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The Homebrew Computer Club was a hobbyist group in the San Francisco Bay Area dedicated to helping people build their own home personal computers. I analyze their writings between 1975 and 1977, in order to understand how their values became embedded in the technology they built, establishing how the personal computer should be used and thought of. These values were based in ideals of open information, access to computers, and the computer as a universal tool, while also allowing for development of entrepreneurial ambitions to market the computer as a consumer product.

With the development of the personal computer in the mid to late 1970s, the idea of what computers were good for changed. The computer entered the home in numbers not previously possible. In doing so, it became a device that was, at different times, useful, friendly, fun, complicated, scary, customizable, and off-the-shelf. Hobbyists drove a significant portion of the early development of personal computers, seeking to use computers in their own homes for their own individual desires. They built the kit machines sold by companies, such as Micro Instrumentation and Telemetry Systems (MITS), an electronics kit manufacturer out of Albuquerque, New Mexico, that released the Altair 8800, the most well-known kit computer. Hobbyists also designed and constructed their own computers from scratch using parts from various sources. The uses these machines were put to were various and creative, although limited by hardware and software capabilities of the time. Some early experiments in home computing would lead to the first personal computer start-ups—most of which failed, but others, such as Apple Computer, would find success in the dawning personal computer industry.

Perhaps the most well-known hobbyist community was the Homebrew Computer Club
in Menlo Park, California, featuring a number of noteworthy members in the arena of early personal computer development whose work spawned approximately two dozen start-up companies. Their meetings attracted hundreds of attendees and they published a newsletter that reached more than 1000 readers. Its location at the heart of Silicon Valley placed it at the center of computer technology research. At a time just before the personal computer was a mass-market technology, there was not yet a home market and hobbyists were among the few users of computers at home. A goal for many of them was to help bring computers to a larger public audience, demystify the technology, and make it easier to acquire. Until the market grew, however, hobbyists built computers for themselves, and the computer developer and user were the same person. They and their peers determined what was desired from computer technology and to what uses it might be put. The hobbyists straddled lines between free information and capitalist endeavors, ease of use and technical complexity, and imagined potentials and built realities.

I examined the Homebrew hobbyists’ writings published in the club newsletter from 1975 to 1977. I found that four rough themes emerged about the technology they built: their personal desires as users, practical concerns as hobbyists, influences and dynamics of this specific hobbyist community, and community values rooted largely in the counterculture and hackers. I examined how the Homebrew hobbyists articulated what they were doing with computer technology, what they thought personal computers might be good for, how they envisioned the computer as a mainstream technology, and what values they embedded in their machines. In doing so, I revealed their place in a continuation of ideals from university hackers and the counterculture, to the transformation of social life with the personal computer and, later, the internet. I found that the Homebrew hobbyists were self-aware of their place in this history, as they explicitly sought out the rapid growth of computer technology into people’s homes and lives, by building their own computers that reflected their desires, encouraging the formation of a personal computer market, and participating in that market as consumers and entrepreneurial developers. This study adds a layer of nuance to the existing narrative of hobbyist computing histories by showing the diversity of values held by Homebrew members, making the club a place where the same technology could be the subject of arguments for the free sharing of information, valuing of individual technical achievements and teaching of others, and creation of companies that sold the products developed from Homebrew meetings.

Several works have traced values that influenced early personal computer developers. The role of hackers’ ideals were laid out by Stephen Levy in his popular history, Hackers: Heroes of the Computer Revolution, in what he calls the Hacker Ethic:

» Access to computers. ... should be unlimited and total.
» All information should be free.
» Mistrust Authority—Promote Decentralization.
» Hackers should be judged by their hacking, not bogus criteria, such as degrees, age, race, or position.
» You can create art and beauty on a computer.
» Computers can change your life for the better.

Levy argued that these values were behind the work of the first hackers, who, in universities in the 1960s, developed notions of time-sharing as an initial conceptualization of the idea of the personal computer. Some of these hackers then became personal computer creators of the late 1970s, and their values continued to influence the computers they built. They were carried through, often implicitly, by many of the Homebrew hobbyists, notably with the emphasis on free information, technical creativity, and support of access to computers.

