

Introduction to Fishing For Photons

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Before we dive into the meat of things here with the first real entry, it's probably worth spending a bit of time introducing myself and introducing this column. First up - who am I? Some of you may know me from the software I write. I'm the author of *PHD Guiding*, *Nebulosity*, *DSLR Shutter*, and a host of other programs designed to make astrophotography a bit less painful than it can be. Others may recognize the name from articles I've written in several astro-mags or talks I've given at various astro-events. One or two of you out there may even know me from my day job (which isn't writing software for [Stark Labs](#)). Of course, the rest have no clue who I am, so for them and for the curious, a bit of a brief history.

History

I got started in astronomy the way many of us have. I got a department-store 'scope (complete with a click-stop variable barlow) and had a look at Jupiter, seeing a few moons and making out two red bands. Things progressed from there a bit and when snooping around in my high school, I found an old Criterion 8" Newt in need of some love. So that I could use it (and cover up for the fact that I was snooping around school closets), I founded an Astronomy Club and we even built a 10" Dob there (the school's Head of Discipline was our sponsor; that worked out well!). While in high school, I did a "senior project" on astrophotography back in the days of hand guiding and developing your own film. For that project, I bought my first real scope, a Meade MTS-SN8 (their first Schmidt-Newt). College just outside of Boston, MA put the kaibosh on the hobby for a bit and that scope stayed in its box for over a decade as I moved around the country from city to city during my Ph.D. and "postdoctoral" years. City lights were bright, options to get under dark skies were slim, and I was spending my time doing research, writing papers, and working to become a professor (by day, I try to figure out how memory works in the brain.)

Then, a momentous event happened. Folks like Steve Chambers, John Grove, and William Behrens started pushing out ways of modifying webcams or video cams to do long-exposure astrophotography. This was incredibly exciting for me and was the spark that re-ignited the hobby. I didn't have cash to spend on a "real" astro-cam, DSLRs didn't exist (and would have been too expensive as well), but \$50 for a Philips Vesta Pro was something I could swing. Modifying the camera involved some soldering skills, but that let me tap into another part of my background.

I grew up around electronics and around testing electronics. One of my dad's many jobs was writing for *Stereo Review* magazine (another way you might have heard my name, as he was also Craig Stark). I held a soldering iron before I held a pencil and from a young age, I started helping him test every cassette deck that was reviewed there. I'd run many of the tests and be the "esteemed listening colleague" (my young ears could hear things his older ones couldn't) on scores of reviews and started building amplifiers and speakers. I also took a keen interest in our first computer, a Northstar Horizon CP/M machine (with 64k of RAM!) and started programming at 10 or 11, teaching myself first by entering in programs from the back of Byte magazine. At 14, I managed to convince a local computer

shop to hire me as a technician to fix their Kaypro machines and the IBM PCs (we had an IBM PC XT at home by then and my dad had started to work for *PC Magazine*). I took over there as the Service Manager a few years later and continued to work there for several years, even if only when home on college breaks. I owe a lot to Reese, the owner there. He had faith in that kid, taught me a lot, and gave me room to grow and learn.

I started college thinking I was going to be an astrophysicist, but physics and I didn't get along too well. I got by, but it wasn't a match made in heaven by any means. I think a lot more like an engineer and I certainly gave electrical engineering and computer science a lot of consideration. I even took the "if you pass this you can actually make it" programming course in college -- my one official programming course (I'd actually taught a few programming courses while in high school but hadn't taken any.) In the term, you learned LISP, 68000 assembly, and C with your final project to write your own version of LISP in C (the language you'd learned only a few weeks earlier). It was a brutal course, considered by many to be the toughest in the university, but it was also fun. There's something very satisfying about programming. It make take you ages to get something to work, but once it does, it just works. You can cross that off the list of things to do and can feel like you've actually accomplished something.

But, a career in CS was not to be. I'd discovered something else. I figured that if astrophysics wasn't going to work out, I could trade one impossibly complex, impossible to understand system for another and I set out on the path that has led to my career. I'm a "cognitive neuroscientist", trying to understand how the 10 billion neurons in our brain with their 100 trillion connections give rise to us. Specifically, I study how memory works, usually by taking many noisy, moving pictures of peoples' brains (called "fMRI scans") hoping to pull out some faint signals from that noise (sound familiar?).

