

# Virtual Maestro

With a series of popular mobile apps that turn the iPhone into a musical instrument, Ge Wang hopes to change the way we think about music.

By Jacob Dagger • Photography by Toni Gauthier

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feature and profile

Jeff Smith had enjoyed plenty of success in the world of Internet start-ups. In 1993, just a few years after graduating from Stanford University, he had cofounded Tumbleweed Communications, a software company that specialized in e-mail security, catering to large corporate clients. Over twelve years, he'd expanded the company, slowly acquiring other software firms, and eventually taking it public on the Nasdaq.

But by 2005, he was ready to move on. An avid pianist and composer in his spare time, Smith decided to leave the business world and return to graduate school at Stanford to follow a different passion: computer music. Early on, Smith was particularly inspired by a course on synthesizing sound, but even more so by the course's instructor, first-year professor Ge Wang '00. A talented programmer who specialized in computer-generated sound, Wang had written a new computer language dedicated to music performance. In his first semester at Stanford, he had founded a pair of novel ensembles: the Stanford Laptop Orchestra and the Mobile Phone Orchestra, both of which featured students composing and performing music on electronic devices.

"When I met him," Smith says, "it was my conclusion that this guy was going to change music, it was [the world]."

As is often the case with those who have proven themselves successful in Silicon Valley, Smith was still routinely in touch with his former associates. It was early 2008 when a former investor asked Smith to review some new business ideas.

The previous fall, Apple had announced the upcoming release of the iPhone SDK, a software development kit that would allow

Smith shared the idea with Wang, whose programming and music skills would lend themselves well to the project. The timing wasn't perfect for either one of them—Smith had his Ph.D. work to keep him busy, and Wang was rushing to wrap up and defend his own Ph.D. thesis and adjusting to his new teaching duties—but after much discussion, they decided the opportunity was too good to pass up. "Wow," Wang recalls thinking about the iPhone. "This is going to change how people do music, this device. But someone will have to actually be there to effect that change. And we might as well be part of that." That summer, the pair launched SonicMule (later shortened to Smule), a start-up dedicated to developing interactive "social/sonic media."

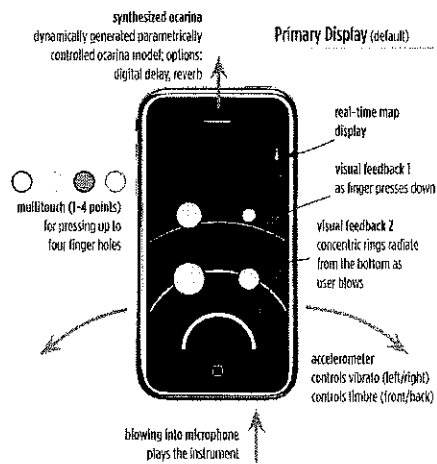
Over the past three years, the growing start-up has released nearly a dozen music-based apps for the iPhone and iPad, almost all of which have been unquestionable successes, commercially and critically. Collectively, its apps boast more than ten million active users. The staff, originally a bare-bones team of six, has grown to twenty-five, with a wave of additional new hires expected this fall. And it's part of a growing industry. In April, *Forbes* reported that the mobile app market totaled about \$2.2 billion last year, up 160 percent from the year before.

But Wang hopes to accomplish much more than simply establishing a successful company. His goal, audacious as it sounds, is to help change the way that music is produced, lis-

tened to, and shared around the world. "I think the future of music-making is one where we might see the relationship of who is producing music versus who is consuming it changing," Wang told the BBC last year. "There you have a few performers performing members, it actually might be a model where

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Music man: Wang, opposite, plays theme song to Legend of Zelda video game using Ocarina app, with speaker "gloves" amplifying sound; above, original schema for what would become the Ocarina.

quickly became the number-one music app in the U.S. and in twenty other countries. Since 2006, it has been downloaded more than five million times.

Wang hypothesized that the Ocarina, as well as other Smule products, have been successful because they allow people to be creative. They have created a catalog of 100 titles for thousands of songs on the Ocarina.

From his desk at Stanford, he pulls up the program on his desktop computer. The circle on a newly installed Ocarina icon, and notes begin to trickle out.

