Cool Tools Show Podcast Episode 124: Kishore Hari

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Our guest this week is Kishore Hari. Kishore is a scientist/science educator who's been building science events for the last decade, but he really sees himself as a community organizer for science. He's currently the science correspondent at Adam Savage's Tested.com and the host of the weekly science podcast Inquiring Minds.

Mark: Welcome to the Cool Tools Show. I'm Mark Frauenfelder, editor-in-chief of Cool Tools, a website of tool recommendations written by our readers. You can find us at Cool-Tools.org. I'm joined by my co-host, Kevin Kelly, founder of Cool Tools. Hey, Kevin.

Kevin: Hey, it's great to be here.

Mark: In each episode of the Cool Tools Show, Kevin and I talk to a guest about some of his or her favorite uncommon and uncommonly good tools they think others should know about. Our guest this week is Kishore Hari. Kishore is a scientist/science educator who's been building science events for the last decade, but he really sees himself as a community organizer for science. He's currently the science correspondent at Adam Savage's Tested.com and the host of the weekly science podcast Inquiring Minds. Hey, Kishore, how are you?

Kishore: I'm doing really well. Great to be here.

Mark: Good. Good, I'm so glad you could join us. We've had quite a few of the Tested crew on our podcast, so it's great to have you join us as well.

Kishore: Yeah, no shock there. We are ... We really like tools over here.

Mark: Yeah, for sure. We're in the same club over here, too. So let's talk about the dapping set and hammer that you recommend, and start by telling us what dapping is.

Kishore: So it's the idea of getting a hammer and a set of just sort of mini anvils and shaping tools so that you can shape metal by hand. The reason I'm so obsessed with this tool as of late

is I grew up reading comics, and the comics I read all featured this character Thanos, which has now entered the cultural mainstream with the Infinity War movie. Ever since I was about 10 or 11 years old, I wanted to build an Infinity Gauntlet so I could have control of all of the space and time, I guess. And with the emergence of all of these Marvel movies, people started creating all of this different versions of Infinity Gauntlets, like 3D-printed ones, and I wanted to make it in my own way.

Kishore: The one I've been building, I wanted to build out of brass. I wanted it to feel like an actual gauntlet. I got the inspiration because Adam Savage has these Nazgul gauntlets that are from The Lord of the Rings character, and you put it on and you hear the noise of the metal just kind of clanging together when you sort of articulate your fingers, and it was hypnotic to me. And so I wanted to do that. I've never made anything out of metal, let alone a gauntlet by hand, and I sort of went into that deep dive into that world.

Kishore: And there are lots of way to do it, but I found somebody who was posting all these videos about hand-shaping metal. It's not something I've ever thought of in my life or something that I've done since metal shop when I was a kid, but I have to say it's one of the more satisfying things I've ever done is just pounding metal on mini anvils and shaping it slowly over time. Nothing comes out perfect. It has a lot of little nicks and scratches because I'm hand-shaping everything, but I love that. It tells a story. It tells the story of when I was shaping that metal, and there's nothing as satisfying as that feeling of just banging on metal. It both is the best release of stress from the day but also just deeply satisfying from a making perspective.

Kevin: And so what's dapping? Dapping is where you make a certain kind of mark, or?

Kishore: Dapping is sort of what the set is referred to. It's sort of the tools are called dapping sets. And there are all these different punches and anvils and other kind of components, and you use a hammer along with this dapping block. It's mostly commonly used in jewelry-making, so a lot of jewelry makers have used this. I actually don't know where the word comes from, but I imagine there must be a historical use of that word "to dap," but I think that probably means something else to teenagers these days than [crosstalk 00:04:31].

Kevin: Undoubtedly. So one of the dapping tools that you pointed us to is something called a dome punch, which is ... it's a ball, a spherical tiny little ball on the end of a handle, and you make, I guess, little depressions, little dimples.