In his book, From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism, Fred Turner traces the lineage of values that allowed the personal computer to be seen as a liberating technology. He finds linkages between the ideas of two communities that otherwise might seem dissimilar: the cybernetics theories and
interdisciplinarity of military-backed university research and the society-building New Communalist wing of the counterculture. Bridging these, Stewart Brand’s Whole Earth network offered a place for those interested in technology, tinkering, networking, liberation, and entrepreneurship to come together and “glimpse the possibility of an entirely new world system, one in which American industry supplied tools that could be appropriated for purposes of transformation.”3 With direct connections between themselves and Brand, the Homebrew hobbyists valued individual choice and creativity with computer technology, while working within or creating a computer industry to make the technology more accessible. John Markoff similarly shows how countercultural influences on hobbyist computing did not preclude entrepreneurship in his book, What the Dormouse Said: How the 60s Counterculture Shaped the Personal Computer Industry. However, he argues for this as a “fundamental tension,” quoting Brand’s well-known saying, “Information wants to be free, and information also wants to be very expensive.”4 The writings of the Homebrew hobbyists demonstrate both interpretations; for some there was a clash between the value of free, open information and the capitalist enterprise of selling computer technology, but for most, both views were held simultaneously. The hobbyists shared with each other, sold to each other, and targeted a larger public at the same time.

Homebrew Members and Meetings

Begun on March 5, 1975 with 32 people meeting in computer programmer Gordon French’s garage and later moving to regular meetings at the Stanford Linear Accelerator Center auditorium, the Homebrew Computer Club was a place for hobbyists to learn about and develop their own machines and software. The club initially was organized by French, Fred Moore (an antiwar activist with interest in computer technology), and Lee Felsenstein (a member of the Free Speech Movement with technical skills). Stephen Wozniak, at the time an engineer for Hewlett-Packard, and his friend at Atari, Steve Jobs, created Apple Computer, while Wozniak sought feedback for his machines at Homebrew meetings. Other notable Homebrew members included Bob Marsh, Adam Osborne, John Draper, Steve Dompier, Marty Spiegel, and Robert Reiling. Bob Albrecht, founder of the People’s Computer Company newsletter, attended the first Homebrew meeting to show his support and demonstrate his Altair 8800, the most sophisticated computer that could be acquired easily at this time. Kit computers, such as the Altair, were not capable of doing much (Moore comments on Albrecht’s machine: “the red LEDs blink and flash nicely”),5 but offered the first real opportunity for technologically-minded people to experiment with computers they owned and could do with as they chose.

The demographics of the club membership encompassed a broad range of ages and technical experience, with little diversity in gender. While fairly balanced across the membership between knowledge of hardware and software, the group encountered differences in experience and education that Moore asked for advice on:

We are composed of outright novices to top flight professionals and leaders in the [computer] industry. Many are somewhere in between. Only a few of us are strong in both hardware and software. It seems to me, we need classes or some more patient and detailed means of conveying information across an ignorance gap, and at the same time not bore the more experienced among us.6

No actual classes were formed within the purview of the meetings, but the disparity in knowledge was a key issue addressed continuously by more informal discussion at meetings, newsletter printings of technical information and instructions, and the opportunity for people with common interests to connect and help each other using the newsletter “Bulletin Board.” The club’s goal of expanding access to computers primarily involved individuals responding to requests for help, not through structured dissemination of knowledge. The club never addressed its lack of gender diversity; women, while implicitly welcomed (through Moore’s use of “his/her” language in
the newsletter, were barely present at meetings. Reading through the newsletter, few overtly female names stand out, although they do appear occasionally in the “Bulletin Board” section. Women clearly were interested in the possibilities for computer technology but were not a notable voice within the club itself.

Homebrew had no formal leadership, although some members wielded more power and influence than others. The newsletter editor often spoke for the club by relating what took place at meetings and what current issues concerned hobbyists. Fred Moore fulfilled the role of editor for the first six months; then it passed to Robert Reiling. While mostly reporting on events happening within the club and outside, the editor, on occasion, did write on beliefs and values. Members were valued explicitly for their abilities and generosity, and the newsletter asked members to contribute any materials they wished to write. The community applauded demonstrations of innovation, efficiency, and competency, as well as for helping others and sharing time or knowledge.

