



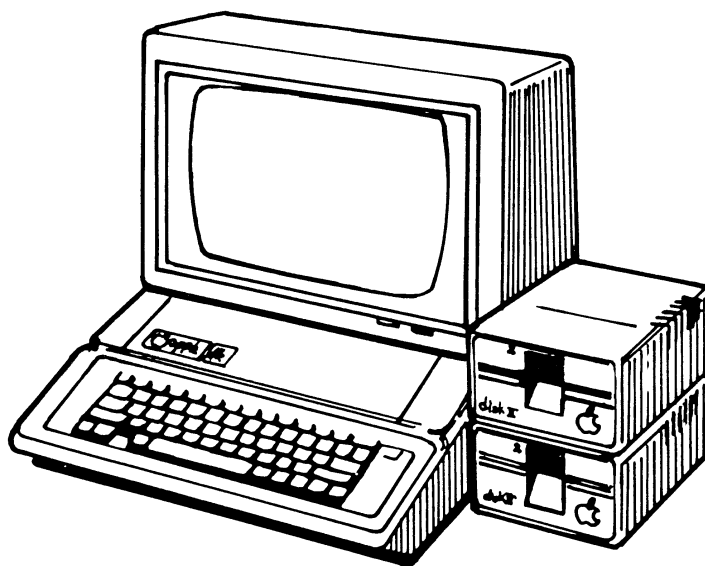
Apple II Computer Information

Steve Wozniak Unbound

SlashDot Interview

07 January 2000

<http://slashdot.org/interviews/00/01/07/1124211.shtml>
29 October 2004



Posted by Roblino on Fri Jan 07, '00 12:00 PM from the don't-hurt-your-back-bowing dept.

I personally consider Steve Wozniak the biggest "star" we've ever interviewed on Slashdot. I was s-o-o happy when he agreed to do this interview that you wouldn't believe it. Many excellent questions for him were submitted Monday. Click below to read answers to the 11 questions we felt best represented the hundreds y'all sent in.

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(1)
LinuxPPC?

What's your take on the use of LinuxPPC vs. the MacOS? Many people say that Mac hardware is (and always has been) better than x86, but it's been held back by the OS. Do you think that LinuxPPC can change that?

Woz:

Many of the hardware advantages that Apple has is due to it's being more tightly controlled by Apple and in it's being more tightly integrated with the software. That allows Apple to make hardware changes and decisions that are more reliable than in the Wintel world. This has nothing to do with Linux and everything to do with MacOS. The basic plumbing is superior to Intel hardware in some ways (firewire on the motherboard for example) and a bit lacking in others (3D rendering hardware) but the basic performance advantage goes to the RISC architecture of the PowerPC processor. Intel's response to this is that even if RISC is 40% faster, that only amounts to a few months lead, according to Moore's Law.

If you consider attractiveness and other external qualities, you can't find any hardware that comes close to Apple's. That's because even companies like Sony, that truly care about the user experience, can't do much about the internal hardware (buying it from Intel like every other manufacturer). Also, companies like Sony are in competition with many very cutrate prices in a commodity market. The internal hardware supplier can't do much about the external quality either.

LinuxPPC certainly has the capability of improving the hardware efficiency and preventing some very bad things from happening and allowing software to behave in more expectable ways. It's hard to say that a great deal of the buyers are much influenced by these things or we wouldn't have so much successful crap around. The Macintosh market would probably be prime and ready for LinuxPPC but it probably needs more ease of setup. Also, other UNIX variants (Like Mach Ten) are available already and only marginally used by Macintosh owners. The performance of MacOS X Server is already quite incredible, and the [largely] Open Source MacOS X Client is coming in the summer.

(2)
Open-source and free software questions

Do you think open-source and free software is really a revolution or only a hype? How do you think things will become in the software industry in the future with open-source variable inserted in their middle? And do you think this model could lead to a more competitive and less monopolistic market?

