LushOne Synth 101
Getting your first sounds

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About the LushOne

- Synthesizer with MIDI or analogue control
- In the style of a classic modular synthesizer
- 2mm patch leads to connect modules or to link to external elements
- Base waveforms come from two digital oscillators
  - Normally configured as an audio oscillator and a Low Frequency Oscillator (LFO)
- Sound modified by analogue Voltage Controlled Filter (VCF)

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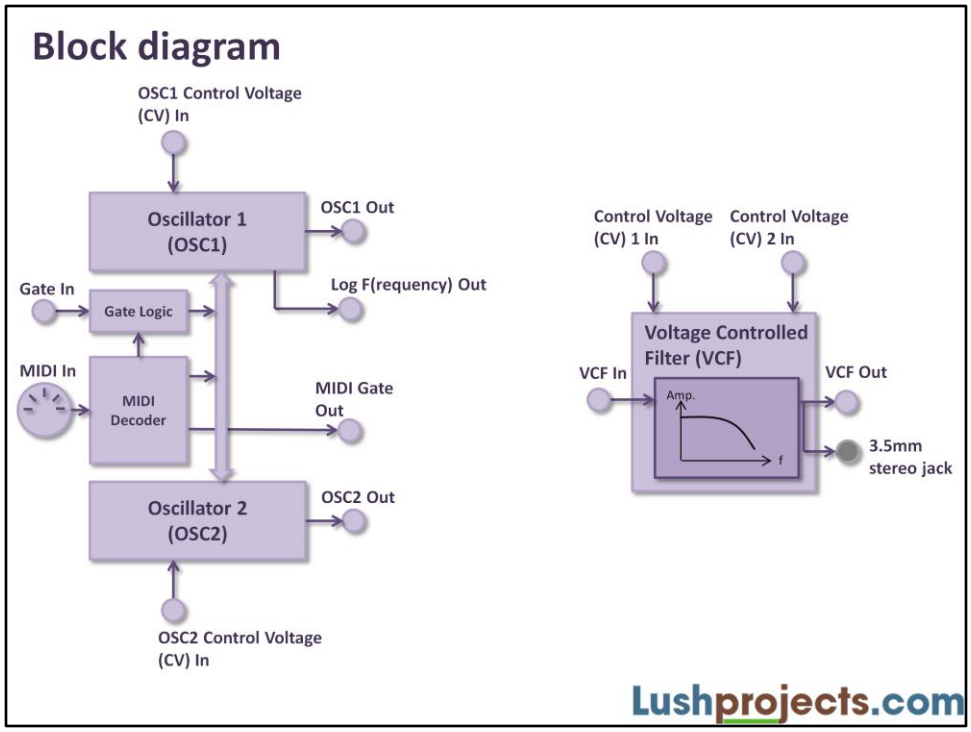


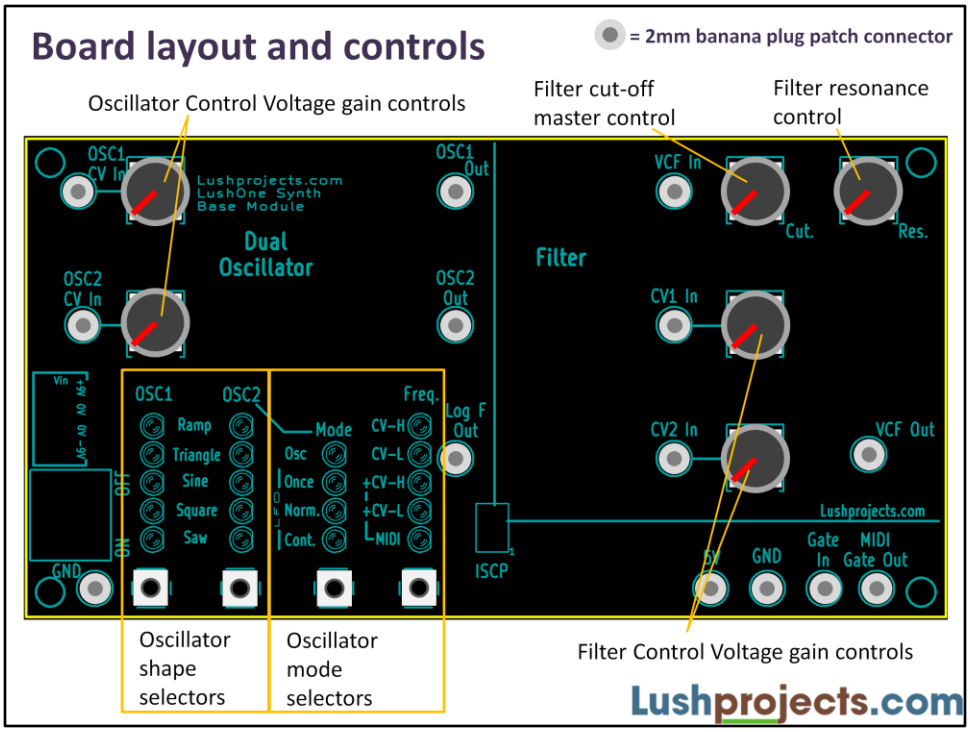
Don't worry if you don't understand all this diagram at the moment – if you did you wouldn't need to do course!

