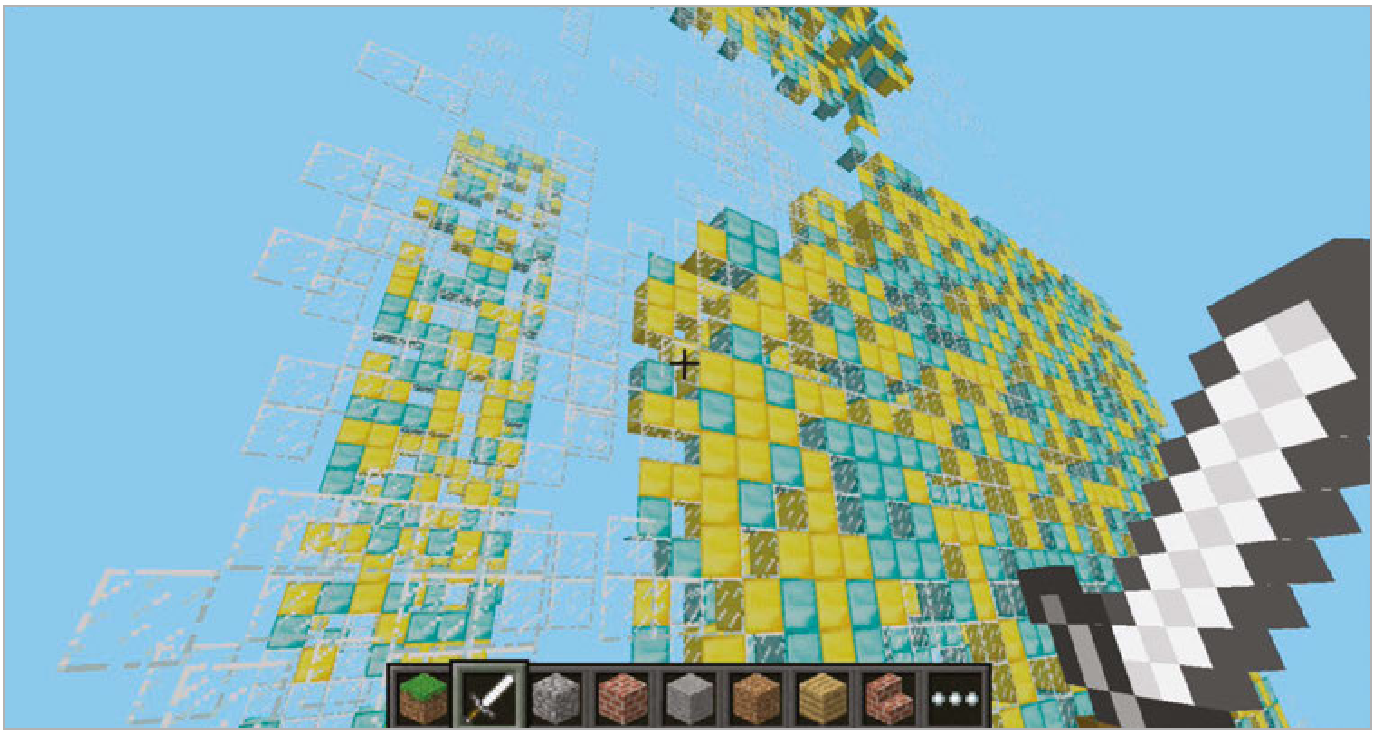
The MagPi ESSENTIALS

[CHAPTER TEN] BECOME A MINECRAFT VJ

Use Sonic Pi with Minecraft to create amazing visuals for your music as you perform it!

Below All of this is powered by Sonic Pi, allowing you to make your visualisations match the music



[MINECRAFT & SONIC PI]

Node-RED is a visual tool for wiring the Internet of Things. It takes care of technicalities, like GPIO access or internet protocols, and lets you focus on your workflow.

Everyone has built amazing structures, designed cunning traps, and even created elaborate cart tracks in Minecraft. How many of you have performed with Minecraft? We bet you didn't know that you could use Minecraft to create amazing visuals, just like a professional VJ.

As well as coding with Python, you can also program Minecraft with an app called Sonic Pi, which makes the coding not only easy but also incredibly fun. In this article, we'll be showing you some of the tips and tricks that we've used to create performances in nightclubs and music venues around the world.

