



Artificial Intelligence Virtual Investor Call

September 17, 2018 at 2:00 p.m. Eastern

Perry Mulligan, MicroVision's Chief Executive Officer and Sumit Sharma, the company's Chief Operating Officer, joined Michael J. Latimore, Managing Director and Senior Research Analyst at Northland Capital Markets in a Q&A session to discuss Artificial Intelligence and its use in various markets, including smart speakers, home security systems, and automotive LiDAR markets.

Perry M. Mulligan was named CEO of MicroVision in November 2017, following a seven-year tenure as a member of MicroVision's board of directors. Perry has over 30 years of executive leadership, operations, and supply chain management experience in small cap, mid cap, and large cap corporations in the semiconductor and technology industries. He has led large teams, numbering over 5,000, and holds a strong track record of bringing new products and innovations to market. Perry was previously Senior Vice President of Operations for Emulex Corporation, where he oversaw Emulex operations, including supplier management, test engineering, logistics, IT and facilities. Prior to Emulex, Perry oversaw manufacturing, delivery of products, and overall supply chain design and strategy at QLogic and commodity management and supply chain at Solectron. He has an MBA from the University of Western Ontario.

Sumit Sharma, MicroVision's Chief Operating Officer, joined MicroVision in September 2015 and oversees the company's engineering, operations and R&D functions. Sumit has an extensive background in high volume consumer electronics and automotive product development and launch. Sumit has held leadership positions in engineering and operations at Jawbone, Google, and MYVU Corporation. A patent holder, Sumit received a B.S. degree in mechanical engineering from the New Jersey Institute of Technology.

Michael J. Latimore, Managing Director and Senior Research Analyst at Northland Capital Markets joined Northland Capital Markets in 2008. He has been a research analyst since 1996, including a previous position with Raymond James. He was also CFO of a software company. Mike specializes in the sectors of communications software-as-a service and Internet of things. Mike earned his B.A. degree from Johns Hopkins University, and his J.D. degree from William Mitchell College of Law.

This transcript has been posted on MicroVision's website for the reader's convenience and prepared by third parties. Readers should refer to the [audio replays](#), when available, on this site for clarification and accuracy.

TRANSCRIPT

Mike Latimore

All right, this is Mike Latimore, Northland Capital, thanks for joining, or staying on line. Just as a little context, again, this is the Artificial Intelligence conference, on Friday we had a lot of companies talking about artificial intelligence and customer engagement, customer service, and then specifically around speech analytics and texts. Today it's been more AI and IOT in video scenarios, and kind of following along that line we have MicroVision next, we have Perry Mulligan, the CEO of MicroVision, and Sumit Sharma, the COO. So, thanks, Perry and Sumit, for joining us today.

Perry Mulligan

Good afternoon, thanks, Mike.

Sumit Sharma

Thanks for having us, thank you.

Mike Latimore

So, just a couple questions here. I guess, a lot of the companies that sort of presented so far have talked about the ability of systems, interact through voice and video, leveraging AI, virtual assistance, smart cameras, that sort of thing, your tagline is about sort of bringing IO to AI. I guess, can you just sort of explain that sort of briefly, and how it might relate to some of the topics we've touched on so far.

Perry Mulligan

Thanks for that, Mike. If you think of it today, for many consumers in the space we recognize that AI represents this beautiful brain somewhere isolated in the cloud, and they have the ability to speak to it, and it answers some simple questions and performs some simple tasks. We're absolutely convinced that we can enhance that experience by providing sight-sound gesture recognition, interactivity in 3D sensing to that brain to help put things in context. So really making that brain much more aware of

that environment from which you are posing those questions, or interacting with it, and, subsequently, making it much easier for users to interact with this great tool, this great platform.

Mike Latimore

That sounds very attractive actually, makes a lot of sense. AI, broad topic, can mean a lot of different things. I guess, when you talk about artificial intelligence, how do you define it, and what technologies are maybe in your products versus something that's in the cloud, let's say?

Perry Mulligan

Yes, let's treat that as a two-part question. I'll give you the layperson version of it first, and then I'll ask Sumit to perhaps explain a little bit more, with more granularity, the subtleties embedded in our product.

So, if I start out, when we think of AI, we think of it in the broadest context, Mike, we absolutely believe that AI is the product, so I'm not advertising that we are an AI company, I'm not advertising that we are doing artificial intelligence in the most general sense. I think of it as this being a very ubiquitous height, neuronet compute engine that's available through the cloud, and we are providing at the peripheral compute and sensory inputs to it. So, I hope that puts it in context.