Kishore: Yeah, you can make different sort of textures using that tool and different hammer sets that come along with it, so you're able to shape and create depth in the metal you're creating. You can create different sort of structural elements. I mostly have been ... With the Infinity Gauntlet has all these raised ridges throughout it and some sort of almost pearling, and I've been using the punch to kind of shape the pearling at the edge of the gauntlet itself but also create some of these raised ridges that it has a texture that catches light in a different way. And when using it on brass, it's sort of fun because brass is actually reasonably soft, so it doesn't take a ton of effort to do this. This is really a delicate kind of maneuvering that you go through with it.

Kishore: I am not an expert by any means with this set. I'm basically taking an Intro to Jewelry Making by doing this at home, but I can't tell you how incredibly satisfying it is. Every year when I go to Maker Faire and other things, I zip by the jewelry-making area and don't give it much of a thought, but it is the most zen experience I've had in making in a long time.

Kevin: And how is it going? How is your Infinity Gauntlet coming along?

Kishore: It's basically done. I haven't revealed it yet because I'm trying to do something complicated with the electronics, and I can't quite get it to work the way I want it to.

Kevin: I see.

Kishore: I'm trying to do it where it's magnetized, and when one of the gems comes in contact it lights up and sort of all of ...

Kevin: Cool.

Kishore: It's basically the electronics that I can't get working.

Mark: That's cool.

Kishore: But it'll get there.

Mark: So what kind of stock metal ... Are you using thin sheets of brass, or 1/32nd inch, or what's the stock?

Kishore: I'm using a brass sheet. I'm using different thicknesses. I'm actually using a fairly thick sheet of brass to shape a lot of the outer gauntlet, and then less thick pieces for some of the decoration for the raised pieces on top. But the fingers itself, I wanted it to have heft, so I'm actually using eighth and sixteenth thickness on it.

Kevin: Wow.

Mark: Wow, I can't wait to see what it looks like.

Kishore: It's heavy. It like ...

Kevin: [inaudible 00:07:31] gonna say it must be heavy.

Kishore: In my 12-year-old mind, it was heavy. When I saw it in the comic, I'm like, "That's heavy. It takes ... Somebody who's called the Mad Titan must be so strong to lift this up," so that's why I went with a thicker gauge. Yeah, and it doesn't look the best compared to all the other craftsmen that are out there, but I don't care, because it is ... It was the jewel of my eyes for the last 30 years, so to have a piece that I handmade myself means the world to me.

Mark: Yeah, absolutely.

Kevin: Cool.

Mark: That's so cool.

Kevin: Yeah.

Mark: Yeah, I find that making something that even though it's not nearly as good as someone who has spent their life honing that kind of skill, one of the benefits is it just makes you appreciate what other people do in that same field. If you make furniture, you can really appreciate furniture in a new way.

Kishore: I absolutely appreciate the deep expertise that people have in this realm, because it's taken me months to get where I am, whereas I'm sure an experienced craftsman it would take a couple days. But beyond that ... Beyond the deep expertise, this isn't something I thought I could do. It's not something that I thought was within the realm of my skillset. Most of my life has been working in science, and either working behind a lab bench or working behind a computer screen, and hammering metal was nowhere in my world. But one day I just picked up a hammer and started doing it, 'cause it was easy enough to go get a sheet of brass from a local shop ...

Mark: Sure. That's so cool.

Kishore: ... and sometimes you just gotta get a hammer and start hitting stuff.

Kevin: That's true.

Mark: That's great. So moving from the heavyweight to the lightweight, you have selected as one of your picks something called a Foldscope. Tell us about that.

