IMPROVING BUILDINGS WITH SMART SENSORS

Collecting data to boost your facility's health, safety and security

This interview originally took place as a *Schools in Focus* Podcast. To listen to the episode, <u>click here</u>. You can subscribe to the *Schools in Focus* Podcast on iTunes, Stitcher and Google Play.

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VIEWPOINT

INTRODUCTION: This episode's topic is "Improving Building Health, Safety and Security with Smart Sensor Technology," and our guest is Mike Davis, National Sales Manager for IPVideo. We'll talk about the different types of sensors and the variety of data they can collect, from physical to chemical to environmental to security. From there, we'll go into the limitless applications of what organizations can do with a "Swiss Army Knife" of sensors to keep building occupants safe and secure. This episode is sponsored by IPVideo.

SPACES4LEARNING: Hi, and welcome to Schools In Focus, an 1105 Media podcast. I'm your host, Matt Jones, senior editor of *Spaces4Learning* and *Campus Security and Life Safety*. Our topic today is "Improving Building Health, Safety and Security with Smart Sensor Technology," and our guest is Mike Davis, National Sales Manager for IPVideo. We'll talk about the different types of sensors and the variety of data that they can collect, from physical to chemical to environmental to security-related. From there, we'll go into the limitless applications of what organizations can do with a Swiss Army Knife of sensors to keep building occupants safe and secure. This episode is sponsored by IPVideo.

S4L: Hi, and welcome to Schools In Focus. I'm your host, Matt Jones. And our guest today is Mike Davis, National Sales Manager for IPVideo. Mike, thanks for being with us.

MIKE DAVIS: Hi, Matt, thanks! I really appreciate the opportunity.

S4L: We're happy to have you here. First question: Could you just tell us a little bit about yourself and what you do in your current role?

MIKE: You bet. My name's Mike Davis. I'm the National Sales Manager for IPVideo. We are a manufacturer—

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we manufacture a number of things, including sensors, which I think we're going to talk about today.

S4L: Yeah, in that case, we can just jump right in. So, when we say "sensor," what are we talking about?

MIKE: You know, sensors, they have a broad meaning. But that's really a device that detects and responds to some sort of input that's in the physical environment. It could be chemicals, it could be physical, could be environmental, but anything that's detecting that and bringing back some information to you.

S4L: And then, what are the types of sensors?

MIKE: Well, we really talk about IoT, meaning Internet of Things. There's also IIoT, which stands for Industrial Internet of Things. Broadly speaking, these are sensors that detect and respond to changes in environment. A lot of these things are going to be ones that you've heard of before: light sensors or temperature sensors, motion or pressure sensors, those are all pretty common. But there's a lot more sophisticated sensors out on the market. And we're just looking for devices that can collect data and then communicate back to us in some way.

S4L: How are these IoT and smart sensors beneficial for us?

MIKE: You know, data seems to be the new thing that everybody's looking for. We hear terms like "big data," and "data analytics," and "data analysis." And we hear that a lot. But that's what sensors do: They bring us that data. When we have that data, we can make better decisions. These, at some level, have intelligent devices that can make their own decisions. They're processing data, and they can make some low-level decisions based on internal analytics or predetermined thresholds, etc. But there's billions of these out in the world today. We see simple things like temperature sensors, and HVAC sensors, etc. This really can incorporate basic sensors all the way up to sensors that can do that data processing, data

analytics, and higher-level decision making on their own.

S4L: This is probably kind of a broad question, but what kind of sensors are there?

MIKE: There are literally billions of sensors on the market today. I heard a term recently that there are over 25 billion IoT sensors online around the world. And these are really in broad categories like environmental, physical, chemical, and all sorts of other sensors, too. These are really devices that look different, act different, but they have the same basic purpose: They're detecting data, and they're bringing back that information. A good example is, you know, one of the sensors that we have can detect vaping. And that's a combination of data, looking at different data points over time and comparing that with an algorithm. So, you can get really complex at times, or really simple.