Let's focus on some highlights:
You can clearly see that the oscillators and the filter are separate. To use both together you have to connect them using a patch leads. These plug in to the 2mm banana sockets on the board. The patch sockets are shown by the small purple circles. The advantage of this modular approach is that you can mix and match both the built-in modules and external modules in all kinds of ways. Patch sockets connect audio signals and control voltages. Control voltage inputs modify the behaviour of the circuit.

The two oscillators share some common modules for processing MIDI events and also for the gate control that turns the oscillator outputs on or off. We'll talk more about these aspects later.

The MIDI In is the large 5 pin DIN socket on the bottom of the board.

You can pick up the output from the filter either from the 3.5mm stereo jack on the bottom of the board or the VCF Out patch socket on the top. Don't try and connect headphones or earbuds directly to the output. The LushOne doesn't contain an amplifier and doesn't have enough power to drive these directly.

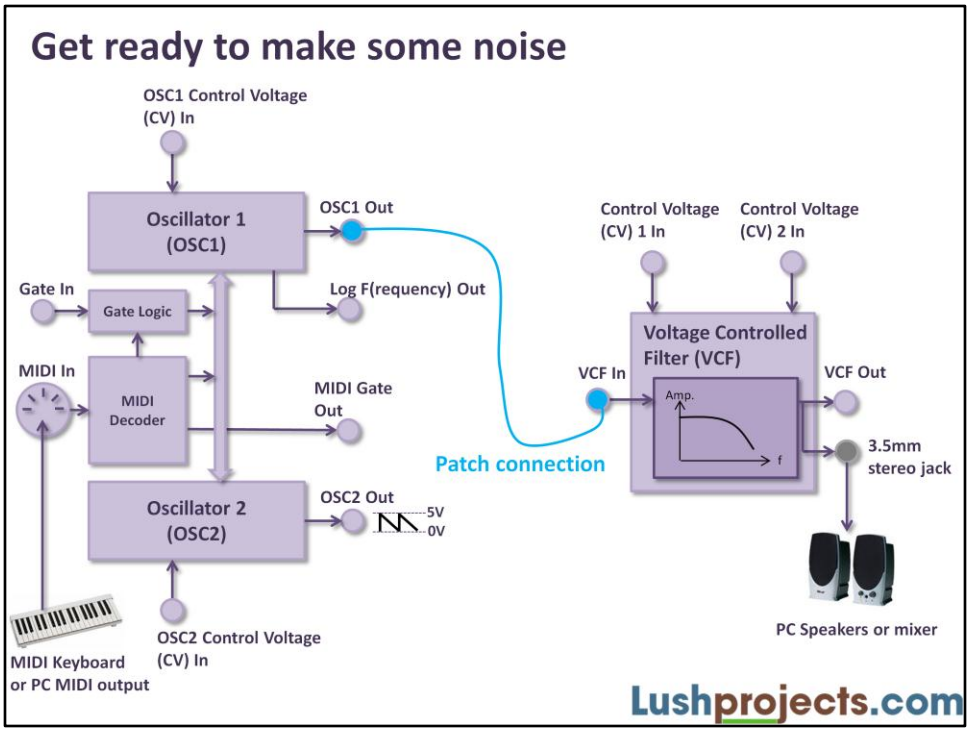


Let's take a look at the board and identify the controls.