Kishore: Foldscope is one of the most exciting tools I've seen in a long time. Stanford professor Manu Prakash is this sort of ... I would say he's like the poet laureate of the science world. I find him lyrical. And what he's obsessed with is creating low-cost, high-quality scientific instruments as a hobby, and so one of the things he did was create a paper-based microscope where for, at scale, as little as 10 cents a microscope you can sort of fold different ... a die kind of cut piece of paper along with these very cheaply constructed lenses and actually get up to 40x to 100x magnification so that you can build your own microscope in the middle of a field and examine stuff in real time. It's an incredible piece of technology because of what that means is we could be out in the Saharan Desert or we could be in our backyard in your woods, and you could take out a microscope and all of a sudden actually be looking at the microscopic world in a different way.

Kevin: So how's it work? I can understand you can make [inaudible 00:10:53] maybe a cheap plastic lens up front, but what ... Is there a second lens for the eyepiece, or is there a screen? How does this mechanically work out of paper?

Kishore: Yeah, so there's essentially just one lens piece that has some magnets built in. There's two way you can operate it. You can have light shine through and have some magnification to actually see it with the naked eye, or how most people use it, which is hook it up to your cellphone camera and just mount it to the camera and use that to actually focus and take images. And really the origami part of this where you fold the paper is building the stages of the microscope so that you can manipulate and move slides within in. It's sort of this incredibly brilliant design that maybe takes five minutes to fold together, and, along with some plastic or glass slides mounting with this magnetic lens, you can be right in the microscopic world.

Mark: Is it kind of like the van Leeuwenhoek microscope?

Kishore: It's not so different from that, except this is more elegant, I think, because it allows ... The van Leeuwenhoek microscope was really hard to manipulate items within it. This allows you to move in the X and Y direction pretty easily. And if I recall the van Leeuwenhoek microscope, it only allowed you to move sort of side to side, and even then that was sort of troublesome with it sort of mounted in. This, because it uses simple adhesives and stuff to mount slides, you can pretty quickly move around, and you can kind of hack it to control the amount of light actually coming through the back of the lens, so you can sort of dim things when you want or add in more light if you need.

Mark: That's cool.

Kevin: And what is the source of the light?

Kishore: Usually it's just sunlight, but there's an LED included with some of the kits. I actually prefer the sunlight, just holding it up to a light in the room or being outside. But at 10 cents a unit, I also don't care if I break this or mess it up in some way.

Mark: That's crazy. 10 cents.

Kishore: At scale. I mean, the ones that he sold on his website were running $5 or $10, but that was really to subsidize sending these out for free to countries across the world. But moreover, I think this is a story less about this one tool but more about what the tool represents, because from this he's built a paper-based centrifuge with some rubber bands and pieces of paper hooked together that will allow you to sort of use a whirligig to actually centrifuge items, to ... At Tested, a couple weeks ago we built a 3D-printed centrifuge out of drone parts.

Kishore: I think there's a democratization of science tools that's happening, and happening in a way that is going to shift how science is done. I initially thought all this democratization meant any hobbyist could use these tools at home, and then I walked into a lab at UCSF and I saw they had a 3D-printed centrifuge, which seems to weird to me because they're a really well-funded lab. Why are you using a 3D-printed centrifuge? But basically they said, centrifuges are expensive for them, too, so why not just be able to print one on demand? And they can order a drone motor pretty quickly and have a few in stock and

they'll just build it themselves. For the work that isn't require precision control of the spinning, why not have that?

Kishore: So I think we're not just seeing this democratized tools being used in the field and people with limited resources. We're seeing high-end scientific labs actually use these democratized tools as well because it's cheaper for them.

Mark: That's really cool.

Kevin: Yeah, I think that's really true. So, this little paper folding lens, which can also ... The same lens can be put onto the front of your phone, and then you can just use the paper as a stage, and that's available on this ... the scientist's website?

Kishore: Yeah, you can buy it at Foldscope.com. They come in different kits. I actually ordered a set for my kid's classroom, so every kid in the classroom went home and was able to build a microscope. In a lot of ways, I think this is a lot less about what you see with a microscope and a lot more about what it means to actually build an instrument that in a lot of ways, at least when I was a kid, I thought was magic.