S4L: Just out of curiosity, for vaping: Is that a movement sensor, or is that a chemical air sensor, or...I'm just curious how you would hone in on vaping in particular.

MIKE: Yeah, so it is a combination of different chemicals in the air. Has to be the right chemicals, in the right proportions, over the right time. But it's a recipe. You know, the way that we look for something like that is, we go into a lab environment. We detect and measure all the things it's possible to detect and measure in a vaping environment. And we build a data model. Once we have a data model that looks at every data point, from point to point and the relationship between each one, we're able to extract an algorithm from that. And that algorithm is what is telling that device if we're finding vaping or not. It's very accurate, and it's very customizable.

S4L: Could you give me some other

> "You know, the way that we look for something like that is, we go into a lab environment. We detect and measure all the things it's possible to detect and measure in a vaping environment. And we build a data model. Once we have a data model that looks at every data point, from point to point and the relationship between each one, we're able to extract an algorithm from that. And that algorithm is what is telling that device if we're finding vaping or not."

examples of some of the unique things that sensors can do?

MIKE: Yeah, there's so many. But some of the main ones that we hear about today really are having to do with air quality. You know, air quality can really affect a person's performance. We know that by studies that are out today. It can also affect things that contribute to the spread of airborne viruses and airborne diseases, like COVID. We know that children are one of the most vulnerable groups; they're breathing in more air relative to their size than adults do, and they have developing immune systems. So, they're very exposed to some of the changes in air quality. We also know that the CDC tells us that there

are environmental factors that can contribute to the spread of infectious diseases that are airborne. Some things are going to keep viruses and particles airborne longer; some are going to be able to be transport vehicles deeper into your lungs; some are just going to keep those viruses alive longer; but they're very influential on the spread of those diseases. We can make you aware of when those are within a tolerance or without a tolerance, we can take action, etc. So, really, they can be very beneficial, especially just around air quality.

S4L: And then, what about safety and security?

MIKE: We always think about

security as motion detectors or cameras. But, you know what? Those are sensors, too. They're sensors that can detect different things. A motion detector is going to detect motion. A camera detects a lot, but we can extract analytics, even from a camera. We can extract analytics and data from audio. You know, we—as an example— have audio analytics that can detect aggressive behavior and bullying, yelling, screaming, fighting. There's audio analytics for gunshot detection. There's even audio analytics that can help you detect certain keywords, like duress words, when somebody's in trouble or in a stressful situation.

S4L: Oh, wow. Is that almost kind of like a…I don't want to say speech-to-text, but…

MIKE: It's sort of like that. It's just like, you know, we get used to using Siri, and get used to using Alexa these days, and this is exactly that. We're able to do that pattern-based recognition, where we're looking for certain keywords or keyword phrases, and able to convert those into an action.

S4L: It's just really interesting because of the potential implications. For things where it picks up on aggressive behavior detection, like yelling, screaming, fighting, is there a chance of false positives with those? I'm thinking of things like sporting events, or places where that's just kind of the general atmosphere?

MIKE: We always have to be aware of where we're putting this—the environment that we're putting them in. Analytics are very intelligent these days. And we can really hone those in on the specific environment where we have the device. So, it's intelligent analytics at the edge that take advantage of things like AI (artificial intelligence) and machine learning. And even when we get into larger systems that are deployed in the cloud, etc., we can utilize deep-learning

analytics. So, there's lots of ways for us to be able to filter out some of those background noises. Not to mention, there are a lot of other factors, too, that—you know, are pulsed audio, that are percussion-oriented, etc.—that we can really pull in to some of these analytics to filter out things that might sound to us like a health event or a gunshot. But in reality, when you're analyzing at a deeper level, it's easy for us to distinguish the differences.

S4L: Once we have all this data, what can we do with it?