The 2mm patch connectors are the round silver pipes. They are all labelled on the board and the labels match those on the block diagram.

The LushOne has the following controls:
- Power switch (down for on, up for off)
- Four gain controls for the Control Voltage inputs. These are next to the control voltage patch connectors they relate to.
- Two master filter controls for cut-off frequency and resonance. They are labelled "Cut." and "Res." on the board
- Two push button controls for the wave shape from the oscillators
- Two push button controls that control the oscillator mode

On the back of the board are two additional connectors:
- The 5 pin MIDI input socket
- The 3.5mm stereo output socket. This is connected to the "VCF out"

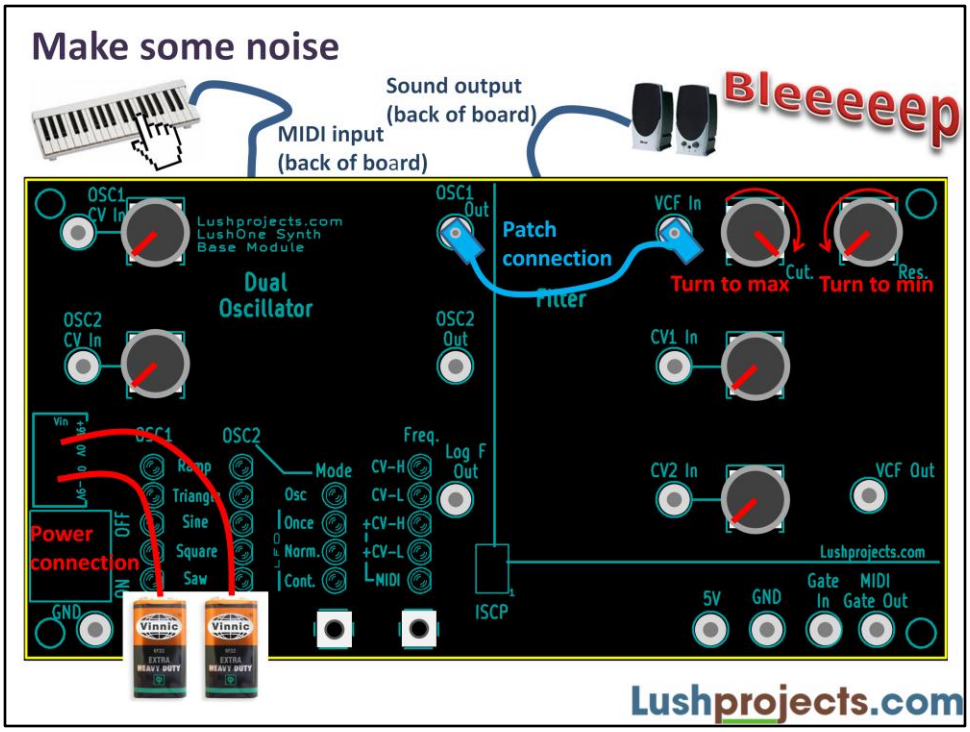


OK – enough theory – let's do something.

We're going to start with just about the simplest thing you can do with the LushOne. You'll need a MIDI keyboard or other MIDI output for this stage so beg or borrow one if you don't have your own. Just about any MIDI keyboard with a 5 pin DIN output should work. [For MIDI geeks: the LushOne responds to all MIDI channels] The LushOne can work without a MIDI controller but to get started it is the easiest configuration.

You'll also need to connect the output of the LushOne to something. PC speakers are ideal but a mixer would also work.

To make a sound you'll also need to use a patch lead to connect the OSC1 output to the filter (VCF) input.



Ready to make some noise? The MIDI input and the 3.5mm output are on the back of the board. You will also of course need to connect two 9V batteries (which I won't be mentioning again!)