Kevin: Yeah. That's really great.

Mark: So your next tool is about a certain kind of a recorder. A digital recorder, I'm guessing?

Kishore: Oh, yeah. It's my H4n, which is basically the only recorder I use when I do any of my podcasting or recording work. And it travels ...

Kevin: Are you using it now?

Kishore: ... with [inaudible 00:16:12] everywhere. I'm not using it now, only because we're using a different tool to record this podcast, but it's sitting here right next to me. And partly is because I ... There's a lot fancier equipment out there. This is basically the size of a soda can, and it's been out for, I don't know, probably eight, nine, 10 years, something like that since, this recorder first came out, so it's not fancy. It's just like the one I have just works. It gets really high-quality audio. It allows you to plug in microphone inputs. But moreover, it's a story about the stories I've collected with this thing that just sound great because it's simple to use and it's so portable. It has allowed me to capture stories in the oddest of places. I use it every week for my science podcast, so my H4n has the voices of Nobel laureates on there to my mom.

Kishore: But I remember I ... I was one of the organizers of the March for Science, and I remember walking down one of the streets where ... that was filled with like 50,000 people, and I had my H4n out just capturing why people cared about science. And I just remember hitting "record" and just walking down the street with this thing, and a tool like that that's so simple to use that you forget you're using it and it's just ... you focus on what its purpose is? I think that's magical.

Kishore: And so this is a podcaster's dream tool, I think, because it's easy. It doesn't go wrong unless you do something wrong, like forget to put batteries in it. I think it's the gold standard for anyone recording audio, especially on the go.

Kevin: Right. A lot of radio journalists use them. So it's about the size of a soda can, and it has kind of a odd-looking double microphones at 90 degrees at the top, so there's built-in ... There are built-in microphones, but you say you can also jack in studio-quality microphones as well if ... And I presume that it has ear jack plug where you can put on phones that you can audit this as you're recording. Is that right, too?

Kishore: Yeah, exactly. So it has the two built-in microphones that you can orient their directions. They actually turn, so you can actually use them directionally. There are windscreens and all sorts of attachments so you can have different type of diffusion of audio sound from them. It does have two external inputs on the H4n. There's newer ones that take in more inputs. So I usually hook it up with an SM58, kind of like a concert mic would be, but you can hook it up to any external mic you want. It can record as separate tracks, it can record as one mixed track. You can plug in your headphones to listen to it. It has phantom power if you need to power and external microphone. It has all of the equalization settings that you would want on it. It's pretty anything you need out in the field it can do. And it just takes an SD card and a couple AA batteries, so it's also the most extensible recorder that you'll run into as well.

Kevin: I think I've even seen documentaries with guys who are making films using their cameras videoing also using this for the sound recording, I've seen.

Kishore: Yeah ... Radio Lab uses these H4ns for when they go out in the field, so professional set-ups use this all the time. And I have beaten my H4n to heck. I mean, I have dropped it on Market Street. It has fallen out windows as I've tried to keep it perched on ledges. It is a pretty hardy device as well. I don't recommend doing that, for anyone that is thinking about that, though.

Kevin: Do not try this at home. Well, yeah, that's a great suggestion. I have a Zoom, a Handy Zoom, pre-model back in the ... It must be almost 15, 18 years old now, that's much simpler, but it's also still running perfectly, so I can account to the durability of these things.

Kishore: Yeah, maybe that's a bad advertisement for the company. You just have to buy one recorder and never [inaudible 00:20:56].

Kevin: Right.

Mark: And so you have the Zoom H1n, Kevin? Is that the one you have?

Kevin: Yeah, I think it's ... Yeah.

Mark: Okay. And-

Kevin: Oh, actually H ... Yeah, the H2. It's an H2.

Mark: Okay. And do you ... Kishore, do you have to ... How close do you have to hold the microphone to someone's mouth when you're talking to them?

