# Computers are Bullshit

What do I mean when I say "computer"? What does anyone mean? Historically, a computer is a thing that Mostly what we actually want "computer tech" for is not computation at all.

Let us for a moment ignore how computers work at the physical level today and look at what user experience they create that is most useful. Mostly what we want "computers" for today is communication of various kinds. We want to communicate with people, and with various sources of data aggregated from people as well as from physical data. The "data" people create is mostly movements and interactions with various objects that exist on the disply.

What would be a reasonable ab initio approach to solving this problem with free hardware? What might such a system look like? First of all, it should not need to do anything when no events are happening and it's not being reprogrammed. By default it should have a visible display that can sit indefinitely without needing any energy or information to travel anywhere. And as things happen it should only power up as needed for that actual thing to happen. For example, if a user moves their hand along a touch sensitive display to drag an icon they see on the screen, and all that does is change the position of the icon, then all that should physically happen is that the pixels change to move where the icon is displayed. If a tap on the icon is detected, the computational ability should exist IN THE DISPLAY to start the event that should happen when that icon gets touched.

Integral parts of our technology are fractal plumbing in thermoplastics which can carry liquids, high voltages and high current, so the display and response will all be built into that. This can mean various inks and dies are pumped around in pixels, pools, lines, etc. There is no reason to be restricted to pixels on a grid, given the fact that everything can be edited after the fact and can be custom for whatever system is being run. Pressure sensors and capacitor sensors can both be used for touch sensitivity, which physically computes with various capacitor charges, moving liquids, etc to make events happen. What events? Physical events, everything is physical: icons, programs, files, directories, sensors, displays.

This whole picture is much more physical than the computer of today. And not surprisingly it's much less heirerarchial. I believe that today's computers represent the deep underlying philosophical and religious beliefs of their creators. The ONE clock that the whole processor runs off is a representation of the One God of monotheism. The belief in a all powerful source of authority from which all authority descends along a long, uniform, rigid heirarchy is at the heart of the type of protestantism that spawned the industrial revolution which led through continuous innovation to the computer revolution. I argue that the creators of technology have been in such a rush since the begining of the protestant military capitalist empires that no one has had time to catch their breath and think things through, and that if we did we'd end up with some much better technology.

This clock talk may sound like paranoid ramblings, but it's not just abstract religious philosophy, it's very much practical applied natural philosophy. I want technology that doesn't do anything unless an event happens, like a finger tap on a screen or high wind detected that a drone needs to rise into the air to grab energy from. So each event should have its own clock. Clocks are replaced by transients. The whole way computations happen is propagation of event signals along various electrical and fluid channels. This also means it's easy for information to flow along diverse channels. This type of computation thus does not distinguish between materials, energy, and information. Information is physical and all physical objects are information.

Programming and building are thus no longer separate. Cutting channels, building chemical factories, setting up voltage sources, setting what high voltage layers go where--all of these things are programming and also building. Memory should be physical, computation should be physical.

An essential component to this type of computational system is the ability to write physical programs in a way that is as easy or preferably much easier than in the existing ways people write "software". Note also that with software and hardware no longer separated and with "compuation"(a term that should be made obsolete by dissolving the artificial barriers between computation and other physical processes) always focused on a specific application, that programmers/users don't need to learn a general language anymore. From what I can tell this follows the path of mainstream software today: the gmail API is a sepearte thing from a language, and is more important for writing a useful program than knowing java or C or whatever. If you specialize in building shitter pipes, you will know all the ins and outs of biological fluid computation/processing to use different types of microorganism to break down waste and turn it into valueable materials, then package those materials into products to be used(mostly fertilizer for growing more food and other materials.) You won't need to be an expert on displays, just know enough to get your display to interact with the shitter pipe compilers. This display will be optimized for working in waste collection areas, while wearing gloves.

Visualization of data should be physical. Right now analog information gets digitized, various digital computations happen to the numbers, then a graph is sent to a display. I imagine most data visualization in our system to be much more direct. Hardware is coded in such a way, for instance, that a physical variable as a function of time for one second after a button press is shown as a line plot on a screen. That is a physical connection: the position of some colored fluids just below a transparrent surface of the display is physically determined by the variable. Almost all programming ends up being a series of transducer events, where one type of physical information is turned into another.