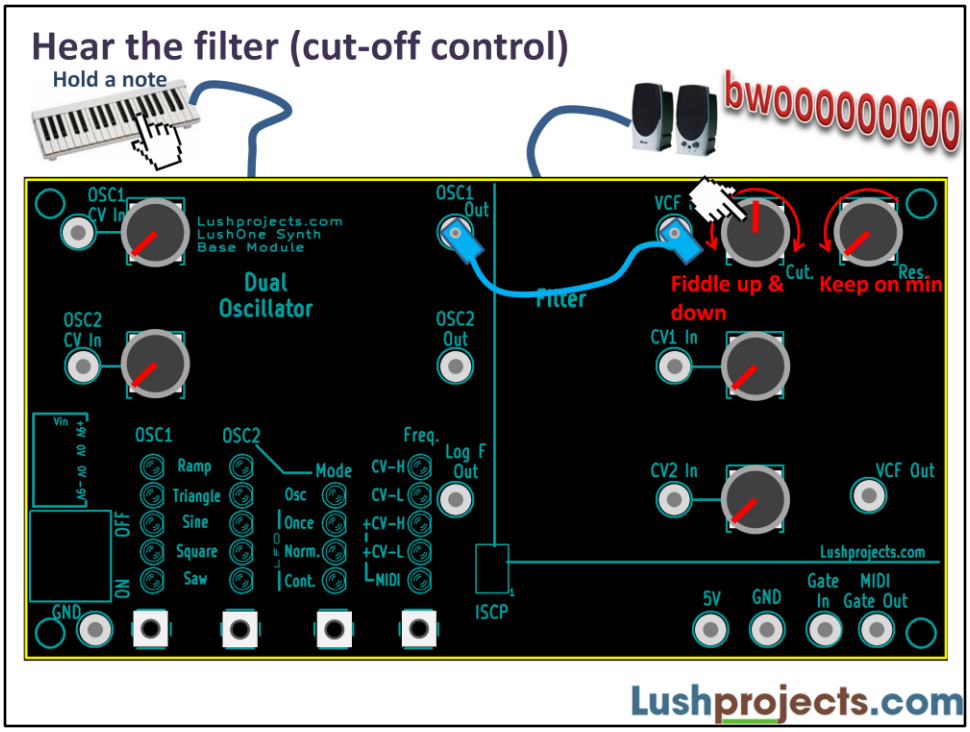
Take a patch lead and connect the "OSC1 Out" to "VCF In".

Lastly turn the "Cut." control which changes the filter cut-off to max and the "Res." control which changes the resonance to min.

Switch it all on. You should see the LEDs light up to indicate the default oscillator settings and if you play some notes on the keyboard you should hear them through the output. If not check your connections, soldering etc. Also check the speakers are powered on with the volume turned up!

First thing you will notice – the LushOne is truly monophonic – it only plays one note at a time. No chords! This may be odd to the digital generation but this is the way modular synths work – One oscillator = One note!

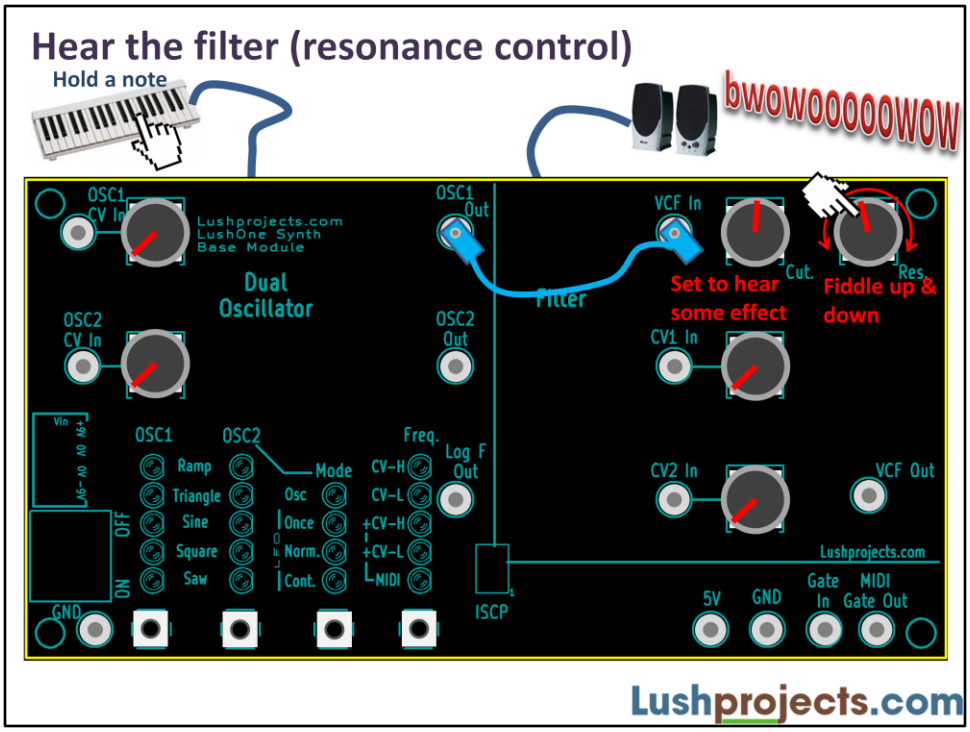
If your keyboard has a pitch wheel try moving it while holding a note. The LushOne supports pitch bend from the keyboard.