Kishore: It's all depends on how you want it to sound, but it's typically a pretty comfortable distance, anywhere from three-quarter to a foot-and-a-half. Somewhere in there. And you can get pretty good audio still.

Mark: That sounds good.

Mark: Okay, so your final pick is a ... Is it a kind of a shoe, or a ...

Kishore: It's sort of an embarrassing one, but I love it. So I have no other way to do this. It starts like this: I don't like tying shoes. I've never liked tying shoes, and if you were to really pin me down I would tell you that I am bad at tying knots, and I have been since I was like six. And so this is a silly thing, but I've always thought shoelaces are antiquated technology. I don't understand why we all our tie our shoes, because there's better things out there.

Kishore: A couple years ago I got turned onto this shoelace system called the Boa System, which is a ratcheting lace system. So your shoe is basically a slip-on, and you slip it on, and then there's a gear on one of the sides of the shoe, and you just turn the dial, and it ratchets it down to the tightness you want. It takes a half-second for you to get the right tightness, and then you're on your way. And to release, you just need to snap out there. You pull it — it has a quick-release — and your shoe just comes right off. I've never gone through TSA quicker than with this shoe system.

Kishore: And I know this is a bizarre pick on a lot of levels. How does this qualify as a really cool tool? Well, shoes are one of those things I use every day. I don't know about you guys, but I do, and I thoroughly enjoy that sound of the ratchets clicking together as I put on my shoes, and I'm done in a snap. I don't know what else to say. And, quite honestly, my shoes fit better, too.

Kevin: So is this ... So we can understand, is this like there are special shoes that comes with this, or is this an add-on that you can add to any pair of shoes that normally take laces?

Kishore: So, this company has shoes that come pre-built with this. They used to specialize in heavy-duty-type shoes, like snowboarding shoes or even snowshoes or heavy outdoor shoes, as a tightening system on those. They recently, I think a couple of years ago, started to expand into more everyday-wear shoes, so running shoes and your typical walking shoes. And they have different ... Different shoes have different sort of gears and dials on them, the strength of the built-in laces for them.

Kishore: There are different systems that I've used and I've recommended in the past that are ... that allow you to convert lace shoes to slip-ons that I like that essentially use some sort

of elastic in them in some way, shape or form, but those inevitably wear out during the lifetime of the shoe. This one just, it doesn't.

Kevin: So you're talking about ... 'Cause I don't have shoelaces. I have these little elastic strings that have a slider clip that's ... allow me to take the shoes off without having to untie them, and then to put them on I just open it up and move the little ... I don't know what you call it, the kind of a clasp that comes down. It's even ... As you say, it takes a second to do, and they're always the right tightness, and yet I don't have to bother with tying them. So you found that they don't last over time? Is that ...

Kishore: So that system that you're talking about, you're still doing something fairly actively, like you still have to slide that little button down, even though it takes no time at all. They have systems that are just elastics that fully replace shoelaces that you just slip on and they're just tight as soon as you put your shoe on. So there's ... It even takes out of that tightening part that you talked about.

Kishore: I like this Boa System a little bit more because it allows me to tighten to the desired thickness I want. So if I ever go on a run, I usually put on my shoes a little tighter than I do when I'm just walking around town.

Kevin: Right. Yeah. Yeah, and, you know, for all the bad rep it gets, I don't mind Velcro.

Kishore: I agree.

Kevin: I mean, Velcro, it's ... It's 21st ... It's 20th Century, at least, if not 18th Century, and I think something ... I think you could still do ... I think that could be improved even more than it has been.

Kishore: You know, I have a seven-year-old at home, and I have now watched him go from shoe to shoe to shoe with every different technology, and I look wistfully at those Velcro shoes he puts on. I'm telling you! I mean, I don't need the lights in the heels that he has ...

Kevin: Yeah, right.