Woz:

I definitely think that open-source is a revolution and not hype. I could have chosen to say that it's both.

There have always been people that believed strongly in free software. They are mostly people that have developed something rather good and even sellable, but small and of limited market potential. I support these people. It's little known, but the schematics of the Apple I were actually handed out at the Homebrew Computer Club before we started Apple.

But there are so many large bucks available just to companies that get people using their software because software is like a portal. It's hard to have a clear advantage in getting software widely accepted just because it's free. That's because Microsoft can distribute a lot of good software, like browsers and email clients, for free, making money in less direct ways. The main attraction to open source software may not be it's advantages (price, functionality) but the fact that some people don't want to support the big successful proprietary companies. There's good reason for fear of monopoly stagnation too. Look at ATT. When I was in school there was only one phone in one color. You couldn't buy an answering machine or any of the neat phone stuff that abounds today. ATT was the only phone company and didn't want any change to their guaranteed business due to competition.

(3) Ease of Use vs Level of Control

Apple has long been noted for having the most (or among the most) user friendly stuff around. What do you think of the trade off between ease of use and level of control? Is there a trade off?

Woz:

In a lot of cases there is a trade off here. In the case of applications, Apple primarily appeals to a market that wants things made easy. That means hiding functionality and control. It bothers people like ourselves. But Apple could say that programmers have as much control as they want, but that certainly isn't true of its hardware. The rule is "keep out" and "don't do it unless you are an expert." You won't find much at all in the way that individual techies can design and use their own boards with a Macintosh, the sort of thing that I always wanted to do.

Then again, Apple is the leader (for decades) in providing user interfaces and hardware interfaces that are easy, like plug and play (and install and pray) yet which can do as much anyway. This is the hardest thing to do in software and hardware and only the greatest artists can do it. It takes a mind that keeps searching for a better way that's unknown, and not stopping at the first few working results.

(4)

Did/do average people need a computer?

In the days of the Apple][, did you believe the average American household needed a personal computer? I remember being told that computers could balance your checkbook, keep your schedule and store your recipes and wondering if that was a cost-effective solution for people, or just an expensive, if fascinating toy. It's my impression that it's only now with consumer Internet access that a home computer provides value for most people.

What do you think?

Woz:

Even as a toy, I believed that every home needed a computer. This was even though I thought the computer would remain expensive and small, sans Moore's law. Also I believed it before the first killer app, Visicalc. I believed that people would become programmers and not need companies as much. You can see how laughable that was.

Although I never talked to Steve Jobs directly on this issue, I never heard him predict outright some things that are very obvious today in the internet days. But he was more forward looking and interested in making computers palatable for people and finding ways that computers could help them, not as computers but as tools to balance checkbooks, etc. The Apple][was just a start in gaining acceptance for computers in the home.

In Junior High School I assumed that transistors were being developed so that people could use them in transistor radios. But my father, who worked at Lockheed, corrected me by saying that they, and the early chips, were designed only for the military, and the consumer market just fell out. This bothered me. I was a person after all. I wanted consumer products to drive the chip market. Around 1969, when I could design any mini computer made, I knew that I wanted one for myself. I told my father that someday I'd buy a 4K Nova computer and he said that it cost as much as a small house (in those days). I said I'd live in an apartment then.

By the way, the Data General brochures that I ordered came with one of two posters. One showed a commercial looking rack mounted computer. But the other showed a Nova in a sculpted shape on a glass table. It made a huge impression on me that even commercial looking computers with dozens of techie switches and lights, could go into a home. At least one other person believed this, since Data General had the poster.

Well, when we had the Homebrew Computer Club, we all talked of this revolution in the sense that it was empowering people without the companies owning the computers. A lot of people were planning to buy an Altair kit computer but a few started designing ones. The designs were a mixture of surplus store hobbieist and putting microprocessor into the existing commercial looking boxes, doing the same things, expecting the same plug in boards to do anything useful. I was in a perfect position to conceive of the

computer in a different way, a personal (not commercial) way. First, I believed only in designing products for the average person. That's the exact phrase I always used. It was hard to stick to this thinking when everyone else, in 1975, was going a different way. I thought out what I wanted to do with my own computer and went for it.

