JOHN Q. WALKER + Zenph Studios

if you can think it, you can hear it

by Jeannie Mellinger

Earlier this year, Sony Classical released a new recording of Glenn Gould's celebrated 1955 performance of Bach's Goldberg Variations. *In short order, critics ecstatically weighed in.* Audiophile Audition *said "This has got to be one of the most exciting SACD releases yet! [It] is a revelation with its clarity, depth, spatial spread of the notes heard and their naturalness."* The Wall Street Journal *called it "a technological miracle." David Perkins, writing for the (Raleigh)* News & Observer *said "the results are astonishing... we hear, with unprecedented clarity, Gould's unique combination of singing line, speed and accuracy." And in Toronto, Gould's birthplace, the* Star *pronounced it "better than the original... [with] all the immediacy of a live concert." The technology used to produce this unparalleled recording is no less pioneering than what Pixar created for its groundbreaking animated movies like* Toy Story, Monsters, Inc, Cars, *and* Ratatouille. *And it is being developed in Raleigh at Zenph Studios. Opus visited founder John Q. Walker to learn more.*

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Step onto the wide front porch of John Q. Walker's traditional-looking southern home in North Raleigh and get ready for a big surprise. You won't find oval mirrors, ancestral portraits and knickknacks. You're in a laboratory of the future – a stripped down, contemporary setting for a technology so far gone around the corner and down the block that it has no competitors.

Impressively tall, with a welcoming smile and ebullient manner, Walker can't wait to show visitors the magic he and his team of software engineers, Ph.D. musicians and physicists are up to. "The house used to end right here," he demonstrates, on the way into the concert hall he added just beyond a kitchen Martha Stewart might have loved until it was filled with laptop computers and recording

"we are inventing an entirely new science."

equipment. We see the control room first – a warren of Neumann mics, Bryston amps, Ultrasone headphones, an Avalon pre-amp and a super-silent hand-built PC with no fans in it.

"Now, I'll wait a second," he says as he gets ready to open the door to the hall. "There's always this moment…" And bam, he gets the reaction he was expecting. "Two of the classic responses," he says gleefully, "are 'Wow!' and "Omigod!'"

Certainly, wow. Two nine-foot concert grand pianos, a Yamaha Disklavier Pro and a Bösendorfer, sit gleaming on the stage. The high-ceilinged 1,600 square foot room is an acoustical sensation that Walker believes to be "the finest of its type on the whole East Coast." In his quest to create the most perfect conditions possible for the re-performance of great piano solos, he found his model in a room that Richard Wagner built for concerts in Bayreuth, Germany.

"We went back to first principles," says Walker. "The room has the same dimensions and size as Wagner's. You know, before there were mics and speakers, there were rooms like this one. One hundred years ago, builders knew how to create great acoustics and then the knowledge almost got lost. This room is self-amplifying and there's a reason for that. If you are a musician or a vocalist and you can hear yourself play or sing, you play better!" The wonderful obviousness of this fact makes Walker explode with delighted laughter.

The room has a hollow stage, a four-inch thick concrete floor and is lined with warm maple and cherry.

"Both woods have musical resonating properties. Maple has a hard reflection, cherry is a bit more absorptive," Walker explains. "The stage is hollow and when you stand there and sing, or play the cello, you can feel the sound come back up through your feet. And when we've had vocalists here, they often sing a line or two and then stop because they've never heard their voices coming back to them in quite that way. Then they compose themselves and start over again."

The concert hall, built behind Walker's home, is lined with maple for its **hard reflection** and cherry for its **absorptive qualities.**

But what's it all for? This incredible room with its attention to every detail, the state-of-the-art equipment and technology, the musicians, physicists and engineers? Aren't there already recordings of Glenn Gould's performance of *The Goldberg Variations?* What could be new about that?

