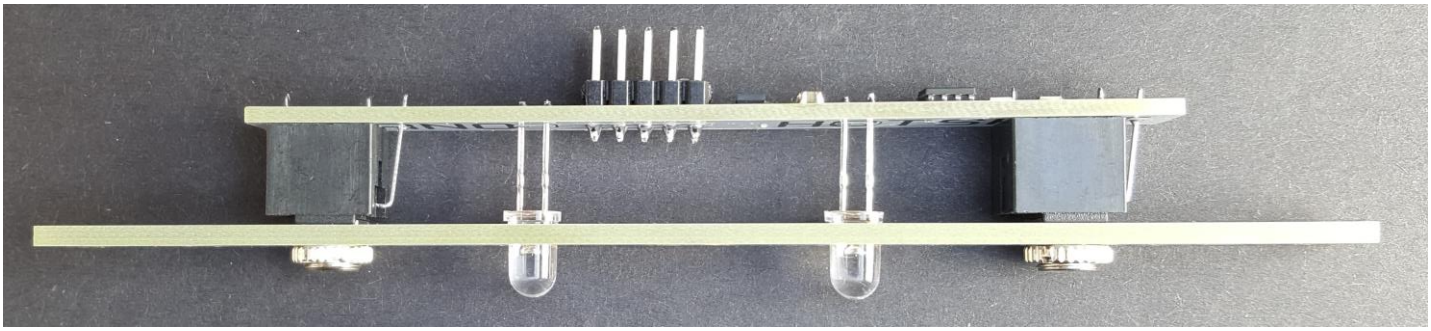
nonlinearcircuits

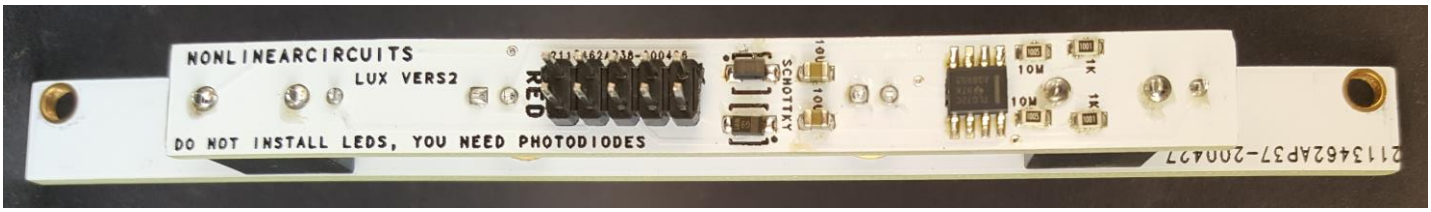
LUX build & BOM

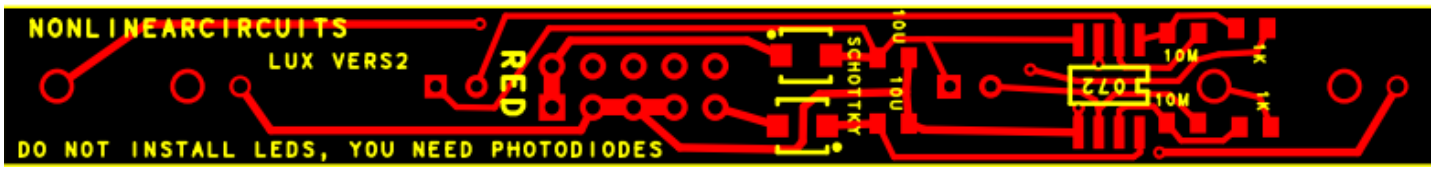
This is yet another somewhat lazy design, kind of fitting for 2020: four resistors, two photodiodes and a dual op amp. The simplest NLC module, so far.

The photodiodes which produce current when light falls on them. This is fed to an op amp which spits out a voltage that reflects the light intensity. The design is really supposed to be an ambience and movement sensor to reflect changing light conditions (if you were playing outdoors for example) and it responds to your movements as you move around tweaking and patching.

It can be used as an optical Theremin, tho the closer your hand (or other appendage) is to the photodiode the lower the output voltage.







BOM – The Tayda & Mouser part numbers are given as examples

VALUE	QUANTITY	DETAILS
10uF	2	0805 25V or higher voltage rating Mouser Part No: 963-TMK212BBJ106MG-T (or similar, search “10uf 25v 0805”)
1k	2	0805
10M (try 1M instead)	2	0805 – see notes
Photodiode	2	5mm See notes 1540051EA3590
TL072 or TL082	1	Soic Tayda: A-1139
Eurorack 10 pin power connector	1	Tayda: A-198 cut to size
Schottky, power rectifier or 10R, optional - for reverse voltage protection...or not	2	SMD SEE NOTES #1. dot on PCB indicates CATHODE (stripe on component). My current fave is BAT54GWX, Mouser: 841-BAT54GWX
3.5MM SOCKET Kobiconn style	2	Tayda: A-865 or Thonkiconn Jacks (PJ301M-12) from Thonk, Synthcube or Modular Addict

