70 PAGES OF ESSENTIAL RASPBERRY PI KNOWLEDGE & KNOW-HOW

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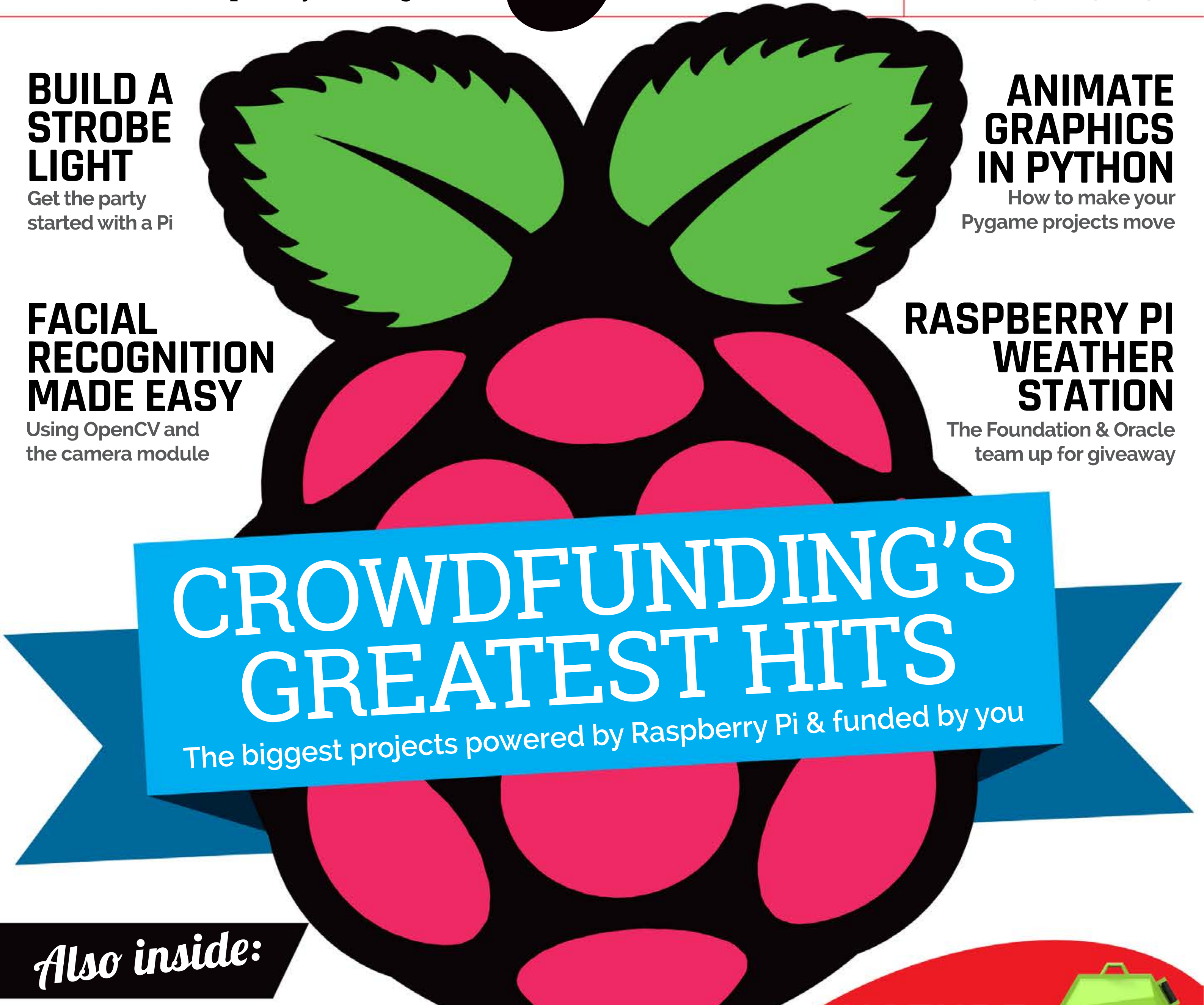

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Plus **SONIC PI: MAKE AMAZING MUSIC WITH OUR ESSENTIAL TIPS & TRICKS**

SAM AARON

Sam Aaron is the creator of Sonic Pi. By day he's a Research Associate at the University of Cambridge and by night he writes code for people to dance to.
sonic-pi.net

SONIC PI π))) TIPS & TRICKS

The creator of Sonic Pi, **Sam Aaron**, shares some of his top tips for budding electronic musicians of all ages...

