Scott Hanselman: This is ACM ByteCast, a podcast series from the Association for Computing Machinery, the world's largest education and scientific computing society. We talk to researchers, practitioners, and innovators who are at the intersection of computing research and practice. They share their experiences, the lessons they've learned, and their own visions for the future of computing. I'm your host today, Scott Hanselman.

Hi, I'm Scott Hanselman and this is another episode of Hanselminutes, in association with the ACM ByteCast. Today, I have the distinct pleasure of chatting with Dr. Mary Lou Jepsen, CEO and founder of Openwater. How are you?

Dr. Mary Lou Je...: I'm great. How are you? Thanks for having me today.

Scott Hanselman: I am just fantastic. I just love talking to cool people that are doing cool stuff. And I tell you, though, I get a little intimidated because when you read up, you do all your research, and you have 250 patents and 50 plus products. And it's like do you have more hours than we do or are you 300 years old? How are you getting all this fun work done?

Dr. Mary Lou Je...: We all work. I've looked at your resume too. It's pretty astonishing all the work that you've done. So what I work in is a little bit different. The patents are really useful when you're designing mixed signal and analog things because you use contract manufacturing. And it's a fig leaf that helps you indemnify the contract manufacturer so you can ship and it's just very helpful to have a lot of patents. And when you use contract manufacturing and not build your own factory, you can ship a lot more product more quickly. So that's the secret.

Scott Hanselman: Interesting, because I think that the lay person who may only have one or two patents, actually, I didn't even think about this until we started talking. I have a patent on the Microsoft Band, if you remember that little device.

Dr. Mary Lou Je...: Oh, yeah.

Scott Hanselman: That would be on the, that failed, the Microsoft Apple Watch, which had sensors and such that were trying to give us information about how we moved. But that patent just happened, it was one of those things. And we always think, as a lay person, about why do people make patents? And you're right. In the course of your daily life, it would be important for you to get patents in order to indemnify the manufacturers and things like that.

Dr. Mary Lou Je...: It helps us get indemnification because we can show it's unique. Because the claims are the things that make the valuable, that you can write how it works and then you write these claims, and combining this with this in this circumstance for this purpose, you own. So that's very helpful in being able to ship stuff using contract manufacturing.

Scott Hanselman: So in the healthcare space, I am not a person that works in this space, but I'm a fan, and I'm a fan because I've been diabetic for over 32 years, and I use an OpenSource artificial pancreas. So I've been attached to an open APS now for almost 10 years. So this is off-label, not FDA-approved, very suspicious type stuff. And we're always promised noninvasive. Diabetics, for the 30 years I've been diabetic, have been promised noninvasive solutions. When I give my talks on it, always say you have to poke the meat bag if you want to know what's going on inside the meat bag. But it seems to me like Openwater medical technology does not believe that. You think we don't have to necessarily poke this giant meat bag that we are to get good data out of this body.

Dr. Mary Lou Je...: By poking, do you mean cut or?

Scott Hanselman: Inject, poke, push in. I have multiple holes in me every day in order to get to the interstitial fluid underneath the skin or push in insulin. But Apple has been promising me with Lite, they'll tell my blood sugar, or with Lite they can tell my pulse ox, and with Lite they can do this. And I don't think that we understand, do we or do we not have to poke the thing in order to get good data?

Dr. Mary Lou Je...: I think we're missing a lot. Certainly people have been working on blood sugar measurements and blood pressure measurements, and there is progress. The issue I come to is $658 million in 13 years. That is the average amount of time and capitalized cost it takes to get a regulatory approval to say this really works for something that's novel and therapeutic, as averaged in a comprehensive paper, which I can share a link for you for. But that's the problem. And what that also means is you're building 10 units a year. You don't get to use Moore's Law, you don't get to use contract manufacturing. They're not interested in building 10 units a year. They make the consumer electronics of the world. And so yeah, you can use AI, you can use supercomputers. But if you actually want to get the data in different ways, you've got to get through those proofs.

And so I love the open pancreas project because it is OpenSource, but it's limited on a certain organ. I wish they'd expand to more organs because then you get to make custom chips that can send light and ultrasound and electromagnetics into your body and then read it coming out. And we get to use the ever shrinking transistor size to get ever shrinking resolution of rather than just measuring the intensity of light or sound or electromagnetics, we can modulate the phase and the interaction of these light and sounds in different ways. And so that's why I left my cushy position at, it was then called Facebook, running a large aspect of advanced virtual reality and augmented reality, and seeing what our checkbook could fund in collaboration with the work of the mighty Microsoft and my former employer, Google, and certainly what Apple was doing, and Samsung.