The heart of a modular synth is the filter. Let's make the LushOne filter do some work.

Hold a note on the keyboard and slowly turn the cut-off ("Cut.") control down. You should hear the note tone get softer and then fade away as the control goes towards minimum. This control changes the cut-off frequency of the filter. As it is a low-pass filter we only hear sounds below the cut-off frequency. Fiddle the control up and down to get a feel for the effect.

If you turn the cut-off down too low then all the frequencies will be filtered out and you won't hear anything. If all is silent check you haven't turned the cut-off right down.



Getting the most from the filter involves using the resonance control as well as the cut-off.

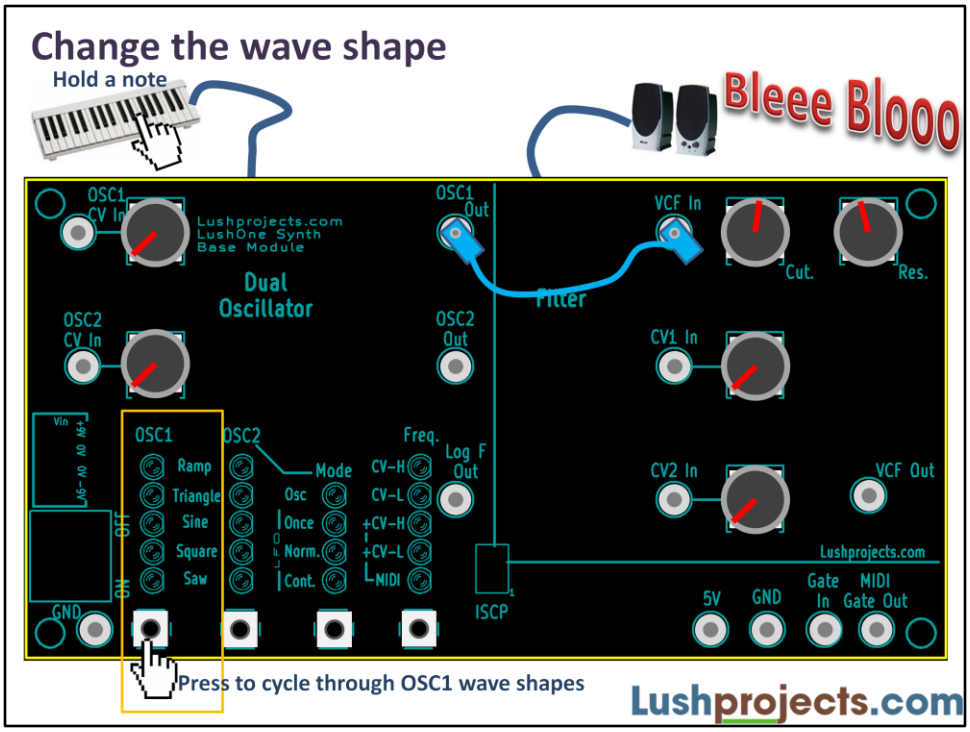
Hold a note again and turn the cut-off control to a position around the centre where you can still hear the note but the filter is having some audible effect. Keep the note held and turn the “Res.” control upwards. You should hear the tone get richer as the resonance adds in new frequencies and then get very harsh towards the top of the resonance control as the resonant effects in the filter start to dominate over the original note.

Fiddle with the cut-off and resonance controls while holding a note to get a feeling for the range of sounds and how they interact. The tonal quality added by the resonance control depends on the setting of the cut-off. They higher the cut-off the higher the resonant frequency. With the two controls you should get some great retro sounds from the synth. I have played with these for hours.