IMPORTANT

- Sonic Pi 2.4 is required.

To update to the latest version, type these two commands into the terminal:

- `sudo apt-get update`
- `sudo apt-get install sonic-pi`

THERE ARE NO MISTAKES

This is the most important lesson. The best way to learn is to just try. Try lots of different things; stop worrying whether your code sounds good and start experimenting with as many different synths, notes, FX, and parameters as possible. You'll discover a lot of things that make you laugh, because they sound awful, and some real gems that sound truly amazing. Just drop the things you don't like and keep the things you do. The more 'mistakes' you allow yourself to make, the quicker you'll learn and discover your own sound.

USE THE FX

Once you've mastered the basics of making sounds with sample and play, you might be wondering what's next. Did you know Sonic Pi supports over 27 studio FX to change the sound of your code? FX are like fancy image filters in drawing programs, except that instead of blurring or making something black and white, you can add things like reverb, distortion, and echo to your sound. Think of it like plugging the cable from your guitar into an effects pedal of your choice and then into the amplifier, but Sonic Pi makes it much easier! All you need to do is to choose which section of your code you'd like the FX added to and wrap it with the FX code.

```
sample :loop_garzul

16.times do
  sample :bd_haus
  sleep 0.5
end
```

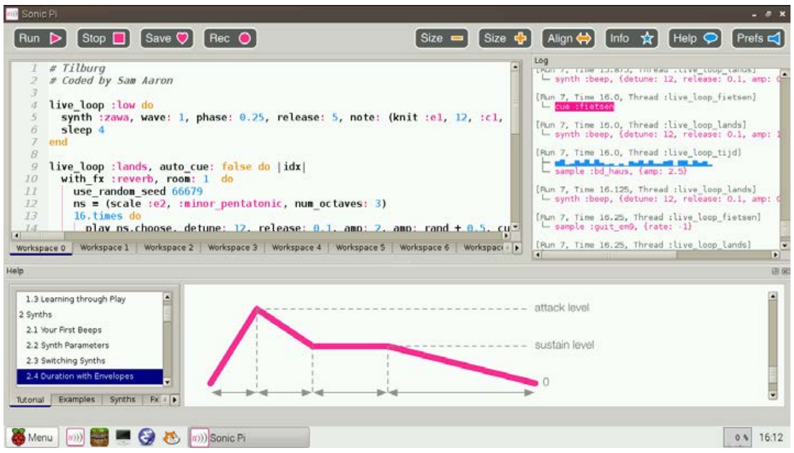
If you wanted to add FX to the **`:loop_garzul`** sample, you'd just tuck it inside a **`with_fx`** block, like this:

```
with_fx :flanger do
  sample :loop_garzul
end

16.times do
  sample :bd_haus
  sleep 0.5
end
```

Now, if you wanted to add FX to the bass drum, go and wrap that with **`with_fx`**, too:

```
with_fx :flanger do
  sample :loop_garzul
end

with_fx :echo do
  16.times do
    sample :bd_haus
    sleep 0.5
  end
end
```