I had an advantage in being good at reducing chips. I could conceive of an entire finished usable computer and design it in few enough chips to be practical. My philosophy of fewer chips led me to dynamic RAMs when all the other hobby computers were going with static RAMs. It just took a bit more design work.

But the biggest advantage of all was that I worked in Hewlett Packard's calculator division. Our calculators were basically computers, yet they were totally human and usable by normal people. They didn't have binary switches to toggle and boot up procedures from a teletype. They had a small amount of code in ROMS (under 1K 10-bit words in the HP 35) and a human keyboard. The ROM program merely watched the keys and responded to whatever key was depressed. So it was quite obvious for me to think of the keyboard and some ROM as integral parts of the computer. From there it's easy to see it in normal people's hands, whereas all the other commercial looking machines had no chance except in the hands of techies.

(5)

What would an Apple II 2000 look like?

The Apple II was the original "geek dream machine." I mean, the Apple][+ we got back in 1982 or so came with schematics! Talk about an open system!

Pretend that Apple (or some other company) came to you and asked you to design a PC that would "fill the shoes" of the Apple II line. What do you think you'd put in it?

From reading your website, I know you're pretty pro-Macintosh... is that the ultimate in what you'd want to see in a personal computer, or would you do some things differently? Where, do you think, that current PC's (not meaning just WinTel machines) reflect the philosophy of the Apple II, and what do you think they have missed?

Woz:

First, my thoughts on what a modern computer would be can't be superior to anyone else's. But, in the light of the Apple][, I'd choose the best processor that I could in terms of package size, performance, integrated I/O, number of leads, etc. I'd prefer unseen advantages under the hood, like RISC architecture. I'd design a board with very few chips that did a lot. The display would clearly be VGA and only standard ports would make sense. This is different than with the Apple][. But the computer would have very few chips and would have high level languages and low level debugging and coding support too. I would try to offer high level GUI ability in the high level language. The schematics and all the code would come with the machine and would be open source (unless someone like Steve Jobs convinced me to sell

it). I would treat the most important aspect of this machine as it's being an example to others of ways to design and code. There are a lot of people that want to learn in this way, on their own. Sometimes it's their desire, sometimes they can't find other sources easily. I'd also try to write some articles with small examples for others to learn from.

(6) Teaching the children

Do you feel that operating systems such as Linux/*BSD are a viable option for teaching those children who have no previous experience with a computer? Certainly the cost factor would be a great motivation for choosing these over other operating systems. It seems to me that it is more difficult to train those who are set in one GUI than those who have no previous experience whatsoever. I really have an interest in this kind of community service and felt that someone like you with experience (and albeit alot more money ;) could provide some insight and advice.

Woz: I think that the greatest need of children is to use computers to help do their homework and to make it look good. They are basically using apps and not an OS.

I personally think that our schools should change and teach real computer science from 5th grade on. You don't need higher level math or calculus or biology to start learning logic design. In this regard, Linux or BSD or even other UNIX variants, or simpler microprocessor Operating Systems, would be required in order to have a greater understanding of the machine and it's innards.

(7) The Steves

What advice can you give the new innovators? As someone who would like to start a company, I can't help but notice that most truly innovative companies tend to boom then bust, either fading slowly into obscurity or being assimilated by some larger company.

Do you have any ideas for avoiding this fate? Is the only alternative to make some money and become a predatory company yourself? Or, alternatively, is this the eventual unavoidable fate of all idea-driven companies (Netscape, SGI, Apple, etc)? Or, to sum up the question: Can an Apple ever defeat a Microsoft?