For us, we consider AI the product, and now we're here about enhancing that, the ability of that wonderful ecosystem to interact with people more readily and easily, make it easier for people to interact with that platform.

Relative to the question about what is unique, or what level of machine, intelligence machine learning, is in our products, I'll let Sumit give you a little bit of color on that.

Sumit Sharma

Just to add to what Perry said, if you think about AI, which is, for right now in the market is Alexa, Google Assistant, Bixby, there's a wide variety of services, these are all cloud computing services, we're

the edge computing now. If you think about our module, think of it more like an edge computer. An edge computer that is an [Input-Output or] IOs point to the actual user, before the cloud service can actually infer something it needs more data, something specific about the situation, about the user, that cannot be inferred by their Google searches, or their purchasing habits by alone, it's something specific, a service that's needed instantaneously.

So, start thinking about this, the way we think about it - the way I kind of describe it internally, as well, is there is, AI is the product, it is the cloud computing platform. It can do lots, it's going to have voice today, it can have more services, but the voice is interaction point that it acquires. So, Amazon Voice Services, for example, that is just the beginning. The brain by itself in the cloud is going to expand more services, more that it can infer, but they need more input, and the input, of course, for humans is, very simply, visual and touch, so data structured any kind of way in any kind of instant allows them to infer more things about that user, and actively provide services to them.

So, in our module that we talk about, we don't use the word AI for our module, even though we have machine learning inside, because it's very specific to what the sensor is doing, what interaction is read, that to user experience to get very specific user data and align the AI to infer from that. So it's almost like, it's taking the load that would be required to take raw user data, apply it to the cloud, churn through millions of data points, parse all that through, and then provide a service, is to have a subset of machine learning, or let's call it machine intelligence, embedded inside our module, that actively allows the AI to adapt a service.

Perry Mulligan

That put it in context for you, Mike?

Mike Latimore

For sure, for sure, yes, that's very great, that's very good. So then, I guess just to make it even maybe more clear, what would you say your machine learning technology, which is in your sensors, like what would that do, specifically, versus what would occur in the cloud? Like what are some of the things that maybe your sensors take off the cloud load, let's say?

Perry Mulligan

So, again, I'll give you the layperson's version of that, Sumit can augment it with perhaps some of the more technical nuances. In the simplest of terms, when we think of what we can provide at the sensor, we have to first start off with the understanding, Mike, that we're coming from the solution with a wonderful advantage. Our LiDAR capabilities has a point cloud density that just makes it very easy for us to do things like object recognition, for us to do things like predictive travel, to understand what motion looks like through the field that we see it happening, so we can apply machine learning from a predictive perspective. So, we can do these, what we think are relatively low power, simple analytics at the device, instead of as Sumit points out sending massive amounts of data to the AI network, and that's as relevant, whether we're dealing with AI that exists in the cloud, or whether you're dealing with the fusion of sensors in an automotive environment.

We're simply combining the characteristics of our device in a way that allows us to provide this very near messaging, very near-term messaging, it provides a latency advantage that we think is a pretty interesting perspective. And maybe I'll let Sumit just expand a little bit to explain why that - it's almost counterintuitive, with more data, why is it easier to do this than it would be if you had less data.

Sumit Sharma

If you think about the - just elaborate what Perry said, think about the mass amount of data that we actually have inside our silicon. That data, we can infer quite a lot with enough machine intelligence, just the right amount, not ball in the ocean kind of thing, we're not solving the entire problem, but we can infer things in milliseconds, or tens of milliseconds, where you can imagine just transporting the data to the cloud would be hundreds of milliseconds, or seconds. So, in the case of [indiscernible] that may not be relevant to lots of folks as in our IOT products, except the interaction point for IOT product is not a capacitive touch LCD, those form factors users do not want in their homes, this allows them to track with a point, and the services are adapting on the fly.

In the case of our consumer LiDAR, it's inferring things about space, space management, but in all of them, the common theme is in the edge computer, which is our module, our edge computing, we infer things that are very, very important, we believe, to the AI, to provide a more streamlined service at a faster pace. Of course, the raw data that's inside there can certainly transport if they require it, but in all cases, that is a backup. The primary thing is low latency, users want this magical feel, even though the AI's in a cloud, they want it as if it's present right there.