"This is exciting time... He equates at the same time, trying to divine instrumental feedback on the blue and green circle. "It's that Russia!"

Since the app was first released in November 2009, people have listened to each other on the app more than 50 million times. Users have left comments on Smule's site saying that listening to the Ocarina has replaced TV as their regular daytime entertainment.

In the wake of Ocarina's success, Smule has released several instrument-based apps, including Maple Piano, Magic Fiddle (inspired, supposedly, by a string quartet once in San Francisco during which pianist Lang played the classical piece "Solo of the Banjo" on an iPad), and Legit Trombone.

They have also teamed with singer Justin Bieber and the producers of the hit Fox show *Glee* to produce two branched karaoke-style apps. T-Pain's app was especially fun. The singer behind the tracks "Buy U a Drink" and "I Love My Cheesecake" allowed for his own version, or, worse, of Auto-Tune, a digital pitch-correction software that Timbaland once likened to "Phonopop for the human voice." And, surprisingly, the software can also cut vocals, eliminating all pitch inflection in T-Pain's track, it makes the human voice sound unrecognizable and fake. The T-Pain app adds Auto-Tune to the iPhone's microphone and lets users to add themselves singing along with T-Pain songs in just about anything they want.

"The thing is that [T-Pain] doesn't actually need Auto-Tune to be good," Wang says. "It uses it purely as an artistic gesture. He's certainly pushed the Auto-Tune to its boundaries in a way that Auto-Tune was never intended to be used." At this, Wang smiles, as if he's found a kindred spirit.

AND AND SMILE have had an impressive three-year run. According to cofounder Jeff Smith, the company brought in about \$1 million in revenue in its first full year of operation, 2009, selling apps for between \$4 and \$5. Last year, they made \$4 million. This year, they hope to double that.

But they're not resting. In addition to developing new apps, Wang and Smith say they are trying to further develop the joint-like aspects of their online apps, for example, by including

challenges and levels that users must pass in order to earn awards, in this case a currency tentatively titled "Smulebits."

They are also looking at converting some of their apps to a "freemium" model, meaning they would allow users to download the app itself for free, but then charge for additional

features. The iPad edition of Maple Piano allows if it may, experiment with first attempt at this strategy. Initially, they will charge for extra songs in future collections of the game, they hope to be able to offer different sounds—the sample, a sharp or a mellow tone—as well.

For the foreseeable future, Smith adds, Smule apps will only be available on Apple devices—either iPhones or iPads, he says, "I'm not interested from a commercial standpoint, either—because that may change as Google's Android is integrated into our phones. In some ways, all of these new music apps seem like a classic example of the Internet's ability to promote over-sharing. *Glee*, *Katrina*, for example, less millisecond of announcement users felt it was for the world to hear. It does for music what blogs, Facebook, and Twitter did for opinion—it lets individuals embrace their need, their right, to be heard. David Byrne, the *Flow* reviewer wrote, "The result—professional-looking book, you proceed to read it and you're perfect—it's exhilarating, no matter how often a singer you are." But a quick sampling of tracks uploaded by users indicates that not everyone is cut out to be an American Idol.