Woz:

Apple made too many marketing mistakes early on. These were hard to see because we were extremely successful anyway. But we really went from first to second in the early 80's. It wasn't to Microsoft, it was to IBM PC's (and all the clones). Only recently did the world find out that Microsoft was a

sleeper and was really in first place. Software made the bigger difference in computers and was what really changed the world more than hardware.

As a computer supplier, Apple is still huge. Our recent model computers still have the greatest market share of any manufacturer. So we must be doing something right. Apple is the only manufacture that is still in control of its future and changing computers and advancing the world and leaving the past behind. Every other one is a slave to Intel and Microsoft and competitive prices that don't allow for much R&D. They are the ones that have been assimilated. I'd rather be Apple. I believe that Apple's turn around is just starting. But it's not a matter of 'defeating' Microsoft. It's only a matter of building the best stuff we can. If Microsoft creates such good things they should be successful too. But there's always the luck of the right approach, even though no successful company will admit it.

(8)

Have you played with the BeOS?

Have you ever had a chance to play around with the Be operating system? Since its developers were part of the Apple culture, I thought I might find a blurb or two on your page. What sort of advice would you offer Gasee? Is the proprietary aspect an albatross (should they opensource the OS and concentrate on apps)? Are they trying to get into the game too late?

Woz:

I have one and always wanted to play with it but just don't have the time yet. I like interesting people that can make your work fun, and Jean Louis is like that. But he had the same proprietary thinking that almost all key Apple execs shared, including the avoidance of licensing the software. BeOS would need something very special to rise above the noise, with Linux and open-source being so popular.

(9)

Garage Development

Once upon a time, garage developers were considered the mainstay of the computer industry. Later, either you or S. Jobs said that the days of garage developers was over, forever. Later still, the Open Source model rewoke the Garage Developer philosophy with a jolt. (Or a Mountain Dew, depending on taste.)

Today, do you feel that garage development still has a place in Computing? And, if so, would it be in software, hardware or both?

Woz:

There were a couple of factors that helped a garage startup succeed in the late 70's. Before that time, computers were physically quite large and expensive and were developed by large teams. Now computer projects, even

games, are worth so much \$ that they are developed by large teams. Around 1975 and 1975 there was a window in which a person or two could develop a good complete computer.

Also, in the early days the computers weren't really personal computers, they were hobby computer kits. You would typically build them yourself and had to operate them at the binary switch level. It was more like ham radio than today's computers. Many big computer companies predicted no future for this hobby market. That's because all their market research was among existing computer customers, those buying the big \$M machines. Those customers had no need for a 4K machine that could only run BASIC. But the market research didn't touch on non-computer users like dentists and schoolteachers and kids. So they missed the boat. Apple tried to rise above the hobby type machine and approach homes with a 'personal' computer. Only then did analysts and computer companies start to see things in a different light.

Today, look how many successful startups there are. These often come from a couple of young people with good ideas and not a huge amount of money. I'm on the Board of one such company now. So it must be happening all over the place, just one step above a garage. It's hard to happen in the garage, because the Apple story is not forgotten. A lot of investors missed out and want to jump at anything having to do with computers that looks like it might succeed. So a couple of people like myself and Steve Jobs would be consumed very quickly today, unless we almost deliberately remained hidden or found a perfect investor like Mike Markkula.

Now that I think about it, we had to grow out of the garage to build more than a couple of hundred computers. So today, many that get funded for a startup really developed something in their homes, in their garages to speak, anyway.

(10) Idealism today

You seem to be one of the most "purely" idealistic people in this industry. (i.e. RMS is idealistic in the sense he wants to push GNU, you are idealistic in that you just want to help kids get a leg up and generally be An All-Around Good Guy.)