I could see this stuff was coming down the pike and no one wanted to touch the fact that maybe we could leapfrog drugs and be able to not just even diagnose, but also treat hundreds of diseases that kill us, not just we've got great results

on glioblastoma, but the implications of the results are for all cancers. We're moving mice into remission of glioblastoma. It's a big deal. It's a hundred percent deadly form of human brain cancer. The implications for all cancers are pretty profound. We've got great results on mental disease, severe depression in humans. We're now doing work with amyloid microclots, which are the hallmark of acute COVID, and type 2 diabetes, and neurodegenerative disease, and aging itself.

So the implications for using infrared light that penetrates our body, ultrasound that penetrates our body, and electromagnetic at diagnostic levels to make general purpose machines that can be configured at the software layer. So we're trying to just make Android where the apps are regulatory approvals that our customers get, and with that, we can make scale. So we are making custom lasers, custom ultrasound transducers, custom chips, all in a custom hardware. So we've started by doing this, it started the company nine years ago next month by building out rooms with lots of equipment to see what worked using phantom tissue now going to buy kidneys at the Chinese, or near Chinatown in San Francisco. So we get a lot of range of dead meat to try this on.

And then moving into carts and got into hospitals for about four years, starting at the beginning of pandemic, and now we've shrunk it down again to make a system that we can ship right now for $10,000 a piece. But the cost of it at volume can be the cost of a smartphone. It's fully OpenSource, like real open source, not whatever. It's AGPL, Creative Commons 4.0 share alike. It's all of that. OpenSource is a distribution model, it's a trust model, and it's an innovation model. And the healthcare industry doesn't mean to be, but the healthcare industry is anti-innovation. When it takes 30 to 40 years to ship a new product, you just got to call a spade a spade. It's a lot of well-meaning people.

Scott Hanselman: No. Well, that very much resonates with me because again, I've been diabetes for 30 years. When I was diagnosed 32 years ago, they said, "I think we'll get this thing kicked in five years." And that's the joke, is that every year they tell you five more years, and then you start, after 30 years, you start getting a tinfoil hat. You say, "Well, it's cheaper to keep me diabetic than it is to fix this thing."

Dr. Mary Lou Je...: Well, right. There's a lot of stories about that, particularly with the kidney, the transfusion stuff. And there's a great book written about it recently about the racket of, I want to remember the two names, [inaudible 00:08:54] and DaVita, where they do, apparently, do that according to a lot of the lawsuits. Cash cow, you're a cash cow of the industry. I am, too. I had brain surgery in 1995. Hardest thing I've ever done. It took 17 years to diagnose it. I've taken a dozen medications every day for the last 29 years to stay alive.

Scott Hanselman: Wow. You can really relate and you're thinking to yourself.

Dr. Mary Lou Je...: I've unwittingly become a neuroendocrinology expert. Maybe this work can help for that, but actually maybe having treatments for all cancers and all mental diseases and addictions is faster and easier. So you got to say, wow, let's pursue that. And so that's really what we decided to pursue. Oh, and by the way, the number two killer in the world, stroke, we have blood flow level detection that's about 20 times better than multi-million dollar MRI. And that really matters for diseases of blood flow. And the number two killer in the world is stroke, that's a blood flow issue. It either stops or it explodes. And when you can see blood flow, actually blood flow, precisely, that's a big deal. So we've been in hospitals for three years studying stroke patients of the most severe type of stroke called large vessel occlusion stroke. When a large vessel is occluded, it blocks everything downstream. So if you don't get the right procedure within two hours, if you live, you probably won't either walk or talk again. You certainly won't have a job again. You probably won't go home again.

Scott Hanselman: My dad had two TIAs last week and they're ocular TIAs and we're trying to figure out is that the harbinger of the big one, and 30% of the time it is.

Dr. Mary Lou Je...: Yeah, the repeat strokes. And so if you had a way to know if you were having an LVO stroke, you could go to the only 5% of the hospitals. This is the worst one, the big killer, it kills 6.5 million people a year globally. Number two cause of death globally. 5% of the hospitals can do the treatment. So by chance, you have 5% chance of getting there because it's not apparent what you have. The gunshot victims, we know what they have, they get to go to the right treatment, even heart attacks because there's an ECG you can put on your chest and find out if you've got a heart attack or not. So we've basically made a version of an ECG for your forehead that tells you if you're having an LVO stroke that could be used in a portable, in an ambulance to direct the ambulance to the right hospital and notify the hospital. So in parallel, they're preparing the cath lab. The solution is to string a catheter up your carotid artery and pull the clot out because it's a plumbing problem.