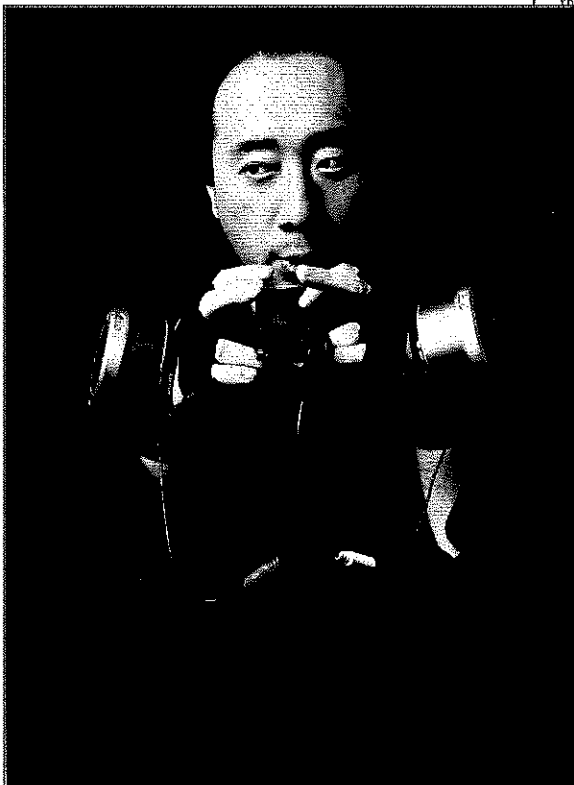
At the same time, the apps do encourage unprecedented, and unexpected, types of musical collaboration. In March, in the wake of the massive earthquake and tsunami in Japan, a posting from Tokyo turned up her iPhone and pulled up Smule's *Glee* karaoke app. Using the phone's built-in mic, she recorded herself singing along to the song "Lemon Merit." She uploaded the song on the *Glee* karaoke website, where it could be heard by other users and invited a few friends to chip in vocal tracks.

The response was astounding. Over the next week, requests poured in from fans less than an hour away from the phone, asking for invitations to contribute their own voices to the project. Within ten days, the track featured more than 1,300 voices, most perfect accents, all singing in support of Japan.

"It's one of those cases where you create something, and then people find uses for it that are not what you originally intended," Wang says. "As a developer, that's probably the most satisfying thing. People using it the way you intended it is awesome, for sure, but when people kind of take a step beyond that, it's just like, wow. Because that it becomes a dialogue."

Dagger '09 was formerly the *City Editor* at *Duke Magazine* in Berkeley, California.

With a rendition of "Swallow to Heaven" performed by Ocarina app users. <http://duke.dukeup.edu>



(continued)



Tuned in, turned on: Rehearsal for Stanford Laptop Orchestra and Stanford Mobile Phone Orchestra concert at the university's Dinkelspiel Auditorium in June.

IN GRADUATE SCHOOL, Wang worked under renowned composer and computer musician Perry Cook, who had a joint appointment in Princeton's computer science and music departments. Wang immersed himself in tinkering. But the programmer in him was always tinkering. Since his time at Duke, Wang had spent a lot of time thinking about the nuances of computer languages. His experience debugging friends' programs made him "appreciate when software... was designed in a way that makes people's lives easier."

There are thousands of computer languages out there, including dozens designed specifically for composing computer music, but despite a great deal of experimentation, Wang couldn't find one that met all of his needs. "One day I came to Perry," Wang recalls, "and I said, 'Perry, I know there are a lot of programming languages out there for music. I think I want to build yet another one.'"

He explained the basics of the new language he was proposing. Cook took one look, and said, "Okay, that sounds pretty insane."

cluding programming, music composition, and live performance. "People learned programming because they had to go create a musical instrument and a performance, and they were going to perform it in front of the class or in front of an audience," Wang says. "The programming becomes a tool and not the end goal."

Though the class comprised fifteen college freshmen, none of whom had any significant programming experience, the experiment was a great success, Wang says. "They rocked it. We were scared. They were..."

When he came founding the first semester on classmen and graduate pieces first own. Wang's original students design at a smile.

His hands-on that attracted faculty outgoing design Chris Chafe, Research in Music really interested

Greg Bass, an assistant professor of computer science at the University of Michigan, and Henry Pauson, a Finnish researcher. Wang had launched a new project, the Stanford Mobile Phone Orchestra (SMPO). As with SLO, the student members of SMPO composed and performed electronic music, but instead of making music through keyboards and mtrclmks, they played on custom-made smartphones. The output of their Nokia 9500, amplified by custom-made gloves outfitted with speakers.

Compared to the old Nokia phones, programming with the iPhone SDK was a breeze. The popularity of the new iPhone also offered them the advantage of a large-scale audience of social applications. "I realized that in the vein of ubiquitous computing, just building something is not enough," Wang says. "It needs to be used. It needs to be in the hands of not hundreds, or thousands,

of people. This is the social part of the app. The phone is responding to soft audible cues passed from speaker to mic.