Do you ever look at the industry and get depressed over what's it's become with companies with virtually no product and running deep in the red but who have "e-" or "dot-com" in their names pulling off ridiculously huge IPOs, companies patenting obviously unpatentable concepts and ideas apparently for the express purpose of suing the pants off of competitors instead of competing with the quality of their products, companies like Microsoft going beyond the boundaries of the law and way, way beyond the boundaries of ethical behaviour to get a step up on the competition, the industry lobbying government to pass laws that would create an entirely unregulated industry, including things like legislation that would legally disavow software companies of any responsibility for creating shoddy products that don't even do what the box says they will do, employees floating with a company just

long enough to vest and then bailing out without a backwards glance so they can go to The Next Big IPO, etc, etc, etc.

What do you look at in this industry to remind yourself that computers and the computer industry can actually help make the world a better place?

Woz:

That's a lot of questions. I don't get depressed at all over anything. I do happen to think that companies that look like the big dot-coms of the future deserve their successful IPO's. I guess that they sort of sell out early to finance their guaranteed dominance. Investors take advantage of this too, knowing that the IPO financing will guarantee that these startups don't lose their early lead. Many see this as a situation where the great wealth being made is being lost somewhere else but I don't. I see it as truly new wealth that's being created due mainly to an accelerated economic system. Regardless, this wealth gets trickled down to all of us to some extent. Eventually, it all gets distributed. As the wealthy approach death, estate taxes will be due. Any large amounts of funds have to be transferred into foundations whose purpose is to distribute them to tax free organizations. Otherwise the government gets half the money. It's just the only efficient way to go. It's in the tax laws.

Some patents are for truly clever things but some are for simple things that every single person would think of if there was a need for it. Wealthy companies patent such things early, when these things are not yet viable, when they are too expensive to market. For example, I used a chip in the Apple][called a character generator to convert characters to dots that could be displayed on a CRT or TV. It turned out that RCA had patented it back when almost nobody could have afforded to put characters on a CRT. Such a simple concept does not help us respect the patent system.

I truly wish that companies would be liable to consumers for products that don't do what the consumer reasonably expected, or that don't include the sort of service that the consumers reasonable expected. I'd like more truth in advertising. I'd like speedy remedies for people that are injured. We need regulation in a lot of technological industries, including cellular phones. Not in order to keep prices low, but to assure that powerless people have recourse and can get things corrected. Most of all, companies should be required to give straight answers. Too many ISP's and phone companies and computer companies and software companies and hardware companies dodge helping in order to save costs. Only a few are very good, and they don't always remain that way. I'd much rather that another person be honest with me than that they sell me something at a good price. This industry will provide service as cheaply as possible due to competitive factors that can only be overcome by regulation.

(11)
The Future of Education

From what I've read, you are very involved with children and their education and technology seems to play a major role in the basis of that education. Personally, I think that next to being loved adequately, education is the most important factor in a developing child's life. In America we seem to take education for granted and are very far behind other countries in regard to the quality of the education that our children receive. Technology in general and more specifically, computers and the Internet, are fantastic tools with a great potential for drastically improving education.

My question: How do you see education making better use of technology and technology making education better?

Woz:

Personal love is certainly the most important thing. To some extent, a teacher offers this, but only to each student 1/30 of the time. 30 computers could become like 30 teachers, but they have to become as personal as possible. They need realistic graphics like games have. They need realistic sounds. They should be voice operated, especially since very early elementary students can't type well. Every time a computer program gets more human-like, it attracts better student attention. But the software needs to be many times as deep as it is today in terms of a personality. It needs to be more like a real person, with many ways to present the same subject, backtracking intelligently, even to the far past, following a student through years of education. The programs should tell lots of jokes as well, and play occasional games too. Today the class presentation is fixed. Each student hears the same presentation in the same time frame. Then a test is given and the variable is the grade. But with 30 teachers, the presentation can be variable, with students going at different speeds in different courses. The student can pick their grade in advance, with the grade now being fixed.

It's too hard to predict that schools will disappear as rapidly as many stores and newspapers and other things of the physical world. Schools currently serve as a parking place for the kids during the day and, even when everything is available at home on the web, parents will still want their kids in a socially healthier environment during the day.

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