Scott Hanselman: It is.

Dr. Mary Lou Je...: If you can get that done within two hours of stroke onset, there's a 90% chance of no neural deficit at all.

Scott Hanselman: Time is brain cells.

Dr. Mary Lou Je...: But this is also useful potentially for TIAs. Those are transient isochemic attacks. What we're seeing in amyloid microclots is there's a theory, it's clogging the capillaries, which are the smallest diameter vessel in your body. This is happening in acute Covid and long Covid, as well as diabetes and neurodegenerative disease and aging. And what we've shown is using ultrasound, as well, and I can tell you the frequencies, we're OpenSource. We're using 150 kilohertz, 10% duty cycle and we're breaking apart those microclots. So there's sub five microns in size, which means the capillary, at its thinnest

width, is five to 10 microns. So the theory is they should be able to get through. We're in preclinical with it, but we're sharing that we're just writing up our first results right now. We also think we should be able to see those microclots which may give rise to TIAs. It's not fully understood TIAs, but we can make these better non-invasive tools that help us have better understanding of it and so forth.

Scott Hanselman: You had a round last year of a hundred million dollars. How do you raise money and also give away things as OpenSource? I have found that that is not necessarily compatible.

Dr. Mary Lou Je...: I made the case - to be fair, $54 million last year.

Scott Hanselman: My apologies.

Dr. Mary Lou Je...: $100 million over the life of the company.

Scott Hanselman: In total funding. Yeah,

Dr. Mary Lou Je...: In total funding that it's a better business model than $658 million in 13 years for a single rare disease that if you get it to work, then you still have to get through standard of care approval and reimbursement. Minimum a billion dollars. Okay, it's single rare disease. Let's take glioblastoma. I happen to know about 5,000 people in the U.S. have glioblastoma right now. A new 5,000 people will have it next year because these ones will be dead. 5,000 people. How many have health insurance? Half? Maybe.

Scott Hanselman: Maybe.

Dr. Mary Lou Je...: And how many will get denied? Let's call it 1,000, 2000. There's 2000 you've spent a billion dollars to get there. What do you charge? Well, most people charge is close to a million dollars. There's new treatments right now that are at $3 million, some the new CRISPR treatments. So it shouldn't take me to say it's an understatement to say that a million dollar treatment is not affordable to the vast, vast majority of humanity nor Americans. So why are we funding R&D that if it works, or companies, that if it works, it's going to be a million dollar treatment? Why?

So the argument of this general purpose device, and it's not, we stand on the shoulders of giants. We've done some really innovative things. The hardware design is really amazing. We're lowering the cost of the system. We've lowered it from a million dollars to $10,000. It'll go down to another thousand dollars, but there's been a million papers published in the last 20 years alone about using infrared light or ultrasound or electromagnetics or in combination to treat thousands of diseases. People get their PhDs, people get tenure, maybe they get into the national, maybe they become I'm sorry, ACM fellow, whatever. But it's a rounding error to say zero of it gets into the healthcare system because no

one can afford the $658 million. And you don't get to shrink the cost of the device first because the FDA considers a quality build 10 units.

I was a CTO, a group CTO at Intel in 2000, 21 years ago. A sample size was 10,000 units for us, a sample size. There's nothing quality billed about 10 units, and so you build these big carts for a million dollars and you get a regulatory approval, you get reimbursement and you get to build 12 carts then and have them in 12 hospitals. It's just, until you can spend another $658 million, shrink it and get it to production. So why not just say, look, we have enough data to demonstrate that this is viable. Because if you look at it, if you make more of something, it's cheaper. It's a slight exaggeration to say if you make 10 x more of something, it's 10 x cheaper, but it's only a slight exaggeration. So you make a lot more, you collect a lot of data.

We're making everybody that buys our devices, and you can make your own if you want to. Good luck with a laser. It's really hard. So it's the ultrasound. It's really hard to do this mixed signal sort of stuff. But the plans are there. You can do it or you can buy this. And it keeps us honest, if you get approval, we're ISO 1345 approved. You can just, we're IRB ready, FDA ready, all that stuff for doing clinical trials, but you can also just take the design and have it built wherever you want to.