On a whim, Wang added a social feature to the app, a moving image of a globe that users could use across, seeing where in the world others were using the app. The app was social, but it did not rely on the same explicit links as other social networks. It projected a sort of anonymity that Wang thought was powerful. "This is here to show you that you're not the only one. Like you, these other people around the world have also paid a buck to get a fake lighter on their iPhone." The globe has now become a recurring feature in the company's apps.

Their next project was more ambitious. They would turn the iPhone into a flute-like musical instrument inspired by an ancient wind instrument featured in one of the early Legend of Zelda video games, the ocarina. For this project, Wang pulled out all of the stops, making use of every iPhone feature he could think of. The design is colorful. Users blow into the device's microphone while

Since 2008, Ocarina has been downloaded more than 5,000,000 times.

but millions, or hundreds of millions. When you reach those different scales, different things become possible, socially and musically. And as a researcher, that is irresistible. I feel like both academia and the commercial world had something to offer this."

That first product was not music-based, or at least not obviously so. It was a virtual cigarette lighter of the sort that concert fans have become fond of waving. But it was different from the scores of other lighters in the App Store. The app features a clean black screen with a remarkably realistic flame that shifts when you brush your finger across it, and actually seems to singe the edge of the screen if you rub it too far one way or the other. You can also extinguish the flame by blowing into the phone's microphone, or using the flamebreather feature, pass the flame to another iPhone (that has

fingered virtual holes that appear on its touch screen). Throwing the device, thereby altering the built-in accelerometer, changes the pitch of notes, and the phone's GPS makes performances playable on a map. Wang called the instrument Ocarina. Ocarina proved to be a massive success, commercially and critically. It earned rave reviews from critics at tech-focused publications like *Time* and *PC Magazine*, but also caught the attention of general-interest publications like *National Geographic*, *Scientific American*, and *The New York Times*. Four technology editor David Pogue invited Wang, writing in the *MacWorld 2009 Expo* on the Ocarina. Accompanied by Pogue on keyboard, Wang played *The Beatles'* "Yesterday."

The app netted up 400,000 downloads in its first month and

And we have these types of devices in the hands of tens of millions, and soon more, people."

IN A WEDNESDAY AFTERNOON in late April in Smedley Palo Alto, California, headquarters, Ge Wang is trying to explain some practical uses of the company's latest iPhone app.

He pulls his iPhone out of his pocket and cues up the app, *Magic Piano*. The app turns a smartphone into a sort of musical instrument. "If something particularly epic is happening in your life," Wang says, "you might play something like this," and as green dots begin to float down the device's touchscreen, he follows them with his fingers, tapping out the triumphant opening notes from *Clara's Air*.

"On the other hand," Wang says, "if you're feeling down, you might play something more like this." Again, his fingers follow a series of descending green dots. But this time, the music that comes from the iPhone's speakers is "190 Years," pop band Five for Fighting's somber ballad about the passage of time.

Over the past two weeks, staff members have been working long hours to get the new release—adapted from the original iPad version—just right. It was submitted to Apple yesterday, and today, in the wake of the storm, things are unusually quiet, save for Wang's performance.

"I realized that in the vein of ubiquitous computing, just building something is not enough," Wang says. "It needs to be used. It needs to be in the hands of not hundreds, or thousands, but millions, or hundreds of millions."

The office, located on the second floor of a two-story building just off Stanford's campus, consists mainly of one large room with a wall of east-facing windows and desks in groups of four arranged in what Wang describes as "ninja-star formation." Wang's desk is in one corner, Smith's is in the opposite. The walls are decorated with colorful drafts of design documents used to build past apps, photos of staff members, and "Almond Film Festival" posters featuring Wang's face Photoshopped in place of the former California governor's.

One of two conference rooms features a long table, comfortable office chairs, and a big screen; it doubles as a site for weekly business meetings and a gaming studio. An X-box console, as well as faux instruments used in the popular game *Rock Band*, are stashed along one wall.

IT SEEMS POSSIBLE TO TRACE Wang's path to computer music back to childhood, though you could also say that his interests weren't all that different from that of the average boy growing up in the 1980s.