Well, just everything. "We are inventing an entirely new science," says Walker, "and that science is – how do musicians perform? We had to write the equations. What does it mean mathematically to press your finger down in a certain way? I'll give you an analogy. You saw the beginning of this stuff in *Jurassic Park* – remember those dinosaurs? The filmmakers had to find, for the first time, what it meant for skin to hang off of muscle. We all know exactly what that looks like, but there were no equations for it."

In that same way, the Zenph team is writing the software to encode musical performance. "We are not re-mastering," Walker says emphatically. "Re-mastering digitally removes the noise from old recordings. That's not what we do. We start over from scratch. The artist plays all the notes again." Even the wrong ones? "Everything."

These notes, right and wrong, with all their original nuance and dynamics, are played again on one of Zenph's elaborately tricked-out concert grands. The keys move, the way the keys of a player piano move, but the technology is entirely different. The player piano, with its rolls of paper, is the skateboard run over in the driveway by Zenph's Ferrari.

"Solenoids make the keys move from inside the piano – the very best of Japanese technology," Walker says. "The movement must be extraordinarily precise down to the millisecond because there are so many things that have to happen – the staccato, the legato. Each touch is replicated. We spent a year reverse engineering how the piano's software worked internally."

When working with piano recordings, there are about ten things the Zenph team needs to determine for each note that's heard: what the pitch is (what key was pressed), when exactly it was pressed down (they code at the level of microseconds), how the key was pressed down (the nuance of the pianist's touch and attack), how hard it was pressed (resulting in the volume), how long the key was held, how the key was released, where the key was already if it repeated, as well as the positions of the various pedals and dampers. The manner in which any individual pianist executes these details is as individual as DNA.

"All of these factors affect the sound of each note," says Walker. "In our first Gould album, there were 17,851 notes; in the new Tatum recording, more than 30,000 notes. We also have to evaluate the original piano, room and microphones." The timbre of the original piano tells Zenph a lot about the dynamic range that was actually played (which overcomes the apparently limiting dynamic range of the original recording), as does the resonance of the room and everything that can be determined about the original mic placement.

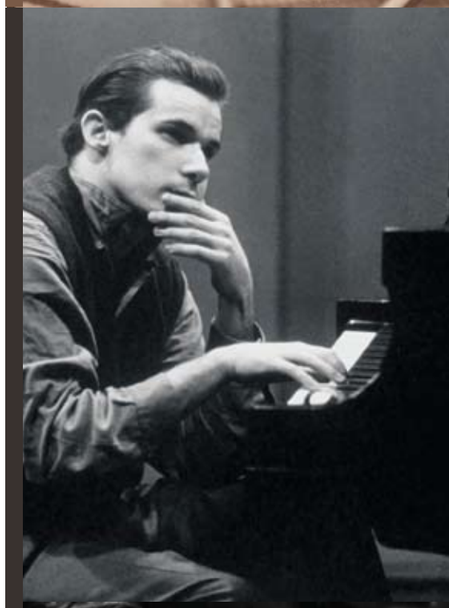
"…you are inside Gould's head, you can hear how he heard it! It feels like your own fingers are playing."

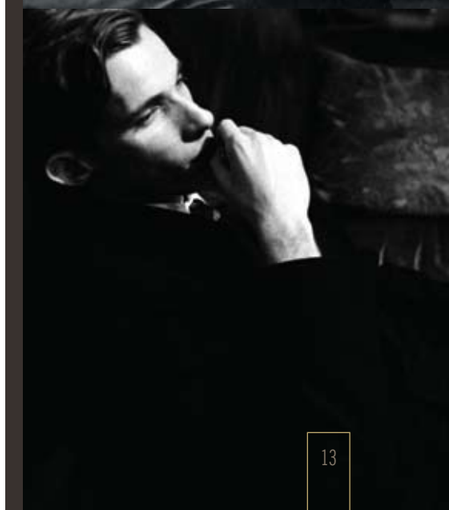
But what about the piano itself? Although Gould ended his career as a Yamaha artist, his famous recording of *The Goldberg Variations* was performed on a Steinway. If the end game is to absolutely re-create the 1955 performance, wouldn't the piano need to be the same? "That particular Steinway was actually a rather poor instrument," says Walker. "But we have a very talented voicer who worked at Steinway for years. We flew him down from New York and he made this piano sound more like a great Steinway."