So why is that a good business model? Because we still ship a lot more of them. We're a lot more profitable. We'll ship a few thousand units this year. We're profitable, just even getting it into the R&D community, a fully reconfigurable, low intensity focused ultrasound system that's wearable and small as well as this blood flow detection unit that's also useful for any movement. We're seeing seizures and we think kidney flow and lymph flow and anything you want, you can change the pulse duration of the laser and we make basically a hologram on camera chips shipping in every smartphone in the world.

Scott Hanselman: So I want to understand, you've said shrink it down a couple of times. MRIs, CTs, big giant donuts that spin. These are giant million dollar machines that are scary, and then we have these pocket super computers. Help me understand why medical devices need to be so big and why you're deciding that no, they really don't need to be so big.

Dr. Mary Lou Je...: Well, you need a big magnet to see. It's one of the most complicated products I know ever shipped. It saved my life. Size and cost hasn't changed in the 29 years since. I wasn't scared of it. People are. But yeah, you have to lie inside of the magnet and a magnet, this is a very specific thing. It's actually, we can get into the physics of it, but yes, it hasn't changed. This is my frustration, as well. And yet, look at what we can make in the silicon fabs and the semiconductor fabs within a variety of materials.

I started life as a teenager falling in love with making holograms. You can now make holograms on these camera chips that are shipping in smartphones that

have high quantum efficiency in the near infrared. The near infrared, that's the thing that goes through your body like the invention of the fire was really important to humanity. You see the light, but you feel the heat. That's the infrared light warming your belly like it goes through, but scatters everywhere. You can unscatter it if you can record the phase of the light and the five megapixel camera pixels shipping in most all smartphones have pixel sizes of a micron. That's the wavelength of light. You can then interfere if you can make a highly coherent laser that allows you to get that information out because the phase of light with the intensity of light is fundamentally a lot more information.

And what we do is we pulse this laser that we made and when you pulse it, for anybody in the audience that ever's made a hologram, you know if anything moves when you're doing your exposure, you get a bad hologram. It's either a dim one or nothing comes out. So if we pulse the laser and something's moving, we get a dim hologram and if nothing's moving, we get a really bright hologram and the gradations that we can see give us blood flow in phantom tissue to 0.1% accuracy, which is 20 times better than anything else we can find recorded, including CT, MRI, Doppler, ultrasound and so forth, using literally a $1 camera chip in your smartphones and a laser that was a million dollars in this room five years ago. But we've reduced it down to something the size of the first digit of my finger in a butterfly package.

And so that, it's a Mopa laser. We use a highly coherency laser and amplify it with a tapered amplifier. It's a little bit more tricky than that because the pulsing, when you pulse something, you change its heat and it's current and that can change its wavelength. And so it's really tricky on how you build that out. But we now have it and it's starting production next quarter.

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That's amazing. So using layperson's analogies here for the audience, you're using light, you're using broads frequencies for both read and write. You are detecting things and then changing it. You are reaching into the body and changing it. Just like gamma knife radio surgery, you're doing pinpoint accuracy targeting things in the body from the outside without having to cut.

Dr. Mary Lou Je...: But with no ionizing radiation. So we're using ultrasound to selectively kill cancer cells at diagnostic doses shown safe on pregnant women in their fetuses in rich countries for the last 50 years and tens of billions of people for the last a hundred years. This is not like a new drug that's never existed before and is being injected into a body, a bunch of bodies. Nonetheless. So the way we do it is we find the resonant frequency of the cancer cells.

So for example, with glioblastoma, we got 16 different lines of glioblastoma built up, these little organoids, little tiny brains, half a millimeter in size, and ran

through frequency sweeps and rhythm sweeps to find the ones that would kill the cancer, shake apart the cancer, but not harm the healthy cells. And when it shakes apart the cancer, it releases proteins that vaccinate the body from the very cancer it has. Whether you're an anti-vaxer or not, you're going to be for this. It's your own protein letting your immune system see it.

