

ep12-guy-dupont

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SPEAKERS

Paul Cutler, Guy DuPont

- P** Paul Cutler 00:00
Welcome to The Circuit Python Show. I'm your host Paul Cutler. This episode I'm joined by Guy DuPont. Guy is a software developer, audio engineer, artist and Seltzer aficionado. Guy, welcome to the show.
- G** Guy DuPont 00:13
Thank you very much for having me.
- P** Paul Cutler 00:15
I wanted to ask you about your Subaru backup camera project that you released a couple of months ago, I watched the YouTube video and got such a kick out of that. How did that work?
- G** Guy DuPont 00:23
Yeah, that so that project is interesting, because it actually dates back to before I got married. When was that? 2018? I think and it was it was my first hardware project that I actually like, put any real work into. And yeah, it came from an actual need, right? If you so if you haven't seen the video, my wife's Subaru has a like third party backup alarm installed that when you get close to something when you're backing up, it beeps the most annoying sound you've ever heard. And there was one day where we were parallel parking somewhere in in Boston, where we live. And you know, it was one of those situations where it took a lot of back and forth. And by the end of it, we were just cracking up because the sound was so annoying. And she turned to me, she said, if you can do anything like because she knows I like to mess around the stuff around the house. At that point. I was just kind of getting into hardware stuff. I do a lot of software stuff. She was like, if you're gonna mess with anything mess with this, like make this better. So yeah, so I replaced the sound the beeping sound with a recording of my own voice making kind of like scared noises like oh, and as you get closer, I get louder and more

annoying. So yeah, so that project has managed to survive. However many years in the car, I just put out a video where I rebuilt it using some more modern parts, I guess I don't know, three years makes that much of a difference. But yeah, more modern parts. I just you know, I designed it a little better, because I know what I'm doing a little more now. And I made it so that you can add custom sounds, which was which was really fun. And I got a lot of good suggestions from the internet as well. Oh, I

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Paul Cutler 01:52

bet well, it always helps with those kinds of projects, when your partner encourages you to do it, instead of like going against the grain and building stuff that just kind of annoys them.

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Guy DuPont 02:00

Yeah, I don't get that very often. And especially because like for folks who aren't familiar with my projects, again, like they're all a little bit tongue in cheek, like all of them have a little bit of a kind of silly edge to them. And so usually when I'm doing something, it's not the most practical thing, you know, my wife rolls her eyes, but it's a good it's fun when people get in the car, and I get to show them and it's,

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Paul Cutler 02:19

it's fun. Absolutely. What does the circuit Python code in that project kind of look like?

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Guy DuPont 02:23

So it's pretty simple. So basically, the way the sensor works is, I don't even know what the sensor is this there's something someone installed in the car. And there's a little brain living somewhere some little microcontroller, I'm assuming. And what it does is it just pulses little buzzer, it used to be a little buzzer with 12 volts on and off when you're getting closer. So it's it's if you know PWM as it's like a very slow PWM where it's just on off on off. And so what you hear is Beep, beep, beep. And so what I did, I didn't even look at what the sensor is I didn't take anything apart, all I did was snip off the wires going to the buzzer. And I have the 12 volts like the the lines going into a an opto coupler. And then you could also probably use a transistor, but basically I turned it into instead of being used to generate a sound, it's used to toggle a switch virtually the Opto couplers tied to a GPIO pin on a I forget which one I used, I use like a C Duino Zhao the little tiny boards. And so really what that what the code is doing is just looking for the pin being pulsed by the you know, 12 volts, which gets converted to five volts. And I measure the distance between those pulses just by using the clock so I just say time dot now and you know, figure out when the pulses are. And since I know those pulses are a fixed space apart, you know, they get closer, but they're always the same intervals. I can basically say if I detect two pulses between, you know this amount of time, I know I'm roughly this close or the car is roughly this close to the thing, it's back again. And so I use that logic and then I just send I have a little mp3 player module, also in there attached to a speaker and I just say you know, anytime I detect a change in the perceived distance, I just send a new sound to the player and it's a little tricky because I wanted the sounds to sound as continuous as possible. I don't want

things like restarting so if you dig into the code, it's a little trickier than that but that's essentially what's going on I'm just measuring the time between these pulses knowing that they are fixed within the car the car only has a certain number of options and then using those just the measure distance to trigger sounds

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Paul Cutler 04:36

well I'll make sure to include a link to those videos in the show notes as well for people who actually want to see how it works or see it and see it on video

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Guy DuPont 04:43

hopefully the code is legible my I'm not known for my my Python skills but does what it needs to do.