Mike Latimore

In terms of the processing of the silicon, are there basically like mini neuro networks in there that are doing some of the processing, or what's the actual functionality that's going on there?

Sumit Sharma

I think that depends on the product, not to get in too much detail, it all depends upon, in some cases the kind of things we're doing, how many tera ops are needed, or how many giga ops are needed to do what we want to do, you can certainly use some commercial off the shelf silicon, but once we get to a certain point we understand the mathematics, we incorporate that within our silicon, and that's adding GPUs and DSBs, that, of course, is, we're a silicon company at the core, so we know how to do that.

But it's not just having machine intelligence for the sake of putting machine intelligence into our devices, it is what's actually relevant. This would create a product that's lean, is launch able, it has the right price point, it doesn't have a whole lot of overhead, just the capability we need.

Perry Mulligan

One of the attributes, Mike - and I don't want to take us down a path that you didn't want to go to today - but one of the attributes of our sensing product is the fact that it has temporal and spatial resolution capability. So, it's so important for people to realize, thinking of scanning a room, well, in most cases the walls and the windows and the furniture are pretty static, so we can now detect motion and clarify and focus our engine temporally and spatially on that motion.

So, when we talk about efficiencies, when Sumit talks about sort of the data efficiency at the center, the edge compute at the center, at the peripheral in our sensor, you get the opinion, or you get the perspective now that says, hey, guess what, we're well positioned to articulate what's happening temporally in that region at that time, and sending that message to the central processor to say, heads up, you might want to be aware.

And let me be illustrative, if I can do that in the display engine where I'm predicting what your finger is touching in an illuminated display, obviously there's no capacitive touch on the tabletop or the surface that you're projecting that image on, we're inferring that through time-of-flight and machine learning, where we are predicting your finger landed. If that's relevant in simulating that interactive display, by capacitive touch display, at 70 miles an hour, do you think it's relevant to detect if the car beside you is going to infer in your lane, it's going to cross over. The same algorithm, the same sort of thought process or capability of this edge compute is required to do both, in a cost-effective low power way that we're discussing.

Sumit Sharma

Depending on the product vertical, the strategy changes, it depends upon what part of the silicon you own and what somebody already has, if there's a 14 nanometer technology that can do this better well we do it, the 14 nanometer technology, is a \$400 processor, that even in video is not going to be able to reduce, but we can infer things - it's all dependent on power and latency, that's the core of why this has to be more efficient. We will incorporate it and give that - AI has got the benefit, again, in videos, it has a great platform, but the AI is what's going to enable the entire platform.

Same thing in our IOT products, people want a very, very fast display at a lower cost so they can deploy more.

Tom Latimore

Yes, okay, got it, makes sense. And in terms of understanding gesture, you mentioned the time-of-flight of the finger moving and so forth, is there some level of accuracy that needs to be there before it's sort of easy to use and lively reliable, almost makes you think of speech recognition, once you get to a certain level of accuracy, speech recognition software becomes valuable. Like here, what level of accuracy do you need and are we there yet?

Sumit Sharma

I'll get to the question in a second, I have to give some context. Think about the 50,000-plus scales that are on Alexa right now, if you were to put them in some sort of buckets, you'll find that some of them, voice only is good enough; some of them voice for display is good enough; some of them voice,

display, plus touch is good enough; some of them voice, display, touch, but gesture is required. There's a spectrum, it's not like all of them required, so that's context, that's important.

Over the weekend I was reading something about Amazon Business, Amazon Business is a bigger opportunity, it's handling how our business that they created in four years, is outpacing all their businesses. The point was, it's a different direction point, it's not what I do with my Alexa at home, these are different kinds of features will be needed, and gestures are not just hand gestures, lots of things can be called gestures. Robots can do gestures, lots of things could be done. So, we need enough of machine learning inside, so we can adapt as their platform adapts.

The point I'm making is that the skills are going to keep growing, and that's just Alexa. You can imagine the actions in Google Assistant and other platforms will grow. You need something developed so you don't have to every year refresh that, and the machine learning allows us to adapt to the situation, to the very specific business that our customers may want to attend to.

So, the accuracy's good enough, I mean, we can demonstrate that, I think, and that's not the case, the case is what are the applications they want to do and is the platform we're creating scalable.