Kishore: A good pair of Velcro shoes I think would look good on me [inaudible 00:26:40].

Kevin: Yeah. I think the way I would do it is instead of having two Velcro straps is to have a hole flap, just have part of the shoe be Velcro. I think we haven't seen the end of Velcro, let me put it that way.

Kishore: What I love about this story, though, is I know it's ridiculous that I don't like shoelaces, blah, blah, blah, but on some level, shoelaces are old technology.

Kevin: Yeah, no, no. They're very antiquated. I think we're right there with you. There certainly can be a better shoelace, and there will be. I'm not so sure about the having ... I think the thing that maybe hesitates for me is having to buy a particular shoe by the shoelace company. I would like to rather be able to apply the tightening technology to any shoe that I liked right now.

Kishore: I hear you. We all want our shoes to be open source in that way.

Kevin: Right. Well put. Yeah, we need an open source version of the shoelaceless tighter.

Mark: So, Kishore, in the couples of minutes we have left, tell us about a list that you're maintaining that's called The Anglerfish.

Kishore: So this is a bit of a Bay Area throwback. So I think you guys might actually remember this. There used to be The Squid List of just the coolest, weirdest, eclectic things around the Bay Area that survived for years and years. It went back to kind of early internet days, at least for my time. And when The Squid List went away, I don't know, I wanna say like five, six years ago it was sad moment because it meant sort of a weird part of the internet kind of moving on. I mean, you guys remember The Squid List, right?

Mark: Sure. Was it from Laughing Squid, from Scott Beale's things?

Kishore: Yeah, Scott Beale did it for a long time, and there was different people involved. And I believe in this idea of just the beauty that comes from people getting together and creating live experiences, and so a group of us decided to revive that spirit, because there's amazing stuff that happens in every town around this country. We're creating something that we call The Anglerfish that is kind of like the weird, eclectic, kind of intelligent events that are happening around the Bay Area. It's curated by me and Annalee Newitz, who's a science fiction author, a friend that runs this long-running event called Nerd Night, a friend that works at the Long Now Foundation, another friend that used to be at Atlas Obscura and runs an event called Odd Salon. We all just like going to these eclectic endeavors, so we've come up with this curated list.

Kishore: It's in beta, and it's sort of coming out in the next couple weeks, and one of the things I found is just how much amazing stuff is happening around just the city I live in. I have a bias toward science. I love science events. I built science events for most of my career. I kind of looked into just what was happening this week as we're recording this, and there's ... I found out there's a patron saint of fireworks, and one of the largest of fireworks festivals occurs in this small town in Mexico, which happens to be the home of a number of fireworks manufacturers. They're showing this documentary in Hayes Valley in that sort of Octavia garden area right when you get off the highway in that area. It's just like a walk-in. They're gonna be screening this movie. I'd never heard of a patron saint for fireworks, but that seems interesting to me, and ...

Kishore: And all the series of events that I think people are putting, investing their creativity into that you can find other people that are like-minded like you at these places and to revive that spirit and showcase that to a lot of people, I'm excited to have something like that exist again.

Mark: That is so cool.

Kevin: Yeah, [crosstalk 00:30:55] really great to have it many cities. That would be fantastic.

Mark: Yeah, and even for people who don't live in the Bay Area to ... plans to come here, they should check this out before they come.

Kevin: Absolutely.

Kishore: Yeah, it'll be at Anglerfish.net, and I guarantee you there'll be something every week on that list that you've never heard of.

Mark: That sounds great, and we'll have a link to it in our show notes. We'll also have a link to everything that Kishore talked about, all these amazing tools, and information about how you can find out more about what Kishore's working on by going to Cool-Tools.org. Click on the podcast link on the right, and it'll take you right there. Kishore, thank you so much. This was really a lot of fun talking to you.

Kevin: Yeah, it was fantastic.

Kishore: Thanks, Mark. Thanks, Kevin.