Biweekly Homebrew meetings were structured around two segments: a “mapping” period followed by a “random access period.” During the former, members described to the entire group what they were working on and problems they encountered that someone might be able to help with. During the second period, members interacted in a free-for-all, trading technology and information, or addressing problems. The informality of the group made it a place that emphasized the joy of tinkering with computer technology and helping out likeminded hobbyists. Despite the entrepreneurial leanings of some members, those involved with Homebrew initially were hobbyists, concerned with helping each other achieve the goals they each had for the computers they were developing. Moore emphasized the hobbyist nature of the group in the newsletter:

Yes, a hobby for fun. Interest in home computing is spreading fast. I feel our club is doing a good job in supporting the individual experimenter get his or her system up and flying. ... Bring your beast in for a demo! Can it sing or play games? What tricks does it know? Let’s have a look at it.?

Values of play and encouragement created an environment for the open, sharing of information and creative use of the technology.

The mission of the club was a topic of discussion at the beginning. The second newsletter lists the results of a questionnaire given to members about what they wanted the club to do. These goals included the exchange of information and skills, problem solving, access to hardware and software, bulk buying, and demonstration of work. The results of a follow-up survey a few months later added an emphasis on practical computing, teaching, bringing people into computing, addressing hobbyist-specific obstacles, and to stop assuming everyone was at the same level of ability or knowledge. These concerns over adequate leveling and dissemination of knowledge imply a disparity never completely bridged; as competency was valued, those possessing such skills garnered greater attention than those unable to keep up.

Looking Toward the Revolution

In later interviews, Homebrew members describe an awareness during the mid-1970s of the dawning personal computer revolution. In 1995, Felsenstein used terms, such as “That [first meeting] may have been the moment at which the personal computer became a convivial technology,” referencing Ivan Illich’s notion of convivial tools, a popular book among countercultural-leaning computer hobbyists and Felsenstein, in particular. In 1984, Wozniak discussed an awareness of the coming importance of personal computers: “Everyone attending the club in 1975-76 knew there was a big computer revolution occurring and the rest of the world wasn’t aware of it yet. That’s why there was so much excitement and spirit.” Looking back, these hobbyists recount a grand and meaningful self-awareness of what they were doing, a sense that they were changing the world through the technology they were creating.

While this degree of portentous language is not present in the early years of the newsletter, the group predicted that computer
technology soon would be widespread. One underlying assumption running through the newsletter was the very fact that people wanted computers in their homes. The hobbyists did not see computer technology as a niche interest but as an untapped market. In the first issue, Moore writes: “What will people do with a computer in their home? Well, we asked that question and the variety of responses show that the imagination of people has been underestimated.” A few months later, he continues with: “The evidence is overwhelming the people want computers, probably for self-entertainment and educational usage.” The hobbyists saw themselves as being on the leading edge of a wave of computer use, with the rest of the public sure to follow.

The first Homebrew meeting marked the beginnings of a community dedicated to sharing technological knowledge and demonstrating what could be created with it. The hobbyists made initial decisions about what the club should be focused on (buying in bulk, teaching and technical information, developing needed software), discussed the current state of acquiring necessary parts for building one’s own computer (only six of 32 present had their own system running), and debated the merits of different approaches and standards. At the end of the meeting, a show of generosity that set a precedent for the club to follow, Marty Spergel gave away an Intel 8008 chip for free. At a time when purchasing parts was difficult and expensive this act is remembered as an example of the kind of sharing Homebrew aimed to be about.