MIKE: So, you know, there's a whole bunch of different things that we can do with this data. And to be honest, too much data is really overwhelming. That's why, when we get these devices…we have a device called the HALO device, and it can collect more than a million data points per day, per sensor. That really requires some analytics at the edge and some pre-built-in things that we want to look for with thresholds, and predetermined actions and notifications that we want to take, because so much data can be overwhelming. So, we have to build in some intelligence at the edge of what we can do with these.

But absolutely, you know, when we're collecting this much data, now we can look at different things that are going to be really geared towards analytics, towards trending, being able to notify you upon certain thresholds or certain events or certain combinations of events. We can have default values and thresholds. We can communicate to the building owners or managers. We can communicate to the security people, you know, whoever it may be applicable for that data. You might be saying that air quality is poor, and we need to take some actions. So, that might be a direct communication to an HVAC system. Maybe we've got too many air particles in the air, and it's time to change that air filter. You know,

The HALO IoT Smart Sensor by IPVideo Corporation is the worldwide leader in campus vaping detection, air quality monitoring, and privacy area security.

Organizations are taking advantage of this cost-effective, all-in-one sensor device to address:
• Detection of vaping and vaping with THC
• Abnormal sound detection like yelling, fighting, vandalism, and gunshots
• Chemical, gas, and smoke detection
• Trespassing and large group gathering
• Health alerts and Indoor Air Quality alerts
• Spoken keyword alerting, panic button, and two-way audio communications
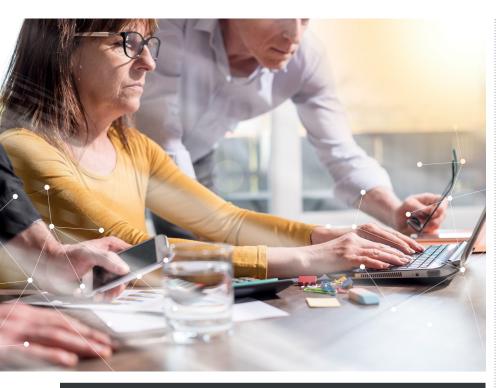• Emergency alert and escape lighting

HALO is integrated with security systems, communications systems, and building-management systems for an automatic campus-wide response.

HALO Smart Sensor: a multi-sensor device for your campus that protects individual privacy. For more information, visit www.halodetect.com.

there's a lot of different applications, and communicating that to the right person—or right groups of people or right systems and devices—is really gonna be something we can build into the device.

S4L: Can you talk a little bit about high-value data events that might require

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some kind of immediate action?

MIKE: You know, there's a lot of those. When you really think about things like security, and we deal a lot—we mentioned gunshot detection and duress words and fighting. And those might require immediate action from security. We've also mentioned that there are things that are oriented around the CDC with different environmental factors that can affect the spread of airborne diseases. Those

might require us to have remediation of air, or recycling air in a room, and that can be communicated at a low level right to your HVAC system. If that didn't do its job and change those environmental conditions, maybe then it's time to notify somebody else. So, there's lots of ways for us to really communicate that data in the right way and to the right person. But definitely, we see security, we see air quality as being two of the biggest reasons why

these sensors are dealing with high-value, high-importance data.

S4L: And when we talk about all this data that we're collecting, and all the things that we can do with it, can you just talk about—at the broadest level—some of the benefits that come out of that?

MIKE: Yeah, absolutely. So, you know, smart sensors can be really about anywhere. Those are areas where maybe we can't have cameras, areas where we have expectations of privacy, etc. So, you know, sensors can go in those bathrooms or locker rooms or other areas where you may not be able to have traditional security devices. These could be times when somebody might need help, or air quality's unhealthy: data that we can get in areas where we don't have traditional security. That's one big benefit. Also, we have long-term trends that help us to understand building performance like air filtration, and HVAC systems, and energy performance, etc. Certainly, a building has a life of its own. And sometimes it really helps just to visualize. So, when we can bring all this data back in, and bring it into a way where it can be visualized, now it's easy to spot trends. It's easy to spot anomalies, and it's really easy to understand and really help you to optimize building efficiency and building configurations. And certainly not the least of that is when we get into reducing energy consumption.