So we ran through that in our studies. We did better than any of the chemo drugs. In the autopsies, we then replicated that in mice and moved 30 mice into remission of glioblastoma. The ones that we didn't give the treatment we had to sacrifice. We sent them to autopsy. Charles River found no damaged healthy cells in the autopsy. There's no cancer treatment that doesn't harm healthy cells. Even surgery you cut through, but chemotherapy, radiation therapy also harms the healthy cells. So it's huge. Just find the resonant frequency of the cancer, get a biopsy. We think it's probably going to end. We're not sure where it's going to end up. People want us to biopsy. We're probably going to start a thing with an organoid cell. So you can send your biopsy, we can find your frequency. In a trial. We are not FDA approved yet.

Scott Hanselman: Of course, of course. So pushing gently on that, if this was a Hollywood movie and I was the scientist and I had glioblastoma, I would jump into the box and I would shoot myself with the thing. How far away is this? Because my neighbor has glioblastoma.

Dr. Mary Lou Je...: We have people, literally next quarter. Literally next quarter, and I have someone in London waiting for the treatment that's at 150 kilohertz. So what we're trying to do is span a whole bunch of ranges. We're turning on and off neurons non-invasively without the one-inch hole in your head. I had the one-inch hole in my head,

Scott Hanselman: No fun.

Dr. Mary Lou Je...: It was death or that. Of course I went for it, but I don't see the vast swath of humanity actually signing up for it. Indeed, they don't for deep brain stimulation where you could get two to do it, but non-invasively, we can reach anywhere in the brain, and in our first study of severe depression, almost half of the patients went into remission with just 10 minute a day doses for three weeks, five days the first week, three days the second week, three days the third week, and they've stayed there. So this could be an at home system that you put on your head.

Honestly, we even found a way to register. We can register precisely to where your thing is by not using a hundred thousand dollars system in the hospital, but an Android smartphone where we take pictures of your head, make a mesh, a 3D mesh, register it on your scans, match your bone structure. When we take those pictures, you're wearing the headset. We know exactly where those transducers are and with the transducers, we delay the phase from, we have these eight by eight arrays. You delay the phase from one emitter to the next

emitter so you can steer that sound to precise focus near, far, up, down, right, left anywhere in the body we wish to go. So it's a very versatile system.

We're making it in a tiled manner. You can buy a ones Z or two Z or a six-pack for your abs and 3D print your own shape so that you can experiment with whatever the ailment is because the implications of focused ultrasound are so profound. We've seen really great results in high intensity focused ultrasound. But that gamma night, well, in the case of how it, it ablates tissue by heating or even vaporizing it. In this case, we're just looking for the resonant frequencies. And with the diagnostic level affecting selectively at a cellular level.

Scott Hanselman: Do you think in some years this will be the kind of thing that someone could build in there? I mean, I could certainly get a prescription for this and take it home, but could I build this myself? Isn't there risk in high intensity focused ultrasound creating heat?

Dr. Mary Lou Je...: Well, we're doing low intensity.

Scott Hanselman: Low intensity.

Dr. Mary Lou Je...: We're doing diagnostic level, achieving the therapeutic result.

Scott Hanselman: Therapeutic results on low intensity.

Dr. Mary Lou Je...: And with that, we can ship it once the first volumes hit, for about a $1,000 a piece, about the cost of a smartphone, and treatment would be like the cost of a phone call. So that really changes things as you think of the shortages of drugs and using drugs, they just affect here, not your whole body. It doesn't flow through your whole body. There could be some.

Scott Hanselman: Do you ever feel like you're really close to a Tricorder? You know what I mean? This is that Star Trek level of non-invasive diagnosis and curative.

Dr. Mary Lou Je...: That's the goal. We're starting with two modules of that, but really when you look the million papers that have been published, there's a lot of talent out there. So we hope to bring them along and get more modules in this unit or compete to save the world, whatever. But we think OpenSource is the right approach because it gets the cost structure right. Literally the Wall Street Journal in December had a headline, "Are we Justified in Murdering Health Care CEOs?"

Scott Hanselman: Oh, my goodness.

Dr. Mary Lou Je...: We all remember Guido, there, who shot the United Healthcare CEO dead on the streets of Manhattan. Of course not. But people are frustrated. There really are death panels, it's called standard of care. Can we move it forward fast enough? Why does so many people have to die? There are 55 million people

dying every year globally, and those bodies are stacking up, and we all know those people. Let's get going. So OpenSource does that and the ACM is perfect because writing software, testing this, getting it out, it's the right way. Otherwise, it's just this. We're literally making new therapies for the fraction of the top 1% that can afford a million dollar therapy. It's insane. Insurance is-

Scott Hanselman: Well, I mentioned my dad and his TIAs. We're literally waiting. We either pay 1799, $1,800 a month for the drug that he needs, or we fight with Medicare. We go back and forth, and right now we're in the middle of going back and forth, and every day is another day that we're wasting time.