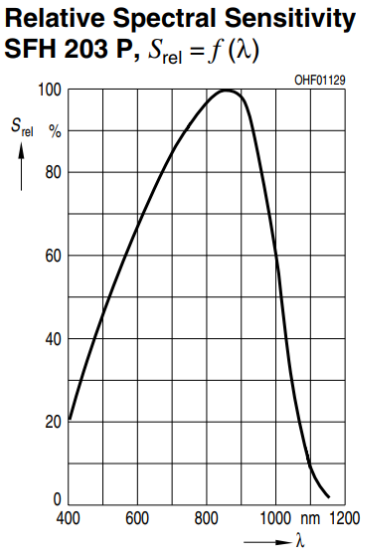
Additional notes:

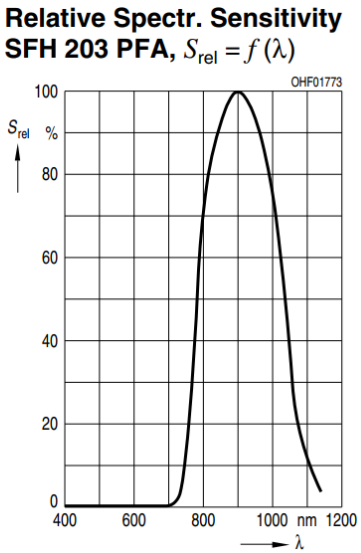
1. , Schottky (best option) **or** standard power rectifier diode 50-600V 1A or more, **or** use a resettable fuse **or** just a 10R. Examples: BAT54GWX, PMEG2005EGWX, AEC-Q101, 20V, SOD-123, PMEG2005EH DIODE, SCHOTTKY, 0.5A, 20V, 1N400x or S1JL or similar.

2. The chips, resistors, caps are cheapest from Tayda. Schottky diodes, CMOS & 1uF, 10uF 25V 0805 caps from Mouser/E14/Farnell/etc.

3. Join the Nonlinearcircuits Builders Guild on FB: https://www.facebook.com/groups/174583056349286/ and ask questions there if you have any. If you prefer not to FB then email is fine.

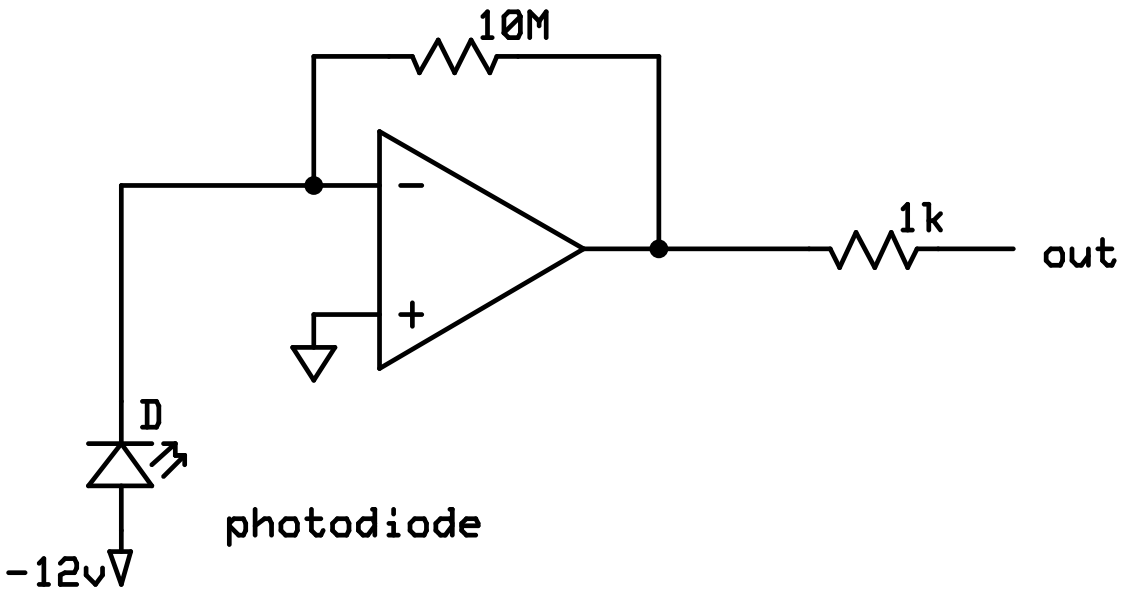
4. **5mm Photodiodes**: You need to choose these and the gain resistors carefully. Get ones that operate in the visible light spectrum and you need to consider the lighting in your studio or where you regularly use your modular. You could have the one section with low gain for bright conditions and the other section with high gain for low lighting. The first ones I used were some crap from eBay with no datasheet or manufacturer code and required 10MΩ as gain resistors to get 0-3V outputs in my shed. Next I tried QSD2030 which are quite 'hot. With a 1M resistor the output tends to sit at 10V in my shed, probably best with 470k. The 3rd ones I tried were 1540051EA3590 which are my favorite so far, with a 1M resistor the output voltage sits at about 8V in my shed at noon (I have a skylight), so it is easy to play the module and get a 0-8V range. I have a few different types on order so will update this build guide soon. If you want to check suitable types, look for the spectral sensitivity chart in the datasheet. In the example below, the one on the left (SFH 203 P) is good as it covers the visible light spectrum. The one on the right (SFH 203 PFA) is to be avoided as it is just works with infra-red; most photodiodes are the IR type. Perhaps only 1 in 10 work for the visible spectrum.





5. **10M resistors** – These set the gain and will likely be too high for most photodiodes unless you play in a dark room. Start with 1M, see the section above.

10M on PCB, try 1M then experiment



Two circuits on PCB