At the third meeting on April 16, 1975, a demonstration took place that has been remembered as cementing the club into a community of like-minded people who understood the possibility inherent in the technology they were developing. Steve Dompier discovered that a low frequency radio could pick up sounds generated by interference as his Altair performed different actions. By matching these sounds to musical notes, the computer could generate music through the radio if programmed to perform certain actions at specific times. Dompier chose the Beatles’ “Fool on the Hill” for his first computer-generated song. After conquering various technical problems at the Homebrew meeting, Dompier had his Altair run the music program for the entire club, as he describes in a People’s Computer Company newsletter: “The recital then proceeded with nary a glitch, much to everyone’s delight. (Although during the demanded encore, the machine did break into its own rendition of ‘Daisy’, apparently genetically inherited.)” Referencing the death of HAL in 2001: A Space Odyssey (the computer sings “Daisy” as its higher cognitive functions are destroyed), Dompier also chose “Daisy” for his Altair’s second song because it is regarded as the first song ever to play on a computer, at Bell Labs during the early 1960s. Touching upon a dream shared by members, the singing Altair showed that computer technology was capable of achieving seemingly any goal to which people could imagine putting it, and that Homebrew hobbyists were a part of the legacy of computer innovation.

Homebrew grew quickly from its initial 32 members; people were excited about computers and wanted to learn more. After six months, club attendance was nearing 100, with newsletter distribution at almost 300. Another survey was conducted at the June 9, 1976 meeting; 250 attended, of whom 101 had computers running. The attendance numbers appear to have peaked around 300 to 400, but the percentage with computers increased as did the number of people reading the newsletter. Of the 240 present at the January 19, 1977 meeting, 182 had their own computer running, while newsletter distribution was at 1500. At the 1-year anniversary of Homebrew, Robert Reiling suggested reasons for its quick growth:

Currently, no single source really covers the information needed by the computer hobbyist. The Homebrew Computer Club is a meeting place where every two weeks, if one desires, he can meet and talk with someone with a common interest. New things may be learned and problems can be solved.

The ability for every member to be involved in sharing what they knew or problems they had created an atmosphere that hobbyists wanted to contribute to. At the same time, a lack of alternative resources made such an organization a
necessity for people who wanted to work with personal computer technology at the time.

The newsletter reveals few major changes during the first 2 years. After 6 months, Moore left San Francisco and his job as newsletter editor; Reiling replaced him and remained in the position through the rest of this period. John Markoff argued that, in addition to personal relationship troubles, Moore also left Homebrew because of a growing entrepreneurial interest in the club, at odds with his deep-seated anticapitalist and countercultural beliefs in free information. 20 While any such disagreement is not mentioned in the newsletter, the hobbyists’ writings do convey other instances of tension over conflicting values.

**Homebrew Values Expressed and in Conflict**

At the heart of Homebrew values was the open sharing of information, an aspect of the club’s roots in the counterculture and computer hackers. Members offered their new or innovative coding or circuitry trick to everyone so that others could appreciate the accomplishment and attempt to improve upon it. Useful schematics were printed regularly in the newsletter or shared at meetings. Likewise, the sharing of software often occurred, although doing so became a point of contention. For these hobbyists, the initial priority was to create working technologies; to do so required collaboration and sharing. It was only as the personal computer market developed that control over innovative knowledge or concerns over copyrighted material increasingly became part of the conversation.

A related core value was helping other hobbyists. Beyond working together at meetings, members also received requests from outside the club, which the newsletter printed so that any member could volunteer aid. For example, in 1975, a high school student from a neighboring town wrote in asking for advice on forming his own club. 21 Letters came from hobbyist organizations abroad as well. Two from South Africa and Italy, in 1976, asked for circuit diagrams to build computer-to-TV connections and information on constructing a home computer without local help, respectively. Following these two letters was a call to members: “Homebrew Computer Club members if you can assist in any way take the time to write these people. Better yet send them some technical material. You can be sure it will be appreciated.” 22 Homebrew encouraged participation in and relationships with other hobbyists and organizations, as a means to spread knowledge and increase the numbers of people involved with home computing.

Although Homebrew in many ways was about sharing and improving access to the computer, the hobbyists also valued technical skill and upheld a kind of do-it-yourself (DIY) ethic. Collaboration was about aiding each other in achieving individual dreams. An article by Ken McGinnis on building a computer keyboard made this DIY mentality explicit: “The advantages of making your own is that you can work on it and change it any time you wish as well as self pride. No keyboard is EXACTLY like YOU want unless you design it.” 23 While members enjoyed helping each other, there was appeal in creating something that fit an individual vision: inventing technology using one’s own skills and abilities, even if those required some assistance, and then being able to show that work off to the club as a whole.