Dr. Mary Lou Je...: Or you move.

Scott Hanselman: Or we move, yeah, exactly. We move somewhere where we can get another healthcare plan or another country with another healthcare plan.

Dr. Mary Lou Je...: That's what I've done just to stay alive. I have healthcare in other countries.

Scott Hanselman: It's funny that you mention that. A lot of... I bet I've worked at Microsoft now for 17 years. I came here to do OpenSource. That's the narrative and that's what people say. They know that I came to Microsoft 17 years ago to do OpenSource, but the part that I don't usually talk publicly about is I also came because we have really good healthcare and Microsoft was the cheapest place for me to get the insulin I need, the insulin pumps, and the medication that I need. At the time it had a Cadillac level healthcare plan, and that tying healthcare to employment is insanity.

Dr. Mary Lou Je...: Right. After my brain tumor, I wasn't going to found my first startup. I had dropped out of my PhD in physics. I was living in a wheelchair, sleeping 20 hours a day, super sick. I got the surgery, finished my PhD, was going to start. DARPA gave us $4 million and I said, "I can't do it. I need really good health insurance." And you know what my co-founder said? "You seem to know a lot about health insurance. Why don't you figure that one out?" And I'm like, "Oh yeah, I can do a startup. It doesn't have to be risky." So everybody in all of my startups and their families get really good healthcare because they're taking a risk being with a startup. But yeah, American system has this, and other systems have drugs I take in other countries, I literally have to get a script from the U.S. and go with a bag of money to where it's made and get the drug that way because illegal for adults, fine for children. Something like human growth hormone, for example.

Scott Hanselman: I love that OpenSource is at the heart of this, though, that it's about availability.

Dr. Mary Lou Je...: It has to be. Yeah, it seems like it has to be because it's a scale thing. Because if we get, as we get the approval, we want the costs to be affordable to change the outcomes. Why is it novel for a healthcare company? Its success to be attached to helping more people with diseases rather than less. The billionaires that funded me, a lot of them would say, "Go for the single rare disease first,"

and if that gets you, and maybe it's not a million dollars, but it's more than a hundred thousand dollars for the treatment then. And the bankruptcies from healthcare are staggering across the country. It's not just not paying their credit card loans or having avocado toast. It literally is The bankruptcies are cost.

Scott Hanselman: Yeah. It's so staggering that when I talk to people in other countries, they don't believe it. You know that the number one source of bankruptcy in the United States is medical bills, and they're like, no, surely no fully organized first world country would ever allow their people to die out of medical debt and go bankrupt, lose their homes is insane.

Dr. Mary Lou Je...: It's the reality. And so with OpenSource, we can get more data. So we're asking everybody to share the safety data because we want it to be safe. Shouldn't that be open? Somebody dies from a Tylenol every day. We don't hear about it because Tylenol is not a hundred percent safe. So share that so that a regulator has that information, all the safety stuff, but also a doctor and patient have the details of it and the efficacy data gets shared. There'll be a group that just shares all their efficacy data because we have this other major tool over time, is really hard to miss, AI. Could it do more with more data, understand more about disease states, treatments, et cetera? Sure. If we create that structure, there's a beneficial structure for everybody in this.

I'm just surprised. I can't understand why people are getting stuck. We've come upon this general purpose thing and we stand on the shoulder of these millions papers. Again, we've pushed it forward with this harmonic stuff and blood flow. We've got really great technology that we've opened to everybody, but a lot of people have really great technology in healthcare and it just doesn't get... The stuff I've seen in measuring glucose, there's a bunch of different approaches. I'm very excited about some of the polarization approaches because with sugar, the light rotates.

Scott Hanselman: I think it's funny. I think of polarization rotation around glucose and light the same way I think about E-ink displays and how E-ink displays rotate the ink to turn black or to turn

Dr. Mary Lou Je...: Sure, yeah.

Scott Hanselman: I remember getting a Gluco watch.

Dr. Mary Lou Je...: There's so many different approaches and I think people run out of gas. They can get funded for their PhD or early research, but then it's the companies that need to do that. So we can take on part of that. Others can take on part of that. The partnerships seem to be evolving. I was talking to the NIH, they went a little blank. The U.S. government is, what did you say before? Yeah, it's in some major transition for sure.