Remember, you can wrap any code within **`with_fx`** and any sounds created will pass through that FX.



```
# Tilburg
# Coded by Sam Aaron

live_loop :low do
  synth :zawa, wave: 1, phase: 0.25, release: 5, note: (knit :e1, 12, :c1,
  sleep 4
end

live_loop :lands, auto_cue: false do |idx|
  with_fx :reverb, room: 1  do
    use_random_seed 66679
    ns = (scale :e2, :minor_pentatonic, num_octaves: 3)
    16.times do
      play ns.choose, detune: 12, release: 0.1, amp: 2, amp: rand + 0.5, cu
```

```
 └ synth :beep, {detune: 12, release: 0.1, amp:

[Run 7, Time 16.0, Thread :live_loop_fietsen]
 └ cue :fietsen

[Run 7, Time 16.0, Thread :live_loop_lands]
 └ synth :beep, {detune: 12, release: 0.1, amp:

[Run 7, Time 16.0, Thread :live_loop_tijd]
 ├
 └ sample :bd_haus, {amp: 2.5}

[Run 7, Time 16.125, Thread :live_loop_lands]
 └ synth :beep, {detune: 12, release: 0.1, amp:

[Run 7, Time 16.25, Thread :live_loop_fietsen]
 └ sample :guit_em9, {rate: -1}

[Run 7, Time 16.25, Thread :live_loop_lands]
```

PARAMETERISE YOUR SYNTHS

In order to really discover your coding sound, you'll soon want to know how to modify and control synths and FX. For example, you might want to change the duration of a note, add more reverb, or change the time between echoes. Sonic Pi gives you enough control to do exactly this, with special things called optional parameters. Copy this code into a workspace and hit Run:

```
sample :guit_em9
```

It's a great guitar sound. Let's change its rate:

```
sample :guit_em9, rate: 0.5
```

What's that **`rate: 0.5`** bit we just added at the end? That's called a parameter. All of Sonic Pi's synths support them and there's loads to play around with. They're also available for FX:

```
with_fx :flanger, feedback: 0.6 do
  sample :guit_em9, rate: 0.5
end
```

Now, try increasing that feedback to 1 to hear some crazy sounds! Read the docs for full details on all the many parameters available to you.

LIVE CODE

The best way to quickly experiment and explore Sonic Pi is to live-code. This allows you to start off some code and continually change and tweak it while it's still playing. So, if you don't know what the **`cutoff`** parameter does to a sample, just play around with it. Copy this code into one of your Sonic Pi workspaces:

```
live_loop :experiment do
  sample  :loop_amen, cutoff: 70
  sleep 1.75
end
```

Now, hit Run and you'll hear a slightly muffled drum break. Now, change the **`cutoff:`** value to 80 and hit Run again. Can you hear the difference? Once you get the hang of using **`live_loop`**, you'll never go back. If you were ever to do a live coding gig in the future, you'd find yourself relying on **`live_loops`** as much as a drummer relies on their sticks. To learn more about live coding, check out Section 9 of Sonic Pi's built-in tutorial.

SURF THE RANDOM STREAMS

One thing that's really fun to try is cheat by getting Sonic Pi to compose things for you. A really great way to do this is using randomisation. It might sound complicated, but it really isn't. Try this:

```
live_loop :rand_surfer do
  use_synth :dsaw
  notes = (scale :e2, :minor_pentatonic, num_octaves: 2)
  16.times do
    play notes.choose, release: 0.1, cutoff: rrand(70, 120)
    sleep 0.125
  end
end
```

When you play this, you will hear a constant stream of random notes from the scale **`:e2 :minor_pentatonic`** played with the **`:dsaw`** synth. It might not sound like a melody, but that's the first part of the trick: every time we go round the

> "You can explore as many melodic combinations as you can imagine"

`live_loop`, we can tell Sonic Pi to reset the random stream to a known point. It's like going back to a particular point in time and space with the TARDIS. Let's try it. Add the line **`use_random_seed 1`** to the **`live_loop`**:

```
live_loop :rand_surfer do
  use_random_seed 1
  use_synth :dsaw
  notes = (scale :e2, :minor_pentatonic, num_octaves: 2)
  16.times do
    play notes.choose, release: 0.1, cutoff: rrand(70, 120)
    sleep 0.125
  end
end
```

Now, every time the **`live_loop`** loops around, the random stream is reset. This means it chooses the same 16 notes every time, giving you an instant melody. Here's the really exciting bit: change the **`seed`** value from 1 to another number – 4923, say – and it will give you another melody. So, just by changing one number (the random seed), you can explore as many melodic combinations as you can imagine, and that's the magic of code.