Most of what we actually *want* computers to do does not require speed or complicated math. With various exceptions we mostly give up on both of these, and suddenly building computers which can be used by the masses for their actual needs out of junk cars, sticks, mud and poop, sounds much easier. Many "computers" will run very slowly, and have very few events. A slow and simple stream of information might flow from the world to the Machine in the form of occasional flooding of a low lying bit of land that drains through a energy catch. That energy is then used to do a scout mission of the area for new trash to collect. If good stuff is found, energy gets saved up for as long as it takes, and freight is put on a long range courier droid that starts slowly off in some direction set by its code, getting energy as it finds it(event driven physical compuations happend when energy is found), and eventually ends up getting reused in the population center where it ends, starting a event for a human to send a signal to reprogram the remote droid base or not. A computer will look a lot more like a tree, and indeed it will often make sense for large parts of a computer to be alive. In a fluid computer, simple things like snails for cleaning can be very useful at setting up a working process.

And of course if everthing we do is seen as a type of physical computation this must also include growing food. The distinction between some sort of food growing pod that gets nutrients from material lines and "computation" in terms of looking at data or whatever will dissolve. A lot of math that happens now, not just with money but with all kinds of measuremetns will dissappear, replaced by direct physical graphical computation.

I want to take a look at how physical computing applies to robots. Consider a robot that is designed to carry small payloads up a small stream. The stream is not navigable for a boat, and is just a few inches deep and a few feet wide. But it goes for many miles, and it's easy for a hopping rolling or walking machine to move along

the land next to the stream. A robot like this has a physical program that after a start event on water configures itself to sit on the bank and spin in the current until a capacitor is charged. On event of full charging, it will roll itself uphill or downhill, with sensors physically programmed to guide it along the creek. If both stuck and lost, it can call for help and have clearly displayed zero energy instructions on how someone can drag it back to a creek and what its mission is. The octohedral rolling droid might be a form factor for the body of this kind of robot. This thing moves slowly, and doesn't do very many things. With the right hardware components it's easy for a novice to assemble the *hardware* which makes this behave as if it has the right software. Because the whole things is free, and simple, and easy to make using the same technology this csn be scaled way up, making a constant flow of robots up and down the stream moving small parts around. One scenario might be to have a rumble of them head up or down stream to anohter settlement to distribute coils, magnets, or other small elements to build up the trash wizard technology over time in new places. This might be a sort of seed pod for the philosophy engine, where the rolling droid has the book encoded on it, and maybe in some cases a proper bound hard cover, but it can also be summmoned by a reader of The Book who joins a value circle and is mastering trash wizardry from scratch.

This whole scenario, duplicated and mutated over and over, is how anarchist infrastructure is built up. There no longer are any "computers" or "software", or "robots". There is just technology and life, which are intermingled, and which process information energy and materials all as flows through itself, modified by physical programs edited by humans controlling displays that control physical matter.

# The Science I walked Away from

The way I’ve experienced science is totally unrelated to how I might have expected it to be based on what I learned in school growing up. When I look back at the whole thing as I’ve seen it, I see it as a rotten institution that I want to have nothing more to do with.

How was I brought up to think it worked based on crap you learn in school and in books? Curiosity draws the scientist toward some question about how the world works. Based on existing science knowledge, a hypothesis is formed, and based on scientific skills an experiment is designed to verify or falsify that hypothesis. Now, with as much objectivity as possible, the researcher carries out the experiment, analyzes the data, and if needed adds some change to the body of what we call knowledge. Then, based on greater knowledge, this all repeats. All this is glorious and good. If it’s not obvious how great it is, just look at all that great stuff it makes! Antibiotics! Refrigeration! Nuclear energy! The future is glorious, and it’s just a natural side effect that this glory reflects on the scientist. This is as it should be! Scientists, almost by accident, since they’re driven totally by pure curiosity, happen to produce the raw materials for an infinitely expanding and glorious future.

Obviously my views have changed, based on what I’ve seen.

Let’s take a look at how my career would have worked had I continued. I started physics in high school, loved it, wanted to know more, and studied it in college, along with math. Note that every step of this was influenced by science fiction. I got sucked into physics and math in middle school because we wanted to understand how someone could build a TARDIS as seen in Dr. Who. Then in high school, I watched Star Trek, where we learn that the natural next step in science is some kind of application of general relativity and quantum mechanics to

understand space time well enough to manipulate it, as in Dr. Who. We see a future where hundreds of years in the future Einstein and Hawking are both considered important enough that the crew of a space ship play poker with them in their spare time.

Then I got to college and found out what the science is like that the people who claim to have “gotten Einstein’s office” do. In short, it sucks. High energy physics has done nothing useful in decades, either for technology or for understanding how the world really works. And it’s structured in GIANT hierarchies where almost everyone is a tiny cog in a giant machine. Most likely in that field you will work on something that is engineering, math or management and not science at all in any classic sense of curiosity driven research. And then, after decades of hard work, you will get some result that is useless to society and the rest of science. All the while watching your funding slowly diminish in real dollars and crush the culture of your field. So, fuck that. Most of the people I went to college with who wanted to do that stuff as freshman figured out otherwise after a couple years or so. Most of us found that much more interesting work is happening in atomic physics, nuclear physics, biophysics, and solid state physics, or just left altogether.