Here, then, is Glenn Gould. He was 22-years-old. He had just signed with Columbia Artists after a critically acclaimed debut recital in New York. They invited him to record whatever he wanted. "He picked a very obscure thing at the time," Walker says, "*The Goldberg Variations*. Before Gould, it was thought that this work could not be played on a piano. And it has since become one of the best-selling classical recordings of all time. It's never been out of print."

Now a remarkable thing happens. The keys of the Yamaha move and the sound is clean, crisp and precise with an immediacy and energy that is flatly astonishing. As the first variation begins, the keyboard is literally alive with Gould's breathtaking speed – so many notes they nearly push the oxygen out of the room. "It's all there," grins Walker. "The dynamics, the articulation, the staccatos, the movement of the pedal, all just as he first performed it. This is how we got our contract with Sony. When they heard this, it took them about three minutes to decide to do it."

There's more. "When they made the





"I've seen a lot of things, but this is truly a wondrous project."

– Marvin Hamlisch, on a recent visit to Zenph Studios

new recording, we used a dummy head – it looks like a wig holder – and we put it where Gould's head would have been. It has microphones in the ears. So when you listen to the second half of the CD, you are inside Gould's head, you can hear it how he heard it!" Walker grows more animated. "I'm not kidding you, you can understand what Gould was hearing and therefore why he made the choices he made. It feels like your own fingers are playing. You can never experience this with a live performance because the pianist would be in the way!"

It takes a moment to absorb what this can mean for piano studies. "To actually see what the piano is doing is amazing," Walker says. "We had professors over from the Jazz Studies department at Duke to hear what we've done with Art Tatum's 'Tiger Rag.' They were so excited because they couldn't ever figure out how Tatum did what he did. But now they can watch the piano move and see **exactly** how he did it. It's incredible information for the entire field."

Another valuable contribution to the field is providing the scores for decades-old jazz performances. "Art Tatum is one of the greatest jazz pianists of all time," says Walker. "But his playing was all improvisation and so complex that the scores were never written. We went to Boosey and Hawkes, the music publishers, and asked if they would be interested in publishing the definitive original jazz scores from Tatum's live 1949 performance. We can take those recordings and turn them into notes. And of course they said yes. You'll be able to really study measure by measure, compare one performance to another. The academic study of jazz will be revolutionized."

Back in the "kitchen," team member Eric Hirsh is seated at his computer, creating the first score. "He gets to do a job that no one has ever done before at this level of accuracy," says Walker. "It's a complicated piece of music." No surprise that Hirsh is both a pianist and a physicist.

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John Q. Walker is perhaps uniquely qualified to bring this technology to life, with the perfect storm of background, interest, idea and knowledge. "I am interested in pure science," he says. "And I also got a piano degree along the way. My teacher in college was one of Rachmaninoff's two students, Ruth Slencznska. She's 82 (and thinks she's 30) and has been helping us quite a bit on this project. I guess what started me down this path was listening to her stories of Mr. Rachmaninoff and thinking 'It just isn't fair that I didn't get to listen to him play live.' And I thought, when the time comes, meaning, when the hardware and the software get good enough, I want to solve that problem. I want to sit in the room and hear Rachmaninoff play live. And Art Tatum and Duke Ellington and Glenn Gould."

Walker spent 17 years at IBM including time in a Ph.D. program at UNC-CH where the whole field of virtual reality was developing. "I realized that we could do virtual reality for music. We're actually going to get to hear things we never dreamed we could hear and they are going to be better than anything we can hear right now. That's *Transformers*, right? That's the dinosaurs! You never thought you'd hear Glenn Gould playing live, but you never thought you'd see dinosaurs, either!"