Perry Mulligan

I think, Mike, if you look at the last [video we put on our website](#), it sort of indicates the speed and latency of responsiveness to touch, by the time you come to CES this year I think you will see, again, what will approach seamless interaction between the unit and the projection system. So, we believe we have that nut cracked, if you would, that's not something that's causing us heartburn.

Mike Latimore

Yes, yes, okay, great. Yes, I mean, on that [video](#) you posted on your website recently, I mean, can you just talk a little bit more about that. I mean, it seems like that's something that holds a lot of potential for you, maybe talk a little bit about the technology you're offering there versus the smart speaker itself, or to the cloud service.

Perry Mulligan

Well, at the simplest point, again, I think what we're trying to illustrate is there are - what's the smart speaker market today, I think 40 million, 50 million units deployed, obviously people have found use and application for voice-activated smart speakers. So, what we're showing though is that the ability to do multistage transactions, multilevel transactions, are so much more readily and easily accomplished if you have the ability for touch and display combined with voice.

So, one of the testaments, I think, one of the tests we try to do is, if you're a busy person, can you order \$100 worth of groceries in four minutes, can you select a multidimensional menu item quickly, and it's not a question of whether or not these, of themselves, are benchmarks or bellwethers, they just illustrate how much simpler it is to accomplish.

I've had friends comment that while they own all of the voice-activated technologies, they'd be worried about ordering an Uber without being able to visually see on the map where it's going. The notion of purchasing something without visually seeing that the platform has got the quantity correct, that the resultant value is correct, that the [Minimum Order Quantity or] MOQ is correct, these things just become a much more natural experience for us, and I think that's why we come back to saying it's not about displacing a solution, it's about enabling the user to interact more easily, because we know if it's easier for them to interact, it becomes easier to transact, and that's how our customers are going to make money.

Sumit Sharma

To add slightly more to that is, display, capacitive touch displays, Amazon showed it launched, there is products that are out there, but yet none of them are taking off as much as a smart speaker by themselves. As Perry mentioned, 40 million to 50 million, approximately so far installed base, and a very small of them are display, so there's a fundamental issue with the demographic, how they want to interact with information. The point was that nobody wants a computer in their homes or in their offices with a camera that's monitoring, that's not what they want, they want a technology that's a screen display with all the benefits. So, we're not displacing anything, because nothing exists. There's no 20-inch capacitive touch display monitor product out there, we're not displacing anything, this is a completely brand new [indiscernible] because the other one has plateaued, people do not want to actually get on it.

Mike Latimore

Yes, yes, no, that makes sense, that makes sense. So, is the implication by putting this [video](#) out, and obviously, that very attractive use case here, I mean, should we assume that one of the main development projects you're working on leads to a product like this next year? I mean, you have a lot of different use cases, obviously, that your products can be used for, but is this like the one that's probably the biggest one for next year?

Perry Mulligan

Again, one of the things we said several earnings calls ago was that we are focused on AI platform owners, and the advantage or disadvantage of that, Mike, as you know, is there's only a handful in the world, and we're talking to all of them about these types of applications and using these types of demos, to allow them to help monetize their huge investments.

If we think of AI, as I described it earlier, in the neuronet and to the cloud, as being a \$19 billion spend this year for companies, growing to over \$50 billion by 2021, the ability to monetize that investment is absolutely critical for these large OEMs, and we think that it's sort of self-evident that the demos that we're doing and the product development we're talking of enables them to monetize that.

Sumit Sharma

I think if you go as far back as CES 2017, we've actually been very public about the direction of how the interaction how worked out, this is sort of just throwing the condensed version of it. Think about it more as, as we have different partnerships, everybody will have their own desire of how they want AI to be deployed out. What we're showing there is exactly how anybody would monetize that. These are applications that we've talked about, but it becomes very easy for somebody to infer, infer from this [video](#), that directionally what kind of transaction, what kind of interaction, human interaction is needed that has been requested, and if that would be something valuable.

So, I think "[Taco Time](#) [video]" is one of my favorite ones, and I think for a while there I've talked about it for a long time publicly and privately, but it's not fantasy, it was actually something that most folks would think that when you're on the fly, it's a very simple thing, but that whole transaction takes less than - the entire script is slow because we're explaining things, but if you did it privately, it moves fast,

and you can go from anywhere from \$100 to \$200 worth of orders, without ever engaging, logging on to anything, it is on the fly.

So, you can infer that, yes, of course, that's kind of application and use cases that will actually enable this market.