Scott Hanselman: Indeed.

Dr. Mary Lou Je...: That's nicest way I can put it. But people are still dying and what can we do to save them? and how do we better engage with the OpenSource community? I think we need the hardware out for them. So that's coming out next quarter and we need to seed some hacker spaces or some labs and so forth to make sure people have access to do things.

Scott Hanselman: I would love to help with that. If I can work with you and get Microsoft to give you office space or we have these thing called reactors that you can have in different cities where you're going to get people together and hack as a collective. That would be super fun.

Dr. Mary Lou Je...: That would be great. That'd be fantastic. There is this issue, it's all ultrasound after 1995 is considered class two after the toothbrushes we all use were approved, and the beauty treatments for getting rid of wrinkles. So as a result,

To use it on people, there's some rules. We like rules, it's okay, but they have to be followed. Biohacking is legal. You just have to follow the local rules on it. But with that construct, even doing it on anything with a backbone is illegal. That's why you'll find in labs in Boston, they often use lobsters because they don't have a backbone. No offense. We've got crabs on the West Coast, so there's things, I wish [inaudible 00:34:17]. But no, there's fast ways to do it and there's IRBs. IRBs are, they're the ethics review panel to make sure anything you're doing with this is checked out, it's going to be safe, share the results. It's all very reasonable.

And even to putting together what we're starting to do, there's different pockets where you can find IRBs, but to help people create their own IRBs is a whole thing, as well, because we want it to be safe, we want the data to be shared, but there's a huge, we really, now that these are coming out, now have to start to engage better with the OpenSource community. So we would love to try the reactors or anything else you might suggest as great in this space.

Scott Hanselman: Yeah, absolutely. My team runs the OpenSource programs office at Microsoft, and I'd love to chat with you, and of course you probably know people at MSR, and I'm going to have Peter Lee, the head of Microsoft Research on soon, so if you know Peter.

Dr. Mary Lou Je...: Oh, yeah, I know Peter.

Scott Hanselman: Right? Lovely guy.

Dr. Mary Lou Je...: I got to end up talking about this stuff at Necker Island, and he was there too and spent a-

Scott Hanselman: That's cool.

Dr. Mary Lou Je...: Yeah, it was. The speakers were on, it's called Mosquito Island, but the mosquitoes were gone. But yes, so I got to get to know him and his wife very well for a week.

Scott Hanselman: That's lovely. So in conclusion, if we can go to OpenWater Health, and we can learn about this, you can click on OpenSource business. You can learn about your patent pledge, you can learn about how you use the AGPL and Creative Commons. What is another recommendation, and how either a hacker or a layperson can get involved and support the work that you're doing at OpenWater?

Dr. Mary Lou Je...: If you want a device reach out to us and you can't afford the 10 K, we might be able to pull it and get it into a local space, a reactor, like you suggest, or whatever the hacker otherwise space is so that maybe more people can have access to it. There's certain universities, but then the universities are already covered for people outside of that who want to help.

Scott Hanselman: I can see up on GitHub.com/OpenWater Health. You've got the neuromodulation hardware, the focused ultrasound toolbox and Python, the blood flow gen two stuff. You're continuing to release everything, firmware, software and hardware up on GitHub.

Dr. Mary Lou Je...: Yes. And we will forever, we changed our corporate rules to do that forever. By the way, Italic Buterin, the founder of Ethereum, wrote a $50 million non-dilutive check, and we changed the structure to be OpenSource forever. He has veto authority, if we ever change that. We had lawyers lawyering this up. How has everybody else gotten out of OpenSource? Open AI was getting out of it at the time, and so we made the best minds in the legal field put together the best construct they could for no way for us to get out of this ever, so we're OpenSpace always.

Scott Hanselman: To prevent you from ever unOpenSourcing or closesourcing anything. That's excellent.

Dr. Mary Lou Je...: Right.

Scott Hanselman: Fantastic. Well, what a joy to chat with you and to learn about the great work that you're doing over there at OpenWater. Thank you so much for spending time with us today.

Dr. Mary Lou Je...: Thank you, too. I hope to work with you with the reactors and the OpenSource and Microsoft community. It'll be great.

Scott Hanselman: Yeah, I hope so.

We have been chatting with Dr. Mary Lou Jepsen, CEO, and founder of OpenWater. This has been another episode of Hanselminutes in association with the ACM ByteCast, and we will see you again next week.

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