The Obsession Hobby is Reborn

Jump back now to that guy who unboxed his scope after over a decade, now holding a hacked up webcam in his hands. He's got the desire to see these faint fuzzies but heck, he's never really even seen M51. His background though led him to the point where he's setup in his backyard with a laptop, the scope, and what looks like a pretty poor excuse for a DSO cam. A few nights earlier it was a simple webcam and there was no way this could be mistaken for some high-end observatory-grade piece of imaging gear.

I still remember that night. Under the glow of the Baltimore City lights, I swung the SN8 over to M42 and found it in the eyepiece (one of, if not the only thing I could find at the time). The glow of the Triangulum area was there and not much else - typical of my urban stargazing and typical of why I'd not set things up before. I placed the modified webcam in the eyepiece barrel and focused things, seeing no more in these short exposures than I had through the eyepiece. Then, I dialed up a few second exposure, waited and the image appeared. "Holy @#\$\$@#!!!!!" The neighbor's lights went on as they poked their heads out from behind the curtains wondering just what would cause their otherwise quiet neighbor to start shouting profanities in the dark of night. Confused though they were, I'm sure many of you have had similar experiences and know just what I felt that night. There it was, looking not much worse than film shots I'd seen in books. There, before my eyes, were details I'd never seen outside of the shots in magazines or on the posters that had adorned my walls as a kid. I could blow out the whole core and see the structure. This wasn't some observatory. This was me, with my 20 year-old 8" scope, in urban skies using a cheap webcam.

After that, I was hooked. Scopes changed, mounts changed, and cameras changed many times over.

After awhile, I started writing software to process the images (I was actually quite close to using my fMRI image tools for this at one point) and that changed from a simple tool to a whole set of programs. The one thing that didn't change was the link to the community on the internet. Out there, I found people who understood this odd obsession and who were inflicted with the same strange desires (just why do we go out in the cold to loose sleep so we can take pictures in the dark?) Out there, I found people who not only understood this, but were willing to help and to teach others who weren't as far along the way as they. I owe a lot to these people and to this community.

Having gotten so much from others in the etherial "out there" is one of the main reasons why I am writing this column and it's why I make programs like *PHD Guiding* free. The most common question asked of me is why I don't charge for *PHD*. One real answer is because it's something I could give back to the community. This brings me to the one thing I want to make clear to the readers here. Yes, I sell one piece of software. Proceeds from it fund development of all of the other programs (and yes, let me buy some nice astro toys). But, the goal here isn't to sell my software or push it in any way. Heck, all but one of the programs are free and even that is fairly low-budget (it costs less than a lot of Plossl eyepieces out there). I may use my software from time to time as an example of how things work, but I promise pushing it isn't the goal and I will make every effort to note how it can be done in other programs. If it ever comes across as a sales pitch, call me on it.

Fishing For Photons

That was a lot of history and background. Hopefully, some found it entertaining and I wanted to put it out there as it often helps to know where someone is coming from, especially in on-line communication. I'm a scientist and engineer and so I approach things from a different perspective than some. You'll at least now know my perspective as I write these columns.

The big question now is, "What's this column going to be about?" One big theme will be trying to understand how imaging works so that we can get the best possible pictures. I'll leave ideas of composition, framing, etc. to those like Warren Keller who understand these issues better and focus on some of the technical bits. The first few entries, for example, will cover the concept of signal to noise as it's fundamental to what we do. After that, I have a number of ideas in the queue, some of which are expanded versions of a [blog I've been doing for awhile](#). Some entries will be technical, others practical, and we'll hit things like gear reviews as well.

What I'd really like, though, is to get ideas and feedback from the readers (assuming there are any!) This means both sending me thoughts and questions for future columns and participating in the forums here. One of the things I love about Cloudy Nights here is the collection of forums and the fact that there's one dedicated to discussing articles and reviews put up here. Find something I said confusing? Put a post up there! Think I totally botched something (and yes, at times I will)? Put up a post and set the record straight.

Cloudy Nights is a wonderful community and I'm incredibly happy to be here. I'd like to close by giving a heartfelt thanks to Mike Bieler for making all of this possible.

Clear skies!

Craig