Beyond the personal hobbyist emphasis on technical ability, Homebrew members also sought to bring computer technology to a wider user base and to educate the public about computers. The very fact of operating as a hobbyist club that focused on sharing knowledge and helping each other enabled members to accomplish this ideal of carrying their knowledge and the technology outwards, as Moore writes, “By sharing our experience and exchanging tips we advance the state of the art and make low cost home computing possible for more folks.” 24 As personal computer technology became easier to use and with more possible uses for it, the potential grew for non-experts to want the technology themselves. Beyond hobbyist groups, other organizations also worked to spread the word of home computing. Already existing electronics magazines featured new innovations in microcomputer technology, seen most famously in the January 1975 *Popular Electronics* cover announcement of the Altair 8800. The first issue of *Byte* magazine was released in September 1975, with 94,000 copies printed. 25 Similarly, the launch
of *Dr. Dobbs Journal*—a spin-off from the *People’s Computer Company* newsletter—in January 1976 received a full page announcement in the Homebrew newsletter. Hobbyist clubs were not lone efforts; they advertised each other’s contact information and celebrated the attention of more mainstream discussion of home computer technology. This goal of expanding access to computers was not a vague dream of hobbyist imagination; Homebrew members were aware consciously of a desire for the technology beyond the hobbyist level that was not met by computer manufacturers. Moore explains the problems any potential consumer base faced in acquiring personal computer technology at this time:

Why did the Big Companies miss this market? They were busy selling over-priced machines to each other (and the government and military). They don’t want to sell directly to the public.

With the release of the Altair, hobbyists thought the situation finally might change; its popularity demonstrated the potential of a home computer market:

*I’m all in favor of the splash MITS is having with the Altair because it will do three things: (1) force the awakening of other companies to the demand for low-cost computers for use in the home, which will mean competition, resulting in lower prices just as happened with the hand held calculator. (2) cause local computer clubs and hobby groups to form to fill the technical knowledge vacuum. (3) help demystify computers. Computers are not magic. And it is important for the general public to begin to understand the limits of these machines and that humans are responsible for the programming.*

Homebrew members hoped that the newfound success of kit computers would spur a personal computer market into being, allowing wider public access to the technology so that computers soon might become commonplace and normalized. To do so they would need to become more user-friendly, to no longer be the kinds of kit computers or DIY machines requiring high levels of technical knowledge to operate that the hobbyists were building.

While roughly agreeing on ideals of sharing information and encouraging access to computers, the values toward technology that Homebrew hobbyists held were not without contention and disagreement. In early 1976, a debate ensued between Bill Gates and hobbyists across the United States over software piracy. This debate reflects differences of opinion that were emerging relating to the value of and limitations on freely shared, open information. I draw upon the detailed account of this incident in Kevin Driscoll’s article, “Professional Work for Nothing: Software Commercialization and ‘An Open Letter to Hobbyists,’” while complicating the reaction that often is presented of the Homebrew hobbyists. At this time, a 20-year-old Gates ran the newly founded Micro-Soft, developing BASIC with Paul Allen for use with the Altair. According to MITS and Gates, the overwhelming majority of BASIC users copied the software without paying for it. MITS sent admonishments to hobbyists through their corporate newsletter but, lacking a positive response, felt hobbyists might react more sympathetically to the software programmer himself, despite the fact that Gates was not a member of their community.

