Re: Suggestions for aspiring hobbyist

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On 10 Aug 2006 00:53:45 −0700, sly.psi@xxxxxxxxx wrote:

> There must be a million of these posts on this group and I apologize in advance if I'm violating some rule.
>
> I come from a computer science background and I'm now looking to get into electronics as a hobby. I have a few ideas for circuits I'd like to construct eventually, most of which revolve around various sensors and audio processing. One specific circuit I'd like to build a sample & bit rate reducer for an electric guitar or bass signal with a CV−controlled LFO to control the intensity of the effect.
>
> Anyway, I've been reading books by Forrest Mims and also /Electronics for Dummies/ at the book store as well as various internet sources for additional information. Some sources claim /The Art of Electronics/ is a necessity while others say it has entirely too much information and the wrong approach for a hobbyist. I don't want to just build pre−made kits or copy other people schematics −− I'd really like to make new and original things happen. I have plenty ideas, but I seem to be stuck in the CS / software point of view when it comes to construction. I can build an entire program in my head for the aforementioned sample rate reducer, but I just can't see envision it in components. I assume I'd need some sort of analog signal to digital signal converter and an IC chip to do the real work of the problem... but I really have no idea.
>
> I already have some preliminary equipment (solder iron, desoldering braid, thin pliers & cutters, wire stripper, 20 AWG solid wire, digital multimeter, etc) but no actual components or breadboard. At this point I am sort of sold on the dead−bug style for educational / experimental prototyping.
>
> So does anyone have any suggestions for me at all in anything I've mentioned? I find myself wanting an expert electronics guy around to guide me, but I don't know anyone, so I turn to internet folk. Any material to read, sources to look up, comments regarding /The Art of Electronics/?

First of all, you can approach most circuit design like you'd approach software design... with building blocks of tried−and−true modules. You start out (as you probably did in software) learning new modules and adding them to your bag of tricks. With circuits those will be Basic Op−Amp Buffer, Inverter/Summer, Integrator, Filter, Comparator, Sample/Hold, etc, etc. You will also learn about the capabilities of various logic chips like Flip−Flops. Don't worry about copying other's circuits... learn from them. Figure out what building blocks they are using and why. Then you can make changes to suit your own needs.

Get a solderless proto−board. These are absolutely indispensible for working out new designs.

One of your first soldered projects could be a bench power supply. For the kind of things you are interested in, you will need to be able to power op−amps as well as digital chips. I'd recommend CMOS for the digital, as it is easy to interface to the analog and you can find versions that work on 15V. You can make your bench supply put out +/−15 and carefully interface the logic to use only +15. Or you can make it +/−7.5V and put the CMOS across the 15V total when needed. You'll want to do this for switching analog signals with CMOS gates like 4051, 4052, 4053.

Now about your desired project: I'm not sure exactly what you have in mind with a "sample and bit rate reducer" for a guitar. Are you trying to pitch−shift? If so, this is non−trivial (beginner or not), because you have to either fill in missing data or chop out excess data... either one causes nasty splicing noises unless done with great finesse. (If you speed up the output rate relative to the input, you will quickly run out of input samples and have to fudge some from somewhere. Advanced schemes attempt to determine the period of the signal and copy just the right portion, but even still you have to chop it off at some arbitrary point if you have an arbitrary rate shift from a VCO. Similar problem in slowing down.)

For a beginner, I'd recommend starting out with some purely analog projects that don't require computer interfaces. Look into phasers, multipliers, and distorters. (Distortion can be done lots of different ways, including subtle colorations, not just full−tilt "Fuzz".)

Best regards,

Bob Masta
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