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Paul Cutler 04:50

Tell me about the custom macro pad that you created that uses circuit Python where you recreated Nokia's t nine predictive text so you can type one hand it this

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Guy DuPont 04:58

project has changed a lot For me, you know, not necessarily in terms of my, my job or anything, but just how I think about hardware projects. And you know, the stuff that I put out. So I have it here, but I'm not going to hold it up because we're on a podcast and I imagine only a certain percentage, you're gonna get to see it. So but yeah, so I basically, I've always been kind of fascinated with t nine, I feel like my generation, like, who came up, I'm 31. So we came up kind of the dawn of cell phones as a as a commodity as a common thing. And the memories I have, like, strongly tied to the cell phones or like stealing my parents and playing Snake and, you know, sending messages to grandma or whoever was using phones, there's a thing I feel like with my friends and folks in my generation, where people people have said, like, yes, smartphones are amazing, right? But like, there's something about texting at night, like people are really nostalgic for t nine. And if you don't know t nine is it's a very primitive predictive text algorithm. So, you know, on those old phones, you only had, you know, stick 12 keys, basically, for the buttons. And so t nine let you type full words using only those 12 buttons. So yeah, so there's certain salary for I think people genuinely felt like they could type faster than they can on a touchscreen. And I get that because it's tactile, and you know, it's it was predictive text was pretty good. I was talking to folks about it, I was like, that'd be such such an interesting thing to explore today, right? And I looked, and there are actually smartphone keyboards that you can download that are just the t nine algorithm baked in. And you can use that but I thought it'd be really interesting to make a hardware keyboard because, like I associated this with these old tactile devices where I wanted t nine built in in some way, it ended up being a pretty simple design, it's a very standard macro pad design, it's just a key matrix with a bunch of diodes, I actually designed my my macro pad that I have available to support any dev board in the cutie pie jow shape, including the ones with the RP 2040, like mounted on the bottom, this I actually have a cut out in the PCB, so I wanted it to be as flexible as possible, I want to

you know, because I didn't know what I was gonna be able to buy. So I tried to accommodate as many things as possible, I realized that with circuit Python, I could pretty easily implement all the logic on the actual microcontroller itself. So that means when you plug this keyboard into a computer, you could just type on it. And it will act as a keyboard like any, you know, RP, 2040, circuitpython keyboard, it'll act like a keyboard to the computer. But what it does is it replaces words as you type them with predicted versions of what you might want to be typing. And the way it does this is it actually injects backspace characters very quickly to make it seem like the words are being replaced wholesale. But actually what's happening is it's just like typing a bunch of letters, and then very quickly typing a bunch of back spaces. So yeah, so the cool thing about that one, I can write it in Python, because circuit Python, which made it a lot easier to test and develop on my MacBook, whatever computer I want to be working on. The nice part about using circuit Python is since I'm writing in Python, I can develop it and test it on my local machine. It's a relatively simple algorithm, but it's still you know, it's a good chunk of code, it was really nice to be able to iterate very quickly and get, you know, feedback knowing that things are working or not working before I even ran it on a microcontroller. And then yeah, the fact that I can just drag the library file so that there's a file that backs all of the predicted words, right, I can just drag and drop that onto the keyboard and update that as I please. So that's been really, really nice. And to be honest, like, I felt confident enough in my ability to like coach people through editing this thing that I've started giving them away selling them. And it's so I think that's a very profound thing that circuit Python enables, right, like, because I'm not, I'm not a hardware developer, I, you know, I've written a lot of software, not all that embedded. And so I'm kind of new at this. But the fact that I have this system where I can put this in people's hands, give it to a friend who to a parent who's not a tech person, and if they have an issue, or they want to change something, I can just send them a file that they can drag onto the board and it just magically is good to go. That's huge. That's huge, right? Like, if you think about the alternative, like if I had to push a firmware update if I found a bug, like how do you how do you get that to people? And there are there are ways right like we have real products that do that, but to know that I could coach anyone, like on an email anyone to drag and dropping a file, especially when it's this thing that people are going to want to customize. That's so cool. That's that's like that's That to me is actually that's the most exciting part about circuit Python. Because to be honest, I don't really like writing in Python that much. What do you prefer? I work as an mostly with Kotlin and Java. So I've done a lot of Android applications, that's kind of been my primary gig for the past eight, almost 10 years. And even in school, the first language I learned was Java. Android, we did all Java for a while, then picked up Kotlin. Kotlin is by far my favorite thing to write in. I think a lot of Python folks would poke fun at the verbosity, I'm not as bad as Java, but you know, I like I like my type system, I like my my generics, my covariance, contravariance, all that stuff, I want more of it.

