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SPEAKERS

Paul Cutler, Les Pounder

P **Paul Cutler** 00:01

Welcome to the circuit Python Show. I'm your host Paul Cutler. Today I'm joined by Les pounder les is an associate editor at Tom's Hardware. He's a creative technologist, and for seven years has created projects to educate and inspire minds both young and old. He has also worked with the Raspberry Pi foundation to write and deliver their teacher training program pi Academy. Let's welcome to the show. Thanks for having me. Paul, sited to have you on you wrote two articles very recently that I'd love to talk to you about both focused on the best boards 2022 For circuit Python. Yeah, RP 2040, I should say and then some of the best add ons for the PICO itself. What were some of the surprises that you came across? As you're testing all this hardware?

L **Les Pounder** 00:39

how versatile ERP 2014 is, I mean, we started off with the Pico, the $4 board all the way back January 21 2021, I think it was, and it just came out of nowhere. It was Raspberry Pi's first microcontroller board, and we just didn't know what was going on with a thing. What does it do? How do I use it, and then the community is just sort of grabbed it. And we now see this plethora of boards that everywhere all different shapes and sizes and different configurations. But all based on this one simple microcontroller, which as we all know, this circuit Python compatible, which is fantastic. So it means we've got really good hardware, and really good software merged together to create some really great projects.

P **Paul Cutler** 01:19

I think the PICO came in number one, which is no surprise, based on how little it costs. Was there another board that kind of jumped out at you that you didn't expect to make the list?

L **Les Pounder** 01:28

Hmm, good one up. So for me, I like the pimoroni range of boards, they have some really clever hardware considerations that they take into account, so that the tiny 2040, so the first small Raspberry Pi pico compatible board, and it really was tiny, I mean, I've got one in front of me right now. And it's, it's like a third of the size, okay, you don't get all the GPIO pins. But what you do get is a curated list of GPIO pins that you can do all the basic, so I squared C SPI, that sort of thing. And standard GPIO stuff, it's smaller is a little bit more expensive, but you're paying for the privilege of a smaller package. So you can stick it into projects. And I've seen people build robots with it. So he had a story on Tom's Hardware about three or four months ago, someone who built a robot, just with a tiny 2040 and a couple of motors which were glued to the bottom of the board. There's no motor control board or anything like that. No H bridge, it's just bear, run it from the GPIO, which everyone now is screaming no use the most control. But it's just a bit of fun. And it was cheap, fantastic little projects and a great little board.

P Paul Cutler 02:31

What do you think it was about the RP 2040. Last year that led to so much success? Was it? Because it came from the Raspberry Pi foundation? Was it just about being available and in stock compared to all the other supply chain was? What's the secret sauce to that? Sure.

L Les Pounder 02:45

I think it's a bit of both. It was something new. So Raspberry Pi's got a massive following. I mean, they've sold something like 42 billion Raspberry Pi's, since they started in 2012. its 10th anniversary this year. In fact, in about two weeks time, that's amazing. They sold all and boards, and they're exceedingly popular, especially in the UK. So that's where I'm based in case we're wondering. So Raspberry Pi has got this following, but also the chip shortage is sort of fueled the search for alternatives. So STM 32 chips at the minute are like unobtainium, you just cannot find them anywhere. And it's even hit Raspberry Pi foundation, so it was probably trading, I should say. So when they were doing they're built up for the Lego compatible projects that we're doing. So it's like an add on board for a pie that has a microcontroller intercepts communication from the pi. So the Lego components, they built it with an STM 32, which is what Lego uses in their original kit. The problem is, he can't find them anywhere. Even Raspberry Pi couldn't get any. So they pivoted and went to an RP 2014 chip inside the built up so that dogfooding they're eating their own dog food. And it works is great a little board and really should have pulled that out as well to show everyone but RP 2014 was getting everywhere. It's even in first party Raspberry Pi accessories. And now it's in things such as on hold up to the camera now pico system. So an RP 2040 based games console from pimoroni. That works with circuit Python.

P Paul Cutler 04:08

That's amazing. And for those of you listening at home, I'll make sure to include those in the show notes. So you can also see some of the photos that led to sharing with us going back to the Raspberry Pi Pico, and the article that you wrote on some of the best add ons, what were some of your favorite things that you saw there?