There is a certain inevitability to Walker's work at Zenph. "All technology applied to entertainment in the 21st century," he points out, "is about a better experience. Think about HDTV. The visual experience is just so much better. But in 2016, just nine years from now, we'll have **ultra** high definition. The specs are already out. And we'll think that what we are now seeing today was just hopelessly crude. It's about moving the ball forward."

So imagine this, gentle reader. In music, sometime soon in this century, Walker assures us we will not listen to mere recordings. We will hear our music, but it will be generated on the spot, just the way we want it to be played that day. You want to hear Gould play and be inside his head? Done. You want to hear him play from the 10th row in the hall? No problem. You want to hear Tatum's "Tea for Two" slower? Or hear it sounding like the blues? Easy. The listener will be the musician.

And what if you want to hear Gould, who died so young, play something he never played? "Yes, that's possible too," says Walker, "because he can exist as algorithms. We know how he moves his hands and what fingerings he is likely to use. I don't know all those equations yet, but I assure you that when we have the high-resolution data to study, we will be able to do this. You've seen this in other fields. When you turn something into data you can do anything with it."

What about a full orchestra? The Berlin Philharmonic, 1923? Fritz Reiner and the Chicago Symphony Orchestra, 1959? "It will happen – soon," says Walker. "And now that we know how to do it, the other instruments will follow much more quickly. It took us a year to decode the first piano, two days to do the second. We'll step through the other instruments and voice. I'm ready for the Beatles reunion!"

Sony BMG recording of the Zenph re-performance of Glenn Gould's 1955 ***Goldberg Variations***

(l-r) Sony Producer Steve Epstein, Sony Engineer Richard King, CBC Engineer Peter Cook, CBC Engineer Dennis Patterson

Then Walker pauses for a minute. "I don't want to oversell this. We're not there yet, but we can see the goal ahead of us. We're literally working on our second instrument, the string bass. And with voice, although we already have software that can create choirs or male or female solo voice, these are not voices that you know. That's where the technology has to proceed – to do **specific** human voices, which we, as humans, are so deeply wired for."

Sony BMG plans, with Zenph, to issue new recordings of old material. They own the rights to all of Columbia and RCA Victor recordings – Horowitz, Rachmaninoff, Thelonius Monk, Duke Ellington, Fats Waller, André Previn and others. "We'll let this first recording succeed and then go on. That's just the start. And of course, it will get better and better and better."

For Walker and his Zenph team, it's all about the realism of the experience. "I want to be very clear," he says. "This is not about live music, or about something which takes the place of live music. This is about making listening to recordings a better experience. That's why we do this. I love live music so much that I want to hear things I would never be able to hear live."

Walker does have his detractors. "We get rave reviews, except from the people who don't want it to work. 'That is not Gould,' they'll say. 'That is a robot instrument.' They don't talk about the experience of listening to it, they just don't like the idea of it. They want the original. That's fine – the original recording exists for you to listen to. We're not replicating the original, we're creating a different, but authentic experience from Gould's performance. But I feel every view is valid, because let's face it, we're pushing the edges. This is the new frontier." The new Gould recording spent most of last summer in the Billboard Classical Top Ten charts.

On down days when he is told, for instance, that there's no money in music or that there is no audience for classical and jazz recordings, Walker takes solace in reading the biography of Walt Disney. "Here he was, with Mickey Mouse and the Silly Symphonies and all these wonderful ideas and he couldn't get investors. He has to come back to his brother Roy with empty pockets and they mortgage the house again. So when I look at that," he laughs, "I know we're on the right track!"

And like Walt, Walker's imagination is without limits. Why not have Chris Botti come to the studio to play with Art Tatum? Why not create chamber quartets with great musicians who never even met? And why not do that Beatles Reunion?

"I am a software engineer," Walker smiles. "If you can think of it, we can write software to do it."