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Paul Cutler 10:29

One of the things that you did mention in towards the end of the video is one of the other advantages that you thought circuitpython offered oversee was just development speed as well.

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Guy DuPont 10:37

So like I said, like one, just being able to write the code, I have, if you look at the repo for this project, the code is set up so that there are basically different boards. There's there's directories for every system that it runs on my system, I mean, like Mac OS, Windows, but then

specific boards, like RP 2040, I think I have a version that runs on the Jow, but not very well. So that's like a sandy board. Yeah, so I have it all broken out. But the cool thing is, the core of that code, like probably 90% of that code is just a single file that gets that's the same across all of them. The point is, the Python that I'm writing to run on my computer here, is not very different from the Python, it ends up getting run on the board. So that's one thing that makes it super fast, right? Like, I would much rather be iterating on my computer. And then when I know it's done, I know it's tested, dropping on the microcontroller, and, you know, figuring out the whole other host of issues that come with the hardware. So that's one thing that's huge. The other thing is just like, you know, Command S like, save reboots, you don't have to compile rebuild. That is that's another huge, huge, huge speed boost. So

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Paul Cutler 11:51

a lot of the projects that you've done have been related to music, and I can see a couple of guitars in the background. Do you play an instrument?

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Guy DuPont 11:58

Yes, I play a number of instruments not super well, I don't think any of them. And yeah, it's funny. It's like folks have pointed out that my a lot, a lot of my projects are have some connection to music or audio. And, like, I never, I don't think of myself as like the music project person. But like, it's obviously true. Like, there's no denying it. And I think that's just like, because I care so much about it. And it's just such a bit been a huge part of my life my entire life. But I just naturally gravitate towards things like that. So yeah, I play the guitar, I play the guitar on a bass. So you know, I have a bass, I can make noises with it, but respect to bases. Just because you can make noises on it doesn't mean your bases. And actually my primary instrument is the drums. So I've been playing that longest I was in my high school jazz band, college pep band. So that's one that I actually have a little bit of real training on. And I do so another music connection is I work not so much anymore. But I spent a lot of time working as an audio engineer. That's kind of how I work towards a lot of the projects I'm doing now too is I spent a lot of time recording, I spent a lot of time working with other people recording and producing music, a lot of time and studios playing with all that fun hardware. That's something that I love doing and do it whenever I can still one of

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Paul Cutler 13:19

my favorite projects that you did that is music related is you put a Raspberry Pi into a what must almost be a 20 year old iPod. Yes. What were some of the challenges with that project?

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Guy DuPont 13:30

That project has so many challenges. Really, it was a fun project, but it's one that I don't look back on as fondly as some of my others, which, you know, I love what I made. I think it's really cool. And I think that one has done exceptionally well in internet land. So very grateful for that. But because it was so challenging, like I don't look back positively on that experience, and I have a hard time like diving back into that project, which I know I should, like you said I took a