L Les Pounder 04:23

My favorite, so all of them I like but my favorite is something that is sheer simplicity. And it's C red robotics Pico to pay. And this is so simple, but it's so expandable. So what it is, and I'm going to have it to come and sit while we're talking in the show notes as well. It's a PICO which has been soldered to a PCB. And then the header pins at the top of the board are raspberry pi hat compatible. So I can get a hat such as explorer hat, pi umbrella, whatever I fancy, put it on there and as long as I know how to inter interface with that board, so I squared C SPI pins, whatever, I can use old hats with the Pico. This is really cheap. I think it's like under $10, with the PICO soldered on for you. And it just opens up a whole world of messing around and playing in these. Alright, it's not the most technically impressive board. It shows pins that have tracks connected pins together. But it's so accessible, just reusing all the old kit that I know I've got loads of, and probably the people listening to this now are saying, Yeah, I've got a load of raspberry pi hat somewhere.

P Paul Cutler 05:28

So you shared a photo of me of all the different boards you have. So we've talked a little bit about the RP 2040. And I'll make sure we get that that photo in the show notes because it's impressive. What are some of the differences between some of the chipsets compared to the RP 2040 that we've talked a lot about? So you've got the STM that you referred to. There's the ESP series from a suppressive help our listeners at home understand, you know, what are these different chipsets,

L Les Pounder 05:54

although different chipsets or a different system on chips or socks as sometimes called, they're all the different ways of having RAM storage, processor power, then such things as Wi Fi or Bluetooth connectivity or a set package. So PSP so expressive, they have the ESP eight, suitable six, the ESP 32, which are well known for their Wi Fi connectivity. In fact, two more of these boards arrived today in the post for me to reply with some ESP 32 boards, but 8266

P Paul Cutler 06:21

is really popular in the IoT world with people doing projects with things like homocysteine, is that correct?

L Les Pounder 06:28

Yeah, it's it's so cheap, ESP two double six has been around for years, a hell of a long time now. And it's found its way into all sorts of projects, you can buy products in the store, with an ESP two double six, I bought a light controller an RGB light controller a few years ago, from the store, I took it apart, because that's what I do. And I looked inside, and there it was NASPA, two, double six, and the debug pins and the control pins. Were all there ready to go. So I could hack it if I wanted to. And yes, I have done that. It's really nice. So check because you've also got these breakout boards, you can get one such design for a breadboard, or you can get ones called the we must D one mini, which are this unusual form factor looks like a tiny Arduino. But

they are great fun to just hack around with because again, they're cheap. Even in the current climate where it's expensive to find chips, you can usually find them for about four to $8, depending where you shop. And you can flash on their micro Python circuit Python and have a good bit of fun with these Wi Fi enabled chips for someone

P Paul Cutler 07:24

just starting out with circuit Python, what board or boards would you recommend to them? What are the top couple to take a look at,

L Les Pounder 07:30

for me, it's a Cytron range. So this isn't biased, I've paid my own money for most of these boards. Fantastic little pause, if you think of just a standard microcontroller board, you've got your USB interface, you've got your pin connections. There you go. That's your dev environment to mess around with. With Cytron stuff, they put on a few extras here and there. So if I just go to the camera now for the video feed, you can see center of the screen, I've got a purple board, it's about four inches wide and about two inches tall. It's got pico in the center of it. So this board the maker pi Pico, is $9. And we've got all the GPIO pins broken out in in rows by the sides or columns, I should say, I've got LEDs on those pins as well. So I can see if the pins are active without connecting anything to it. So in a classroom environment or in the home, where if you're not comfortable electronics just yet, this shows you what's going on. It shows you that our pins turning on enough to flash an LED. We've got grow connections, these things on the left and right is I've got a white polarized connection. They've got three to four pins inside them generally, these work with Grove connection, so Grove components to make electronics a little bit simpler. So you can buy like sensors or PIR sensor, passive infrared, the same thing that's used in alarm systems. Or you can buy motors, pulses, LEDs, all that sort of thing. Plug them straight in farms who worry about which pin goes where. And initially the maker pi Pico and the other ones as well as another one to left here, the RP 2040 version, and the new maker nano RP 2040. They're all designed to work with micro Python. And they do but they found their home with circuit Python, because of the ease of use of these boards and ease of use for circuit Python. If I want to do something with say the microSD card on the MCI Pico, I just download the appropriate library from circuit Python. Put it in the libs folder, and away we go. Easy to do.