Gates wrote a letter that MITS sent to multiple computer publications, including the Homebrew newsletter, which printed it in full, with Reiling commenting that this was “the only MITS ‘software’ we have ever reproduced.” In his letter, Gates explains that he made his living developing software, yet users did not view it as a product that needed to be purchased:

*The amount of royalties we have received from sales to hobbyists makes the time spent on Altair BASIC worth less than $2 an hour. Why is this? As the majority of hobbyists must be aware, most of you steal your software. Hardware must be paid for, but software is something to share. Who cares if the people who worked on it get paid?*
Part of the problem Gates faced was trying to build a consumer software market before one existed, and, for hobbyists, it was not yet clear if software was a product to be sold or information to be shared. Gates goes on to argue that the end result of software theft would be the stifling of further progress in software development:

"One thing you do do is prevent good software from being written. Who can afford to do professional work for nothing? What hobbyist can put 3-man years into programming, finding all bugs, documenting his product and distribute for free? The fact is, no one besides us has invested a lot of money in hobby software. ... Most directly, the thing you do is theft." 31

Gates was on the forefront of what obviously would be eventual success, but it would take a few years before the personal computer software industry would show itself as viable, with the 1979 release of VisiCalc from Software Arts, and until the early 1980s before the software market truly exploded. In the meantime, Gates struggled to convince hobbyists that software was a consumer product.

From the perspective of the Homebrew hobbyists, while they agreed that Gates and Micro-Soft deserved compensation for their work, some saw the ultimate fault lying in the business deal Micro-Soft struck with MITS. Micro-Soft was paid $180,000 by MITS to make BASIC available for its customers. 32 MITS then sold BASIC to Altair customers for $75, if purchased alongside hardware, or $500 standalone. 33 As the Altair kit itself cost less than $500, this was not a price many people were willing to pay. In a response to Gates’s letter sent directly to him and copied in the next newsletter, Mike Hayes of MNH-Applied Electronics argues that the entire issue was the result of a foolish business decision:

"I am one of the 10% minority who paid for Altair 8K BASIC. ... As a professional programmer/analyst with almost 10 year’s background in accounting, manufacturing and research applications using COBOL, PL/1 and assembler language, I deplore the flagrant abuse of copyrighted software apparently practiced by many hobbyists, and some professionals too. What is the difference between stealing software and someone’s stereo outfit? In either case the guilty party is a common thief. ... We programmers have to eat, too! So why should BASIC or APL be given away?" 37

From this hobbyist point of view, Micro-Soft should have charged much more to MITS upfront, without depending on royalties from high-priced individual sales. At a time before a stable software market existed, it was yet unclear how such a product should be sold to consumers and who should pay for it, as Driscoll explains “unlike hardware, there were no proven economic models for the production and pricing of software.” 35

In the newsletter, Reiling comments on the ubiquity of views, such as Hayes’ toward Gates’ letter, but also acknowledged the existence of opposing views within the club, a detail that is left out of many historical accounts of this incident: “It is one opinion and, in fact, may represent the predominant thinking of hobbyists on this subject. Nevertheless there are other views and the next Newsletter will present one.” 36 As promised, the following issue printed a hobbyist response supporting Gates by Charles Pack:

"I’m sure that if I were MITS, I’d be chuckling all the way to the bank over the deal I got from you. After all, your marvelous software has allowed them to sell a computer which, without it, none would have touched, except as a frustrating novelty item. ... It’s too bad you didn’t get the profit from your efforts that they did from theirs, but that’s your fault, not theirs or the hobbyists. ... And, by the way, calling all of your potential future customers thieves is perhaps ‘uncool’ marketing strategy!" 34

This letter echoing the arguments Gates made concluded open debate within the newsletter; Homebrew appeared to support a balanced handling of the situation, while clearly stating...
which side most members fell on. However, two offhand shots at Gates’ accusation of thiev-ery, within an otherwise technical programming article by Lichen Wang appeared in the next issue:

However, since Mr. Bill Gates claims that he did not get payed [sic] enough and is in the mood of calling people thieves, ... I decided to code one myself. ... For the time being you are welcome to copy mine and I will not call you a thief (this includes Mr. Gates). 38

The newsletter presented the majority of Homebrew hobbyists as valuing the free avail-ability and exchange of information, even copyrighted information, with the market determining what counted as a product to be purchased.