But then as an undergrad I was exposed to yet another sci fi world that changed everything. I read the Diamond Age by Neal Stephenson, and my whole view changed. In that book, while dystopian in some ways, there is still a glorious and shiny future available for those who apply physics correctly. That world was based on “molecular nanotechnology” as described in the 80s and 90s by K. Erik Drexler, Ralph Merkle etc. I *believed* in that! I was totally obsessed. I believed I would one day become an immortal planet sized being wandering the universe studying physics if I could just be there when the big breakthrough happened. That drew me to nano physics/”condensed matter”, and I worked in a top lab at Berkeley for the year in that field after I finished undergrad there.

That was super fun, I learned a ton, and it really was a plugged in lab. Great funding, great facilities, everyone went on to get top jobs, our advisor was super famous etc. And it led smoothly to another research position based on where I was living the next year, at a top lab at Yale, also in nano physics.of sorts. That led to a phd, and before graduating I had a job lined up based on connections from that lab. I ended up going to work for someone whose phd adviser got his phd under the professor who my phd advisor did his post doc under. I moved fields slightly but ended up back in a field that overlapped with my phd advisor’s phd advisor from caltech. My point is that this whole process is very much a “family affair”: once you’re in the inner circle of elite science you tend to move around in it based on personal/professional relationships, not based on the science itself.

To be clear, let me go back to the idealized picture from my youth. I would have imagined something like this: I’m curious about how electricity moves through various materials, so I pick some material that is particularly interesting, dive in, and hope that it turns out to yield fruit. Nope. What you work on as a professional scientist is more of a tribal identity than a question that occurred to you based on looking at the world as you find it around you. Now the caveat to that is you never want to compete directly with your advisor after moving on in your career, because it’s essential that they support you and that goes against that. Also they have a head start by many years so it’s not a good idea. So typically what one does is move to a slightly separate sub-tribe for the post doc than you did for the phd. That’s what I did. So then, the next step would have been to apply for a “real job” as a faculty member, based on some ambitious hybrid of those main sub-tribes I was exposed to. Maybe throw in some twist to that that makes it my own, some slightly “new” idea, usually one that’s already around that you know will work, but that is not being pushed at the moment. It also helps to blend in something fashionable(the role of fads and fashions in science is about 10 more long blog posts so I’ll try not to go into that here).

And where would that leave me? What questions would I be answering if I did that? In my view, none. The main "question" if you want to call it that, from my old field is "can the United States government successfully build a quantum computer to break codes?" That is the central question that all work in my old field feeds into. People find side questions along the way, but in the end that's where all the money and power are and if you're not pushing that objective along, you'll lose out on both and become irrelevant or unemployed. And what exactly does this work involve? Are we building a computer that you can actually use? No. Are we learning how the universe works? No, quantum mechanics is not being changed by this work, the theory stands as it has for decades in terms of its basic structure and how it explains things like atoms.

What it is, in fact, is a sort of stunt based extreme sport. Just as in skateboarding you're constantly pushing to ollie over a bigger object, spin the board more times in a kick flip, or get a higher air on a vert ramp, the modern "scientist" is usually trying to demonstrate some sort of epically extreme "trick" with a better score than their predecessor. In the case of quantum information "science", this means longer coherence time qubits, better control, more gates, scaling up the systems, etc. As in any extreme sport, you get points for style: even if your coherence time is not much better than other groups, if you do it in some super macho bad ass way, you still get props at the conferences, which lead back to more money and respect.

But what if I just want to build a microprocessor out of mud and soot? My background in solid state physics should set me up for that. It appears that it should be doable. Even if it's huge and slow, doing fab without the current fab infrastructure would be huge for society, and it's frankly more scientifically interesting to study dirt and soot than some fancy bullshit. But that's not "serious". If you study what is effectively dirt, but do it in a way with a lot of expensive equipment and trendy materials(e.g. graphene!) it's called science and you can still play with the big kids. But if you simply grab some random dirt and start playing with it and measuring it with a 20 dollar Arduino board, you've gone rogue, become a kook. And theory is even worse. Theorists not only have no interest in helping society solve real problems or studying the world around them in a way that might possibly be related to curiosity, they won't even help experimentalists solve problems that would get money and power if they were solved in the applied or experimental parts of science. They can only work on stuff that's so obscure that only another theorist can do it, because that's how you get money and power within theory. So inevitably this leads to a sort of academic wankery event horizon where at the worst you have string theorists totally disconnected from any kind of reality or experiment or society at large, doing useless math no one but them can understand and expecting the rest of the world to take them seriously as the purveyors of the Ultimate Truth.