P Paul Cutler 09:20

That's amazing. Is that the same board that you just wrote an article about in the last couple of weeks? The little

L Les Pounder 09:25

one here? Yes, that one that's about 67 days older article. And fantastic little boards are normally boards with this size. When you put them on a breadboard. You're very cramped for space either side of the board. You may have one column of pins and that's it. With this one, you got two to three because cleverly, they've got right angles pins on the underside of the

board, which means that I told him to come in so you can see it's slightly narrower by about one row either side. And that gives us a little bit more space. But also cleverly we've got making Reports. Let's get this in sharp There we go. And these are stemma Qt compatible connection. So stemma Qt we should be aware of an Adafruit is range of boards wave. Now, it's I squared C broken out into proprietary connection. It's like a polarized connection, just same as grow, but very small. And there's even a grow converter for this board as well. So you can use Grove components and stemmer. At the same time.

P Paul Cutler 10:22

And what are some of the examples of what you might connect via stem or grove? What are the kinds of sensors that people might want to use with it?

L Les Pounder 10:28

Oh, lots are, there's so many. The first one you'll think of is sensor temperature, usually temperature, light sound, the ones that we go to exhaust know what we experienced in our common lives. We see lights, we hear sounds, I sort of experience temperature. So you want to log that and use that in experiments. But you've also got RFID readers, NFC, PIR sensors, you've got rotary encoders, you've got potentiometers, all of these things can be a return of value and their interface, so interactive with and we're stemma, Qt and Grove, and quick and quest which is pimoroni, sort of version of stomach, UT, and quick from SparkFun, you can just plug straight in, and away you go. You haven't got to worry. And it's really easy, Steven, great fun. So kids can get involved with electronics, circuit Python. And also if you're just starting out electronics, it's a good way to sort of get your find your feet before you want to go into the big projects.

P Paul Cutler 11:23

So I understand you just built yourself a circuit Python project that you shared on Twitter Elgato announced their new stream deck foot pedal, and you thought to yourself, I can do that and do it cheaper.

L Les Pounder 11:33

Yeah. Oh, yeah. I feel I can do it cheaper. And being a microphone. Yeah, I just want to make it anyway. So you're gonna hear some old man sounds and I just go down and pick this finger ox. It weighs a ton. Thank you. So I have my hand right now a aluminium box or aluminum for the American viewers. And it's got some guitar stomp switches on it. This is all heavy duty, it's meant to be interfaced with your feet. So really heavy use. And inside here was the KB 2042 keyboard from Adafruit. We're circuit bifen. And it was emulating a USB keyboard. And all I did was have shift a shift B Shift C on these foot switches. So when I pressed it, it would change from one scene to another. So right now I'm controlling my OBS fee for the show is a Here we go. Let's go out and shop. And that's another circuit Python device.

P Paul Cutler 12:23

Is that the cueball? Yep,

L Les Pounder 12:25

it is the Venus dosta KeyVault 2040. It's actually an old one. That's a new ones. I've got stemma Qt on and mine hasn't unfortunately. So I can control my video feed now. And I can go from one scene to another, just by pressing keys on here.

P Paul Cutler 12:39

And I'll make sure to include photos of those with that looks almost identical to what a guitarist would use on stage.

L Les Pounder 12:45

Yeah, that's what so in my youth, my many, many years ago now I used to play guitar not in a band, I just my own personal pleasure. And I had to stomp pedal so I knew what parts to get. And I thought, yeah, I can make my own. Yes, I did. I got something wrong, though. And I'm going to highlight a failure because I love to highlight failures, because fail is our first attempt in learning. And that's something that a friend of mine carry on Philbin taught me years ago. This is a failure because I should have had this line of switches in a triangle. Because I got size 10 feets in the UK size, which means when I put my foot on here, I can get both of them at the same time. Oh, sure, if I'd done it in a triangle on the corners, so middle and bottom left, bottom right. And it had a lot more space to do it. So that was a failure. But it's nothing other drill and a bit of time can't fix

P Paul Cutler 13:34

what's the beauty of being a maker, right? We learn from our mistakes, and we do it all over again. Yep,

L Les Pounder 13:39

we do it all over again, normally make more mistakes and learn from those mistakes and do it all over again.

P Paul Cutler 13:45

Hey, it's Paul, we'll get you back to the show. In just a moment. I wanted to say thank you for listening. If you like the show, please hit the subscribe button, write a review or tell a friend. You hear that a lot. But it really does help for other ways to help the show visit circuitpython show.com/support. Now back to the show. So the other thing that you've been really into lately

is retro tech. And going back to the computers of at least my youth since I'm getting up there in age and taking a look at things like the Sinclair's and Commodore 64 years. Tell me a little bit about your experience working with those lately.