At the same time the hobbyists debated Gates’ piracy concerns, they also cemented the values they upheld in the club’s Articles of Incorporation. Talk during the January 7, 1976 meeting on making Homebrew into a nonprofit corporation led to a committee of unknown members writing a charter. No discussion was printed on the resulting Articles, although the newsletter mentions that at the meeting 2 weeks later, “The ‘Charter Committee’ gave a rundown on the proposed charter which was followed by a lively discussion of pros and cons.” 39 The Articles established Homebrew as a nonprofit, with goals centered on education and access to computer technologies:

1. To promote the dissemination and exchange of computer related information, especially of an educational nature, by the organization of public meetings, the maintenance of a library and the publishing of a newsletter.
2. To support the development of educational materials, especially computer software, suitable for use by the home computer user.
3. To maintain centers through which members of the public involved with home, hobby or educational use of computers may obtain access to specialized computer equipment. 40

These mostly reflected values that had been printed in the newsletter before. The use of computers in schools was a topic Homebrew dealt with frequently; projects often were mentioned in the “Bulletin Board” involving teachers requesting help. By September 1976, the Homebrew newsletter was promoting computer classes taught at the Community Computer Center, another off-shoot of the People’s Computer Company, “For family and friends of people who always wanted to know about computers, but didn’t want to ask them, four easy-going classes are available. ... You can learn how computers work and what they can and can’t do.” 41 The prominence of education in the Articles was a natural evolution of hobbyist thinking, as a means to achieve greater access to computer technology and develop its use in creative, fun, and useful ways.

The Articles also contain a clause on the rights of software developers using club resources: “The use of equipment owned by the Home Brew Computer Club in the development of any software shall be conclusive evidence that such software is in the public domain.” 42 An emphasis on public domain software continued. In early 1977, Gordon French (who became Homebrew’s librarian) commented in an article on copying cassettes in the club’s library, that “I neither steal, nor duplicate, software which is protected by copyright.” 43 While never admonishing those who copied Micro-Soft’s BASIC, some Homebrew members did take a stance that copyright protection should be respected.

**Homebrew Computers and Their Uses**

Computers built by Homebrew members reflected the values of this community of hobbyists, the necessities of developing technology in an industry that was not yet set up for home computing, and the personal desires of the designers. Moore explains that their work...
was “a hobby for the experimenter and explorer of what can be done cheaply” and describes the efforts of a hobbyist named Bob to build a computer-based community bulletin board: “Admittedly a rather limited device, but Bob feels we should make do with what we have or can salvage. The true amateur spirit.” After Norman Walters built a computer from scrap parts, he comments that “every cost-cutting trick possible was employed,” using parts scavenged from friends or purchased from surplus electronics stores. In an article on display circuits for microcomputers, Ray Boaz writes that, “As with most true homebrew computers the main goal is low cost, which usually means the minimum parts and cheapest parts to do the job.” Doing so had an inevitable effect on design choices, leading to an emphasis on practicality and minimalism in trying to accomplish specific goals.

Other computers written about in the Homebrew newsletter in late 1976 demonstrate the multiple kinds of uses hobbyists were putting them to, as well as how computers were starting to impact members’ home lives. Charlie Pack built a machine from an Altair 8080 kit to do small business work, such as analysis of investment portfolios and income taxes, as well as maintain an index of magazine articles. Pack comments that with his computer, “the hardware now being used represents a practical minimum for the performance of the applications now being run.” In addition to these uses, Pack asks if there is desire for games on such a machine. The hobbyists embedded the ideal of the computer as a universal technology in the machines they built, by designing them to be capable of being put to any imagined use.

In the same issue, Ray Boaz echoed this value in focusing on his computer’s educational and family uses. Boaz sought his family’s support for his computer hobby by writing applications for them, extending the computer beyond use by hobbyists with technical skills to people without knowledge of computers. He wrote a program for his children to practice multiplication and addition. His daughter brought her friends over to work on the computer and planned to bring the machine to school. Boaz remarks on his success, “This is a short and simple program, but to a nine year old girl, it is like magic” and “There seems to be no end of what can happen when your kids can compute.” By involving his children, Boaz observed that his wife became more accepting of the computer as well; his otherwise masculine hobby now becoming domesticated with the computer more fully entering the home. In doing so, Boaz embedded another core value in his computer: that of expanding access to the technology. The uses Pack and Boaz put their computers to echo the early work of computer hobbyists building their own computers from scratch almost a decade earlier described by Kevin Gotkin, and including uses such as: home finances, cataloging information used in the home, calculation, and education. Hobbyists had discussed computerizing such household tasks for years, as they built for themselves what industry had not yet figured out how to supply to them.