Born in Beijing, he spent most of his childhood in Kansas, where he grew up on classic video games like *Mario Bros.*, *Donkey Kong*, and *The Legend of Zelda*. His first musical instrument was an accordion, a gift from his grandparents; his second was an electric guitar, which his parents bought him unimpressed when

he was thirteen. "In retrospect, that seemed like kind of an unconventional thing for parents to do," Wang says. "To preemptively invite an instrument of rebellion and delinquency into your home." He took lessons from a teacher at a local music store and was soon jamming to Metallica and Guns N' Roses. He loved experimenting with sound.

"My parents have always encouraged me to follow my interests," he says. "They never had sold me on anything. They wanted to see what stuck. And music stuck."

At Duke, Wang (who went by "Gary" at the time) studied computer science, excelling in programming courses, spending many late nights in the Ter Hoolander computer lab, and often serving as a de facto teaching assistant and debugger for friends. But he also balanced out his schedule with music courses: composition, theory, music history.

One course in particular stood out for him: "Electronic Music," taught by music professor Scott Lindqvist, who is now Duke's vice provost for the arts. It was during that class that Wang first heard a recording of "Table's Clear," an experimental piece of computer music by composer Paul Lausky. The piece begins with seemingly random clanks and bangs, the sounds of kitchenware being handled roughly. But as the piece goes on, the sounds begin to organize themselves into a musical groove. "This was the first piece of computer music that moved me musically," Wang says.

"It was like, I want to do that, or I want to help people do that." The course also gave him his first opportunity to compose and record his own computer music. Until this point, Wang, like many of his computer-science classmates, had envisioned a career in programming, either with a software giant like Microsoft or maybe with a videogame design company. But now a second path appeared. Lausky, an acquaintance of Lindqvist's, taught at Princeton University, which has a renowned sound lab. Wang applied to the graduate program there and was accepted.

Wang's first foray into the smart-up world also came during his time at Duke. With four friends he hatched a plan to launch an Internet site that would compile, summarize, and synthesize online reviews for a wide array of consumer products. This was in the late 1990s, when reviews of this type had just begun piling up online. The five picked their things into a Go-Haul and headed north to Cambridge, Massachusetts, where they rented a townhouse and got to work on their site.

"The Internet had gone through peaks and valleys in terms of levels of excitement" due to raises among investors and entrepreneurs, says Matt Killingsworth '00, the group's leader. "At this point it felt like anything was possible, that *this is the future*." But after a few months, Killingsworth says, "we began looking at the financial assumptions we and others in the Internet industry were making."

"In the process of raising round one of financing," he says, "we became increasingly skeptical. The rate at which we were assuming we could turn visitors into revenue seemed less and less feasible." When the time came to decide whether they should request an additional semester's leave of absence from Duke, they decided to pack up and head back to campus. The following spring, the dot-com bubble burst. Killingsworth is now pursuing a Ph.D. in psychology at Harvard University. His thesis involves using a smartphone app he developed to more accurately measure and understand happiness in humans.

Wang's research in music really interested

### There's a Class for That

The world of smartphones and development can be daunting for those who want the right combination of programming skills, entrepreneurial spirit, and time. For many students, there are courses at Stanford that offer a hands-on introduction to the field of mobile computing. Wang's first course, "Introduction to Mobile Computing," was a 10-unit course that focused on the design and development of mobile applications. Wang's first course, "Introduction to Mobile Computing," was a 10-unit course that focused on the design and development of mobile applications.

the variety." Donald reads, "One of the doctor said, 'What's a server?' The student honestly had to figure out how he answers that."

For many students, it was an exhilarating first step into the world of apps. There are plenty of examples of students who have had their first app. In 2007, a group of Stanford University undergraduates created a temporary relief application, which, after meeting on apps for a number of large conferences, found its way to the App Store. It was a simple app that allowed users to request a ride to a specific location. The app was acquired by academic Web giant Blackboard, which is building them out of campus-specific apps across the country.

At Duke, John Wu, Harding '09 spent six weeks during the spring of his senior year developing *ShedZilla*, a smartphone version of a classic desktop game that had up to millions of downloads last year during the App Store's first month in 2007.

—David Bygner