L Les Pounder 14:18

Oh, well, for the last just short two years I've been working with Linux format. So Linux format is magazine in the UK and America as well which focuses on the Linux scene. And I've been working with them for at least 11 years now. And the last two years I've been working on Retro computing articles. So going back to the roots of computing so looking at the Commodore 64 cm makers, the Atari s T's even further back Commodore PET Apple to Sinclair computers and showing how these machines were used in their time to do similar projects. So what we do now, granted what we have now is a lot more advanced and technical. We've got lots of better kit, but I never knew before. During my articles, but the Commodore 64 How to use a port that could be used to do electronics. I had no idea I was flabbergasted when I found it, how does this work so I went to went to tindy and I got a board to break out the connections, got a pin out, worked out what things went where, and then learn how to interface with those pins by using a series of pokes and peaks. So poking something into a memory register and and peeking to see what's changed. Suspect difference to pi from just say no led on led off that sort of thing. We actually now have to know where things are, but it wasn't too difficult. And I did a personal blog post on this as well just as an aide memoire for myself to remember in years to come. And it's fascinating because basic was sort of the language of that time it was it was Python, really, for the 80s. It was accessible to everyone, it was simple enough to understand, but it could do some quite advanced things if you've heard to put a bit of time in. And okay, sure it couldn't throw around microcontrollers and motors and that sort of thing as easy as what we can now. But you've got fantastic results with very little code, maybe 20 lines of code, see something quite complex.

P Paul Cutler 16:05

So out of all the computers that you've been going back and taking a look at is there one that jumps out to you, that's still your favorite all these years later, completely

L Les Pounder 16:12

biased, but Commodore 64 That was I was a Commodore kid, I went through the ranks of the Commodore 16, the Commodore 64, then the Amiga range. And it was said then that I went off to the dark side of PCs, the four 860 x 33. But Commodore, so just the excitement for me. Oh, it's dead, the whole playground mentality. So everyone's got Commodores. They're all talking about the games that they've got. But do we talk to the kids who've got Sinclair's? Well, not really. But now we do because it's big open community of retro gamers. But it's it's fascinating. All this old tech is becoming new again,

P Paul Cutler 16:47

I'll talk to Scott shockcraft later in the season. And one of the visions that he has for circuit Python is to take something like the raspberry pi 400, which has the keyboard all built in all one

Python is to take something like the raspberry pi 400, which has the keyboard all built in all one device and just plug it into a TV using an HDMI cable, which is almost the exact same experience we had as kids. So it's cool to see all the retro tech coming back. But at the same time, that vision is still being realized all these years later.

L Les Pounder 17:12

Yeah, in the 80s, you turned on the computer, there you go, the BASIC interpreter was ready to go. And from there, you could type in your own codes to make something or you could just load your disks or tapes. In the UK tapes were the main thing. And it just immediate. And what Scott's doing was circuit Python to make it immediate on bare metal is fantastic. So now if we get a Raspberry Pi Zero to Wi Fi zero, put circuit Python on bare metal instant on, we can have kids hacking around in Python, really quickly, really simply backed up by all this fantastic library that has NeoPixels, motors, sensors all ready to go. So the kids don't have to learn all that just yet. Of course, we want them to learn that we want them to expand their knowledge. But when you start learning something, you don't be inundated with all the technical stuff at once. You want the good stuff that means you're going to keep learning and keep winning.

P Paul Cutler 18:05

So I've been asking you all the questions. Now we come to a segment where I call, turn the tables. I'm a big vinyl record fan. I've got a turntable here at home. What question Can I answer for you?

L Les Pounder 18:14

Well, I'm gonna throw one back here because we've been talking about all the stuff of yesteryear. So vinyl is STL. But it's coming back really popular. Now. I'll ask you a question of, you're trapped on a desert island. You've got all the creature comforts, you could desires. You've got food, water, heat, shelter, everything that will keep you alive. But you can only take one computer, and its entire back catalogue of games to entertain you for the rest of your life. Which one and why? Wow, that

P Paul Cutler 18:41

is a fantastic question. The first one that jumps into my mind is the Sega Master System or here in the US the SEGA Genesis. That was for me the pinnacle of gaming. I know I'm dating myself by that. But I have so many memories as a kid as a teenager. And as a young adult when I first moved out of my house of my parents house and took that with me of playing, you know, American football or Golden Axe, there were so many games I was a Sega guy wasn't a Nintendo guy. So if I could just take one thing, that would probably be it. I don't need anything modern. I have fun reliving my youth, whether it's with my record collection, or some of the retro gaming stuff going on. I've been working on trying to build a stand up arcade cabinet for literally 20 years, which is kind of embarrassing to admit to, but I love my retro tech and I've always loved my Genesis, I still have that original Genesis and every couple of years I take it

out and my wife's eyes just light up. It's just it's so fun to go back to. So if I'm stuck on a desert island, I know there's not you know hundreds or 1000s of games for it. That's probably the one thing I'm taking with me if I saw the Kindle full of books,