S4L: What are some of the problems that can be solved with a smart sensor?

MIKE: I really think that that's unlimited. There are so many opportunities; there's so many different types of sensors. And being able to bring that data into a format where we can make intelligent decisions really opens that wide. We know air quality is probably one of the biggest reasons for

people to be installing intelligent sensors today: building management; certainly security, especially in those areas where you have privacy; chemical detection, especially those that are hazardous or harmful; vaping and smoking—we know we have problems with that in so many places; vandalism; fighting and aggression; people who may be having duress or in threatening situations where they need to get help, but they don't have any other way, other than maybe yelling a verbal word that could be detected; and many, many more. I mean, there's just a lot of potential applications for this technology.

S4L: Okay, and just because we had talked about vaping, a little bit earlier, I wanted to circle back around to it really quick. Is that for nicotine vaping and THC both?

MIKE: You know, we can tell the difference. So, we can actually detect both. We can detect vaping. We can also detect vaping that includes THC.

S4L: I was wondering if you could tell us about the future of these products. What's coming next in the pipeline?

MIKE: Matt, so there's a lot happening in data collection. Right now, we're seeing more and more adoption of intelligent sensors. This is big data. We're bringing a lot of data and a lot of information into places where we can do data analytics, and the smarter the data analytics and the more data we get, the more solutions we come up with. So, there are really an unlimited number of sensors in the market. We look at times when we can combine sensor data into unique signatures, like we do with vaping or vaping with THC. We look for audio analytics. And there's other types of analytics, too. There are other types of sensors that can provide us data that we can run analytics on, too.

And then, when we're able to combine those into event profiles, we really get the strength of all that data

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and all those analytics, and pushing those analytics either at the edge or in cloud-hosted solutions, where we've got unlimited processing. So, honestly, this is just the beginning. We've only scratched the surface of what's coming for IoT sensors and smart data. We're really going to be able to help secure, optimize, and make safe more and more places where the sensors are available.

S4L: Okay, I think that was about everything that we had prepared. And I just wanted to ask if there are any last words or last thoughts that you wanted to get in before we signed off for the day.

MIKE: Thank you for having me, thank you for talking with us. I really appreciate it. This is an expanding market that's growing very, very quickly. And it's applicable to so many areas. I like to tell people that we really sell a Swiss Army Knife of sensors, and there's a reason for that. You can do so much with the same data—data like chemical analysis, we can collect data on some different chemicals. And that might not be only applicable to air quality; it might be applicable to a number of different areas. So, we're finding value across a wide range within building environments. So, safety, security, health can all be affected by multiple different areas. And we really see that convergence coming. These are IT, IoT, and IP-based products. And we really see the power of networking these together, making a big change in the future of how people build and manage their buildings.

S4L: Yeah, definitely. And I love that term of a "Swiss Army knife of sensors," just because it seems like it gets across the sheer variety of things that the sensors can do, and the type of information that it's capable of providing.

MIKE: Yeah, it's so true. You know, if you think about a camera, we used to think about a camera as this system there to tell you after somebody has broken into your store. But today, we use cameras for so much more. We use them for counting the number of people coming in and out, and for knowing, and doing facial recognition, and all sorts of things. That's happening across every sensor that's out there. We're just extracting more and more data, more and more value, and more and more use cases for all of that. And then, we can combine those data and layer them on top of each other to provide more complex detection and reactions. So, it's an exciting place to be, and we're super happy to be where we are: providing a lot of value to our customers and growing and growing.

S4L: Unfortunately, that's about all the time we have for today. Once again, I'd like to thank our guest, Mike Davis, National Sales Manager for IPVideo, for sharing his time and expertise with us this afternoon. Thanks also to this episode's sponsor, IPVideo. Finally, thanks to our listeners for tuning in and spending some time with us today. I'm Matt Jones, and we'll see you next time on Schools in Focus.