I'm going to cut this short now and do something else, but in short here is what I've come to believe. Science as a world view and science as an institution act like a religion, is less useful all the time, is not fun to do, is a net negative for society, and generally is just a huge bummer. I'm not sure what to call this thing I'm trying to do now, but it's not that. Fuck science.

# Transistors etc.

In order to have the feedback I want for this motor, I need some form of transistor. Right now I'm using FETs, which cost a few cents. More specifically I use the IRLML0060TRPBF which go from $0.50 for one to down to about 0.16 in bulk at least from digikey, so probably well under 10 cents buying from

China directly. So in terms of the bill of materials cost it's basically ok for now, but this is really not ideal for the overall long term plan. I want zero money involved in the production, and I know of no way to get transistors in bulk without money or a fab facility at this time.

My plan has always been to harvest electronics from trash, hopefully from old smashed up cars. But I don't like the scalability of this for transistors. A car definitely has some transistors in it, but the labor involved in getting them out and the number per car are such that I think it will never compete with scrounging up some money and buying them. Microprocessors are a different story, but I think for transistors scavenging them as discrete components is unlikely to be cost effective in most cases. Older electronics might have enough that it makes sense, but the failure rate and lousy characteristics may also make that not worth it.

So where does that leave me? I'm really not ok with buying transistors, but I need transistors. I could use something electromechanical, the way brushed DC motors do, effectively making a mechanical transistor(also known as a switch) with the brushes. But that has obvious drawbacks I want to avoid involving wearing and precision. So I think what this all points to is fabrication. I have to actually get into fabrication. I have about 12 years of microfabrication experience, and my phd involved some pretty hard fab, so it's hardly surprising that I'm ending up here.

What does that mean? Am I going to go buy a mask aligner, RIE, sputter machines, etc? No. Actually, HELL no. What I want is fabrication technology targeting discrete transistors which can be made with no special tools from trash. I know that sounds crazy but I don't believe it is. Essentially I think some form of organic electronics will be able to satisfy this. I think it should be possible using compounds found in the waste streams I'm using anyway to get the kinds of behavior I need for an FET. I've been looking through the literature and asking friends over the last few months, and it's clear that this problem is not being worked on in the way I want to because my figures of merit are different. To people working in the capitalist economy, billion dollar fab lines are already sunk cost. If you design a new part that uses the existing fab line, or better yet one a couple generations back, the added cost for another transistor is close to zero. So you only veer off from that when you get something OTHER than cost or simplicity in return: ultra low noise, low power consumption, speed, etc.

Basically what I want is fab from soot. Soot is everywhere. We breathe it and it sucks. But what is in soot is a incredible zoo of interesting carbon structures. Bucky horns, onions, tubes, sheets, etc. have all been seen. I remember seeing a somewhat alarming thesis years ago from MIT where the student had taken images of the soot found on the roof of the building in Cambridge. Basically every weird looking carbon shape in the literature is right there in the air every Bostonian breathes(someone in Beijing should repeat this for even more horrifying results). Also, soot should have all too many polycyclic aromatic hydrocarbons. Found here: https://en.wikipedia.org/wiki/Polycyclic_aromatic_hydrocarbon (https://en.wikipedia.org/wiki/Polycyclic_aromatic_hydrocarbon)

As noted on the page they're pretty nasty poison but they're everywhere and we're stuck with them so I view that as free.

Although it's been almost 15 years since I was in the carbon nanotechnology world, I've been trying to keep an eye on that stuff over the years, and from what I can tell the nanotube and graphene stuff remains pretty bad. On the other hand, the organic electronics work with smaller fragments of graphite, with various other atoms around on the edges(e.g. PAH's), seem to be actually turning into technology. I've been trying to dig into that literature to some very limited extent and I think that's where this will go. To do that I'll probably need both a

chemist and a transport expert as collaborators. But I'm pretty sure this is where my research is going to end up. It involves all the threads I've worked on in my physics career and I really do need it for the motor to be really free.

When I quit mainstream physics to do sex toys I thought it was so drastic, but it looks like I'm going to end up being a solid state physicist eventually after all. Maybe. It's all just talk now, but given a few more months I think I'll have solved the other main problems and this will be the main hard part of making "really free" technology.