Raspberry Pi Zero and I put it inside a fourth generation iPod. So I basically got to the iPod except for the click wheel. I really wanted to feel like I was still using it a real click wheel. So that was challenge number one was just kind of reverse engineering, how the click wheel was talking to the actual iPad hardware and make it talk to my hardware instead. And fortunately someone and I forgetting his name I think is Jason gar had already figured out the pin out of the click wheel. So it wasn't that bad, thankfully, and I use PI GPIO just using it to like bit bang the input. So yeah, so I'm using the original click wheel. I put a new color screen one of the little composite ones from Adafruit in there, and then you know, like a LiPo battery and a little charge charger board. Also from Adafruit, I think It's It's very cool. It's, it's, it looks great. When it's on and working, it feels great. But yeah, just like getting things to fit in small spaces is not a trivial thing. You know, that was pretty early on in my hardware experience. So I, I've picked up a lot of tips and tricks since then for how not to break stuff. And I broke a lot of stuff making that project and it lingers with me, that was still pretty painful. But yeah, and again, like to tie back to the Python thing, it was another project where I was able to do a large, large bulk of the development on my local machine, rather than trying to get it to run right away on the final hardware. And that was the first that was really the first like bigger Python project I picked up again, reluctantly, it's not my favorite, but it just, it was so clear with the Raspberry Pi and just I used t TK enter tkinter is called tkinter as a joke, but you know, the Python UI framework for building the UI for that, like those were just obviously the right choice, given the constraints. And then there was a Spotify API library written in Python. Yeah. So again, I built it all on my machine and got it 90% of the way there before putting it onto the Raspberry Pi, I highly recommend folks do that whenever you can, like, you will, you will be thankful.

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Paul Cutler 16:19

So before we wrap up, I have a segment called turn the tables. I too, am a big music fan. And I've got a record player in a turntable here at the house. But I've been asking all the questions, here's an opportunity for you to ask me a question.

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Guy DuPont 16:29

Sure. Can I sneak in two quick ones? Let's do it. All right. One. If circuit Python wasn't Python, if Python disappeared from the universe, what would you rather be writing your projects? And,

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Paul Cutler 16:43

you know, Python is really the only language that I know I can now that I know enough Python, I can read other code. But it would probably be JavaScript. The first itch I scratched was building a web app for some friends of mine for a Major League Baseball pool, almost similar to fantasy baseball, but different. So since I started down that web dev path, it would probably have been JavaScript. Yeah.

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Guy DuPont 17:05

I hope nobody unsubscribe to your podcast for this very hot take. But see, I secretly wish it was JavaScript instead of Python. I would take I would take JavaScript any day. But sure, that's an unpopular opinion. Don't get mad at Paul for my unpopular opinion. Hit me up on Twitter if you

unpopular opinion. Don't get mad at Paul, for my unpopular opinion. Hit me up on Twitter if you want to fight about it. Second question. What's, what's the best set you've seen at First Avenue?

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Paul Cutler 17:25

That is such a great question. I have been so lucky to live in Minneapolis all these years. And for those that don't know, first avenue is where Prince recorded the Purple Rain concerts that you see in the movie. So it's kind of an iconic nightclub from that perspective. My favorite show actually is in 1994, I won tickets on a radio station called Rev 105. Rest in peace, but I want to tickets to an Best New Band showcase. And I went and I saw some bands that I had never heard of one was called Seuss's pedals, which turns out their lead singer was the wife of Paul Westerberg from the replacements which I found out years later. And I saw this little band little known band called pleasure, they blew me away. I've been going to shows for years and I had never seen a band so tight. They were a three piece. I ended up moving to the east coast a couple months later, and a friend of mine moved out about a year later and I said, hey, whatever happened to pleasure, I'm like, I never really heard anything. I really thought they'd make a big and I was working at a Best Buy store at the time and he goes out to the music area grabs a CD and brings it back to me and that was semi Sonic. Oh, who's you know known for closing time? Yep. But this was their their debut CD that he handed to me. I've seen some great shows there. But you know, for a band that was just starting out, they were so tight. So put together so polished that it still sticks out in my mind to this day.

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Guy DuPont 18:44

That's awesome. It's on my bucket list to to catch a show out there. I have I have a number of Twin Cities, friends and Twin Cities Live Music friends specifically. So I think it'll happen sooner rather than later.

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Paul Cutler 18:57

Before we go. Speaking of looking people up if people want to look you up on the internet, where can they find you?

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Guy DuPont 19:02

My YouTube channel is where I try to funnel everybody to and that's just my name. My name is Guy Dupont. The spelling will be in the name of the show, I assume. And then I spent a little too much time on Twitter. And I have literally have to use like the internet to find my own Twitter username,


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Paul Cutler 19:21

which I'll link to it in the show notes. So make it easy. Yeah,

 Guy DuPont 19:23
link to it in the show notes. It's my name but the user viz divide of

 Paul Cutler 19:27
DuPont guy thanks so much for being on the show.

 Guy DuPont 19:30
Thank you again for having me, James and lovely chatting again.

 Paul Cutler 19:33
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