Enter a new world in Minecraft and open Sonic Pi. When we're using Minecraft to create visuals, we try to think about what will both look interesting and also be easy to generate from code. One nice trick is to create a sandstorm by dropping sand blocks from the sky. For that, all we need are a few basic fns (Sonic Pi functions):

- `sleep` – for inserting a delay between actions
- `mc_location` – to find our current location
- `mc_set_block` – to place sand blocks at a specific location
- `rrand` – to allow us to generate random values within a range
- `live_loop` – to allow us to continually make it rain sand

Let’s make it rain a little first, before unleashing the full power of the storm. Grab your current location and use it to create a few sand blocks up in the sky nearby:

```
x, y, z = mc_location
mc_set_block :sand, x, y + 20, z + 5
sleep 2
mc_set_block :sand, x, y + 20, z + 6
sleep 2
mc_set_block :sand, x, y + 20, z + 7
sleep 2
mc_set_block :sand, x, y + 20, z + 8
```

When you press Run, you might have to look around a little, as the blocks may start falling down behind you depending on which direction you’re currently facing. Don’t worry: if you missed them, just press Run again for another batch of sand rain – just make sure you’re looking the right way!

Let’s quickly review what’s going on here. On the first line, we grabbed Steve’s location as coordinates with the fn **mc_location** and placed them into the vars **x**, **y**, and **z**. Then, on the next lines, we used the **mc_set_block** fn to place some sand at the same coordinates as Steve, but with some modifications. We chose the same x coordinate, a y coordinate 20 blocks higher, and then successively larger z coordinates, so the sand dropped in a line away from Steve.

Why don’t you take that code and start playing around with it yourself? Try adding more lines, changing the sleep times, try mixing **:sand** with **:gravel**, and choose different coordinates. Just experiment and have fun!

[HELP WITH FUNCTIONS]

If you’re unfamiliar with any of the built-in fns such as **rrand**, just type the word into your buffer, click on ‘int’, and then press the keyboard combo **CTRL+I** to bring up the built-in documentation. Alternatively, you can navigate to the ‘lang’ tab in the Help system and then look up the fns directly, along with all the other exciting things you can do.

Live loops unleashed

Okay, it's time to get the storm raging by unleashing the full power of the **live_loop**, Sonic Pi's magical ability, which unleashes the full power of live-coding: changing code on the fly while it's running!

```
live_loop :sand_storm do
  x, y, z = mc_location
  xd = rrand(-10, 10)
  zd = rrand(-10, 10)
  co = rrand(70, 130)
  synth :cnoise, attack: 0, release: 0.125, cutoff: co
  mc_set_block :sand, x + xd, y+20, z+zd
  sleep 0.125
end
```

What fun! We're looping round pretty quickly (eight times a second), and during each loop we're finding Steve's location like before but then generating three random values:

- xd - the difference for x, which will be between -10 and 10
- zd - the difference for z, also between -10 and 10
- co - a cutoff value for the low pass filter, between 70 and 130

We then use those random values in the fns **synth** and **mc_set_block**, giving us sand falling in random locations around Steve, along with a percussive rain-like sound from the **:cnoise** synth.

For those of you new to live loops, this is where the fun really starts with Sonic Pi. While the code is running and the sand is pouring down, try changing one of the values, perhaps the **sleep** time to **0.25** or the **:sand** block type to **:gravel**. Now press the Run button again. Hey presto! Things have changed without the code even stopping. This is your gateway to performing like a real VJ. Keep practising and changing things around. How different can you make the visuals without stopping the code?

Epic block patterns

Finally, another great way of creating interesting visuals is to generate huge patterned walls to fly towards and get close to. For this effect, we'll need to move from placing the blocks randomly to placing them in an ordered manner. We can do this by nesting two sets of iteration; press the Help button and navigate to section 5.2 of the tutorial, 'Iteration and Loops', for more background on iteration. The funny **|xd|** after the **do** means that **xd** will be set for each value of the iteration. So, the first time it will be 0, then 1, then 2, and so on. By nesting two lots of iteration together like this, we can generate all the coordinates for a square. We can then randomly choose block types from a ring of blocks for an interesting effect:

```
x, y, z = mc_location
bs = (ring :gold, :diamond, :glass)
10.times do |xd|
  10.times do |yd|
    mc_set_block bs.choose, x + xd, y + yd, z
  end
end
```

Pretty neat. Whilst we're having fun here, try changing **bs.choose** to **bs.tick** to move from a random pattern to a more regular one. Try changing the block types – the more adventurous of you might want to try sticking this within a **live_loop** so that the patterns keep changing automatically.

Now for the VJ finale. Change the two **10.times** to **100.times** and press Run. Kaboom: a gigantic wall of randomly placed bricks. Imagine how long it would take you to build that manually with your mouse! Double-tap **SPACE** to enter fly mode and start swooping by for some great visual effects. Don't stop here, though – use your imagination to conjure up some cool ideas and then use the coding power of Sonic Pi to make it real. When you've practised enough, dim the lights and put on a VJ show for your friends!