When you find sounds you like try playing different notes and seeing how they change. It’s well worth exploring the filter for deep bass sounds.

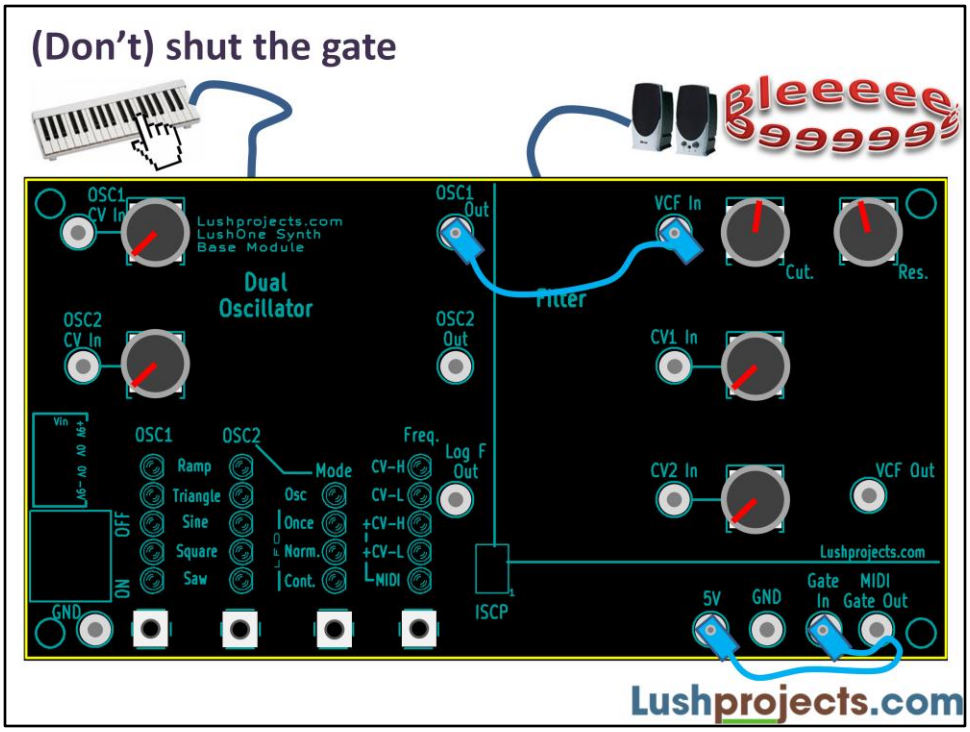
If you turn the resonance control up high (generally past half-way) the filter will start to “self oscillate”. This means that there is so much resonance that the filter make a noise even if there is no note sound going in. Set cut-off to the mid point and then

turn the resonance control up while not holding a note to hear this. Self oscillation is a characteristic of many analogue synths. Learn to love it! If you find you can’t make the LushOne shutup then try turning the resonance down.



Another way to change the sound is to change the basic wave shape being generated by the oscillator. Each oscillator on the LushOne can produce a sawtooth (“saw”), square, sine, triangle or ramp wave. On OSC1 the saw and ramp will sound the same (one is the mirror image of the other and your ear can’t tell the difference) but you may want the two options for specialist effects.

You can cycle through the OSC1 wave shapes by pressing the first button. Try different filter settings with different wave shapes to hear the range of sounds. You normally want to use angular waves like saw and square as these are rich in harmonics that interact well with the filter.



At this point you might be getting fed-up of holding down notes while you fiddle with the controls. The LushOne normally has a gate on the output of OSC1 that stops the sound unless a MIDI key is being held down. This gate can be overridden if you want continuous sound or just want to use the LushOne without a MIDI input (more on that later). To override the gate use a patch lead to connect the "5V" connection to the "Gate In". The LushOne will now continuously play the last note. You can fiddle with all the filter settings to your hearts content and have both hands free to operate both filter controls at once.

If you want to you can connect an external switch or push button between the 5V connection and the Gate In.

Recap

Congratulations! This is the end of module 101.

You now know how to:

- Connect up the LushOne
- How to use the filter master controls
- How to select the OSC1 wave shape
- How to override the OSC1 gate

I hope you are already making some fab sounds.

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Next time

- LushOne 102
- We'll be creating some real Radiophonic Workshop sounds by using OSC2 to create richer effects

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