Homebrew hobbyists not only built their machines for their own and their families’ desired uses, but they also looked forward to what someday would be possible with widespread personal computer technology. Moore discusses the responses to a survey of what people would use a home computer for in the first issue of the newsletter:

*Uses ranged from the private secretary functions: text editing, mass storage, memory, etc., to control of house utilities: heating, alarms, sprinkler system, auto tune-up, cooking, etc., to GAMES: all kinds. TV graphics, x - y plotting, making music, small robots and turtles, and other educational uses, to small business applications and neighborhood memory networks. I expect home computers will be used in unconventional ways—most of which no one has thought of yet.*

These thoughts about computer uses mark the moment Homebrew stood in the beginning of the transition of computer technology to public, nontechnical use, where it could serve a multitude of desired functions: practical, creative, educational, and fun.

However, Homebrew hobbyists did not exist in a bubble separate from industry
concerns and ambitions; many worked for computer or electronics industry companies, some went on to form their own personal computer or software businesses, and some outside companies turned their attention to the growing market of home computing starting with the hobbyists. The newsletter announced the December 1975 launch of the Byte Shop, one of the first personal computer retailers, with the succinct declaration of “Computer stores are opening.” Over the next two years, multiple mentions of new outlets for computer technology followed. This was the beginning of a consumer market, with small companies jumping into what they saw as a growing field.

As the market expanded and showed promise, Homebrew members turned to starting businesses of their own. Marty Spergel started M&R Enterprises, releasing the Astral 2000 microcomputer in May 1976. A few months later, the newsletter announced Processor Technology’s release of the SOL terminal, designed by Bob Marsh and Lee Felsenstein, and featured on the July 1976 cover of Popular Electronics. The Apple I, designed by Wozniak while he worked for Hewlett-Packard, was initially created for sale to Homebrew members in 1976, then quickly bought up by a local computer store, leading unexpectedly to the rapid growth of Apple Computer. Their quick success was a result of the development of the Apple II, released in 1977, and one of the first mainstream personal computers intended for a wider range of consumers. It was one mark of the turn from hobbyist to more user-friendly consumer computer technology: preassembled as a literal black box with all electronics components hidden away and safe from the user. Although few of these hobbyist start-ups lasted longer than a handful of years, these hobbyists interested in commercializing the computer technology they had worked on within the club were a part of the transition from the computer as an object of big business or research to its place as a personal technology in the home.

These early hobbyist-turned-personal computer entrepreneurs reveal the diversity of opinions toward computer values held by members and the changes in Homebrew that took place over time. There was no hard divide between those who wanted to make computers accessible to the public and those who wanted to sell them; in fact, the goal of making computer technology more easily available was aided by those desiring to grow the marketplace for it. Members, such as Fred Moore, who held more explicit anticapitalist leanings, either left the group early on or did not raise their opinions on entrepreneurial activity in the newsletter. For Homebrew, the move from tinkering with technology for personal satisfaction among a like-minded community to manufacturing and selling it to a public comprised of computer experts and those new to the technology was a natural transition.

**Conclusion**

Between 1975 and 1977, Homebrew hobbyists built their own computers on the cusp of the personal computer revolution. These hobbyists started from a love of playing with computer technology, seeing what they could accomplish with whatever parts they could get hold of, and then sharing the results and process with others. They wanted everyone to be able to have and use their own computer, to do with whatever they might desire. Their values came out of the hacker culture and counterculture, leading the Homebrew hobbyists to build into the personal computer notions of accessibility, individuality, and creative use. By 1977, the state of personal computer technology had changed. No longer reliant on kits or building a machine from scratch, people interested in the technology could now purchase an off-the-shelf computer and immediately start using it. Some Homebrew members continued to work only as hobbyists, but many transitioned into the growing personal computer industry to bring their innovations to a public market and stake a claim on the design of computer technology for decades to come.

**References and Notes**

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