you guys offer that piece of the puzzle. But whether they have existing cameras, VMS, trailers, whatever, we're an easy POE plug and play solution and we can add on to what they already have. And that's what a lot of our customers, they already have the cameras like I mentioned before. So now we can add gunshot to it and it's just an easy ad-on.

Tim (17:30)
Yeah. When we talk to customers, we're talking about, like Mike said, what are the existing cameras and VMS and infrastructure that we need to be able to cooperate with? But we also, like you mentioned, we talk about what their processes are. We have customers that have those twenty four seven command centers where they're able to react to alerts instantly. And we have other customers that use either forensically because they don't even have law officers on duty all the time. So if something happened, they can go back, they've got a bookmarked piece of video, they've got the audio, they can match up the time

date stamps, and they can do some kind of retroactive investigation based on the data that was collected. Obviously it would be great if everybody was able to stand up a command center and monitor in real time, but we work with our customers where they're at.

Kalli
Sorry, I was just going to ask out of curiosity because you did mention defense solution. Is that defense military or defense as in just being defensive? Do you work with defense and military as well?

Tim (18:31)
Yeah, so this technology originated out of our defense division and they've been doing this for 30 years. They have solutions that are fixed. They have gunshot solutions that sit on vehicles. They have ones that soldiers carry to let them know what direction they're being fired from. But we operate separately. We're in the same division. We utilize some of the same knowledge, but it's very different customers. And I think the biggest difference is what we've talked about, about being able to be usable for police departments to be able to integrate with common VMS systems and be able to be used with whatever cameras. Whereas with defense customers, they need you to be integrated with whatever system is on that vehicle, which is probably very customized and been around a very long time.

So we operate very separately, but we have the benefit of that expertise that goes back 30 years. And really we touched on AI a little bit and it's a buzzword. And if you go to the shows now, everybody's got AI on their banners, but it's really only as good as the data that you're using to train your models. And we're using data on gunshots and other kinds of noises that's been recorded for decades. I mean, we know what's been shot, we know the distance, the aspect, we know what it was recorded on. We're not looking for gunshot sounds on YouTube to train our models with. And so the benefit of having that history and that very high quality dataset is what informs our AI to minimize false alarms and to not miss real ones.

Mike (20:18)
And we add to that library often. AI doesn't know what it doesn't know. So there's sounds it's never heard before that to me and you sound nothing like a gun at all. But once you start breaking it down and analyzing it, it's very close in the spectrum of what we're looking at. But like Tim mentioned, I think we have one of the largest acoustic threat libraries up in the world from decades of the defense side and gathering that data and we continue to gather it.

Dustin (20:50)
Just wrapping up here, if you could give one piece of advice to organizations looking to invest in smarter infrastructure today or they're thinking about AI or collecting audio information from the field, what's some advice that you can give them as they're starting to go down this path?

Mike (21:06)
I mean the first thing I would say is understand how you're going to use whatever technology you're going to try to deploy or integrate into your current system. It's understanding how you're going to use it. Like Tim mentioned earlier, we have a lot of people that use it real time and react to it there and we have some that do it from a forensic standpoint. And usually the ones that are dealing with it from a forensic standpoint and checking it later are the ones that don't have time to react to it in real time. So just understanding, hey, the ATD sensor will help and solve some of your problems, but you still need to interact with it and those alerts and what you're going to do when you get that first alert. So a lot of people don't think that far down the line. They just want to add another layer of technology and haven't thought how they're going to use it day-to-day and how it's going to affect their workflow.

Tim (22:02)
Yeah. I mean, I would say for public safety type of customers, the first thing we want to understand from them is how do they respond in the event that a gun is discharged on their property or in the vicinity of the people that they're charged with protecting in their city, on their campus? Because most of those conversations start with, well, we get the call. And just helping people understand that you might not get that call, you might get six calls that all tell you different information. And so beginning the process with an automated alert is going to significantly increase the time that you can get there and mitigate any further violence and help any victims if there are any. And all that time is really critical. And our customers have a lot of technology to sort through. We understand that they've got a huge priority on hardening their buildings and making sure nobody gets in and nobody brings a weapon in and making their facilities very safe.

But where their customers or their students or their citizens are the most vulnerable is out in the parking lot, far away from the building, far away from other people. And this is where we see the most incidents of gun violence happen. So just helping people understand what the nature of that threat is and giving them options on how to respond in a better way. And for critical infrastructure, it's not that much different. I mean, critical infrastructure

customers tend to be very security focused and they understand what their vulnerabilities are. They're very technologically ready. They have very professional security staffs. So they just need to know that we exist and what we're able to provide for them and giving them that alert so that they can quickly turn to monitoring for other indications that they have damage, whether they're looking for indications of a fire or indications that some asset is leaking oil or vibrating in an unusual way or some indication that that thing has been compromised in which case they have another set of big decisions to make.

Are they going to shut down that station? Are they going to reorganize and reroute power or water or whatever they have to do? So we just let everybody know what we're capable of and how we can fit into that system.

Dustin (24:23):
Yeah, absolutely. 100% agree. A big part of what we do is I tell customers all the time is they ask us, what can this technology do? What can this component do? What is this feature? What is this benefit? But it really boils down to understanding a customer's workflow and walking through some of those scenarios and say, okay, hey, if this happens, what is the plan? How do you react? How do you currently do that today and how do you want to do that in the future? And we can help you understand how that technology is going to dovetail into those equations and those scenarios so you have the most likelihood of success and ultimately reducing that reaction time and be able to make those decisions appropriately. Well, I appreciate your time and your knowledge, Tim and Mike. Where can folks find Acoem online or if they want to get in touch with you guys?

Tim (25:11)
Yeah, you can visit us at acoematd.com. So that's the best way to find us and we can schedule a demo and we'll talk about it from there.

Mike (25:24)
And we're both on LinkedIn and we also have a YouTube channel with a few videos on there, but acoamatd.com is the best place to start.

Dustin (25:32)
Awesome. Thanks guys. I really appreciate your time today.

Mike (25:35)
Thank you,

Dustin. (25:37)
Thank you.

Outro (25:37)
Thank you for tuning in to the Haivision Podcast. Make sure to subscribe for more exciting discussions with our experts.