Mike Latimore

And you'll probably just order more, too, if it's easier to do, higher price per use.

Sumit Sharma

That's right.

Mike Latimore

Right before you presented we had iRobot on, and they're kind of like almost like a little mini autonomous car now. I mean, I assume, there's a lot of use cases, and the one that's maybe most visible is the smart speaker one, but in terms of some of the smart home technologies like, I don't know, these kind of consumer robots, or different smart gesture sensing technologies in a home security scenario, but yes, how do you think about those opportunities, beyond the smart speaker here?

Perry Mulligan

Maybe if I could, sometimes, Mike, we're always challenged to try to explain it to our families, what the heck do we do, and the last time I was asked to explain this I said, think of our grandmother, Nan, coming to visit, and we tell the AI platform that Nanny's in the house, and it knows where the couch is and it knows where the floor is and it knows what the room looks like, and if Nanny's having a snooze on the couch in the afternoon, it's okay, because sometimes she does that. But if Nanny's lying on the floor, maybe it might want to call her name or call 911.

So, that spatial awareness, that whole context of being able to put, environmentally, a situation into perspective, is sort of the difference between taking a picture of a room and standing at the doorway of the room. Your awareness of what's going on is very, very...

Sumit Sharma

But to add, the IOT, the question was you know, well, in the robotics, I think lots of different applications, certainly you could have a [indiscernible], but, primarily, I think what Perry's talking about is our, what we call consumer LiDAR product. So, for example, iRobot wants to do mapping services, cloud mapping services, you need some sort of sensor, a very low compute threshold on the edge, some module, our consumer LiDAR products are for those kind of services. The specific application that Perry talked about, certainly, really thought through internally, you could not enable that with a camera module, you could not enable that just primarily with interactive projections, but our consumer LiDAR product, which is, again, [indiscernible] LiDAR portion of it.

It enables that robot to do something, so these modules, what iRobot is making is a consumer product, we are a module supplier, so we enable them to do more without having to use an I7 processor to take a lot of information and locally have to do it. So, their overall system could be smarter with a potential lower cost. So, that's the philosophy behind all the different verticals.

Perry Mulligan

You think at the end of the day - I'm sorry, Mike - the hypothesis we're offering is that we believe that our technology will offer performance that is equal to or better at a lower compute, at a lower cost. So, while I fully understand there's many different competing solutions available, that's what we think we can bring you with our consumer LiDAR solution.

Mike Latimore

Yes, good, good. And then I guess just last question would be, if you go back several years now, there was some component costs that were high cost, like green lasers. Are there any sort of components in the supply chain that are of costs that are a little bit too high for a specific use case, or do you feel like the supply chain is, and the components that you need are sort of readily available?

Perry Mulligan

Mike, I'll just sort of remind folks that I only spent 30 years in supply chain and operations, so anything above zero is too expensive, and infinity is the quantity I want. Having said that, we put that aside for a second, we have this wonderful opportunity here that says we're in the right place and the right time. Our technology leverages standard industry processes, standard industry technologies, where we're dealing with world-class suppliers that have the ability to ramp as we see fit. And you know and I know that when we're talking to these large platform owners, you don't end up talking in six figures worth of volumes, you talk seven figure, eight figure kinds of volumes because that's how they define success.

And one of the advantages, and one of the things I'm absolutely pleased to remind folks of, Sumit has been with us now coming up on three years, and in that period of time he's managed to transform what was sort of the "grad shop" mentality of operations within our company, it's something that passes the scrutiny of these world-class OEMs, and if we hadn't been able to pass that scrutiny we wouldn't be at the levels of conversations we're having today. So, we're primed and ready to go.

Mike Latimore

Yes, awesome, that's great to hear. Good, well listen, that covered the main highlights I had. I mean, anything else, Perry or Sumit, that is worth touching on real quick here?

Perry Mulligan

I really appreciated you taking the time and giving us the opportunity to speak with you and your audience today, Mike. We're excited about where the company is positioned, we're excited about the future that we're facing. We will respect that we came from a long history of display, and we really believe that the laser beam scanning technology core that we have will allow us to leverage the LiDAR side of that equation well into the future. So, thanks again for the time, really appreciate it.

Mike Latimore

Very good, thanks Perry, thanks Sumit. Thanks everybody for being on line, and if you want to just stay on a little we'll move to the next company here, but again, thanks, Perry and Sumit. Thanks, have a good afternoon.