L Les Pounder 19:48

but I take a Genesis or something like that the hours so I had a Genesis so in the UK it's a Mega Drive. We called it and I had one and for about a year the only game I had was altered least Yes. Oh, that I do not like that game anymore. It was the only one I could play. So when I got Streets of Rage about a year later, I played that to death. And I mean to death because I hated all to be so much. But then I got a Super Nintendo as snares, and Mario super archetype, super control pro protector, as it's called in the UK. All those classic games Legend of Zelda, that blew me away. So the Genesis unfortunately got put to one side, because only had the two games, whereas the Super Nintendo had all of these fantastic games that were just coming out just look better. And I enjoyed myself immensely, probably far too much that it may have affected my school grades.

P Paul Cutler 20:44

Well, I think that goes for all of us. But at the same time, I don't think we'd be where we are today with that without both the retro tech and without the games, I think that inspired entire generations of folks to get to where we are today. Definitely tell me how you got into circuit Python specifically, for me,

L Les Pounder 20:59

it took a plane journey. And this is where we start a very interesting story, we'll help it's interesting for you. I was invited to pi con in the US in 2018. Along with well, I shouldn't say along with I was there to support a young man named Joshua Lowe, Joshua Lowe, you may know was all about code on Twitter, he created some software called Edublogs, which is a way to write Python code with blocks in a web browser. Very clever. Take a look if you can. And he was invited to come over to the states to talk about his project. And it is that I went too long because I was his mentor at the time, I was teaching him a bit of Python. So disclaimer, he now knows far more Python than me is a very clever lot. But went to the education summit at the start of Python. And I met Scott Scott shockcraft. And having a chat with him. And he says, Oh yeah, we're giving away some circuit Python boards. And I'm like, what, what circuit Python. And he hands me this thing is about an inch in diameter, this tiny board the Gemma m zero, especially made for Python. And it was my first circuit Python board. And it was like, Oh, right. So he explained about micro Python circuit Python the link between the two. And I then went into a session where Scott's and katni. And I learned how to do some very basic circuit Python, work with RGB LED, so NeoPixels. And it just sort of got me hooked. So when I got back, I ordered a circuit playground Express. And then I just went a bit mad. And I've got lots of different boards down. And it just sort of clicked in my brain how circuit Python work. So I use micro Python. Before I have, I've got one of the PI boards, one of Damien George's original boards. And that works well. And I enjoyed it. And I still use micro Python, but circuit Python. For me, it was just like an abstraction, which made sense. It took away the complexity for the user. And you've got these cool little boards that can use crocodile clips and all sorts of

connections to make some really cool projects. And so I just had fun. And in that session, just making LEDs turn on and off, we're circuit Python, learning how it all interactive Roven and then speaking to Nicolas Toller Bay, who created the new IDE and he showed me how it works with circuit Python is blown away because me was so simple circuit Python so simple. The hardware was so simple. Anyone could do it. So we all got in our swag bags at this bank calm and these $8 Gemma zero was to take away in play. And it just started the whole thing for me.

P Paul Cutler 23:29

So it seems like NeoPixels and the circuit playground expresses are almost like a gateway for lots of people coming to circuit Python.

L Les Pounder 23:37

Oh yeah. Yeah. NeoPixels I have a deep love for I use them all the time. And I'm not even joking to my right in front of my television. I've got a cutie pie which controls the beauty lights where you see over a mirror and like a movie studio and there's NeoPixels inside of them so I swapped out the LEDs. So now it glows around the television is a lovely bright colors. At Christmas. We'll have lights in the window, and we'll have NeoPixel lights the tree is fully NeoPixels everything's epic. So we've got to start that has to be led. So I can control NeoPixels remotely from my phone anywhere in the world with MQ TT and lift in different topics. Fantastic. I love NeoPixels and when circuit playground Express has them on the board ready to go as to offer boards as well. So okay, that's instant brain candy.

P Paul Cutler 24:23

Let's thanks so much for being on the show today.

L Les Pounder 24:25

Thanks for having me, Paul.

P Paul Cutler 24:26

It's been a pleasure. Alright, check out lessons writing at Tom's Hardware and Linux format. Thank you for listening to the circuit Python show an independent podcast with the people in and around circuit Python. For show notes transcripts into support the show visit circuit Python show.com. I'm your host Paul Cutler, and I'll be back next episode. Don't forget to hit subscribe and stay safe.