1) Thinking about user interface design

The first device I want to discuss is my iPod. I use it to listen to music using headphones while walking, riding my bike, on the bus, and in my car (via digital interface).

One strength is the storage size. I am able to store lots of music on my iPod, and personally have no problems managing it with my computer. Another strength is the screen, which is always clear and readable. The screen is backlit & reflective, meaning when sunlight strikes it, the screen uses the actual sunlight to illuminate the text. Another great part about the iPod is compatibility. I can happily use iTunes, Winamp, or any of many other software programs to manage it. The Alpine head unit in my car also supports the iPod. I simply connect it to a cable in my glove box, and the car will charge the iPod while seamlessly digitally interfacing. I can browse the content using the normal (and steering-wheel) controls, and the interface also bypasses the iPod DA, feeding the digital files to the head unit for conversion. This allows for the best possible reproduction of whatever files are stored on the iPod.

The iPod does have weaknesses. One of these is durability. Mine has not suffered anything past the normal scratch or two, but I have heard of many premature failures. Another weakness is the DA, as it leaves much to be desired. I feel that the higher-priced units should have better quality digital-to-analog audio conversion. Another weakness is the battery. Again, I have not experienced this, but the battery is not user-replaceable. Any device expected to outlive its battery should have a simple mechanism for battery replacement.

My phone (Motorola K1M) is the second device I will discuss. It only use it as a phone and messaging device. I feel that phones should be great at being phones, and everything else should be secondary. This phone is not too fancy, and I feel that it hits fairly close to the mark, but does miss in a few ways.

First, the strengths. The phone has decent call quality and reception, among the better I have used. The phone is also proving quite durable, unlike many phones I have managed to break in the past. I will say that its battery life is a strength, but my usage patterns are not a very strenuous test of this.

The phone's weaknesses are mainly in the software, which is just terrible! The interface is confusing, requiring users to memorize strange methods to do things that
should be simple, such as viewing a picture or video. The phone tries to do more than it really can. The hardware is fast enough to call and message, but not fast enough for fancy graphical menus or photo and video processing. The manufacturer included these features, and as a result, users are guaranteed to meet frustration if they try to use all the features. Another annoying "feature" of the K1M is the way the speed dial works (err... does not work). The first 9 are the only entries that can be dialed (by holding the corresponding number down for a few seconds). The phone keeps all of the contacts organized by alphabetically assigning "speed dial" numbers to them, but this is very annoying, because to set the ones you actually want, you must re-assign whatever was automatically placed there. Phones I've owned in the past have featured much better speed dial. In other systems, the contacts have a different method of indexing, and speed dial numbers are just used for quick access to those you call frequently (well, duh!). Normal speed dial systems also allow double digit speed dials (more than 9!), and show previews of who is assigned to the speed dial numbers while you are dialing them.

The last "device" I will discuss is my car, a 2-door Ford Focus SVT. My car's primary purpose is to take me places around this area. It also serves to take my wife and I around here, and on longer trips. Sometimes it also gets packed full of friends for a trip to the lake or something. The car was designed for exactly my demographic. It has a great balance of sporty and economical features that fits me well.

The fact that I primarily drive the car alone means that the compact design is a strength. Because the car is small, it is able to be very light weight (roughly 2500lbs). This helps give it high efficiency, quick acceleration, and nimble handling. Another strength is the 6-speed manual transmission. Since, once again, its primary task is to take me places, the 6-speed manual transmission is a great way to boost both efficiency and fun. The third strength is the suspension. The SVT Focus comes with good suspension components. They don't ride too high or too low, and provide a safe and responsive feel to the car.

The first weakness of the Focus is actually its safety due to size. While the small dimensions lend a lighter weight and higher efficiency, they also mean that the car (and passengers) are more likely to sustain serious damage in a collision with a larger vehicle. The second weakness that I can think of is that all the power windows don't have automatic roll-up and roll-down functionality. The sunroof does, however: one quick
press of the switch, and the sunroof will slide fully open or fully closed. The driver's side window also has auto-rolling, but it is limited to the down function, not up. It would be really nice to have one button, perhaps even on the keychain, to open and close both the windows and the sunroof. This functionality would be very convenient, relatively simple to implement, and wouldn't add anything significant to the cost of the vehicle. A third weakness about the car is the lack of rear doors. The 2-door design really limits access to the otherwise roomy backseats. The 2-door models do have longer doors than their 4-door counterparts, which makes it more comfortable for the front passenger entry and exit, but in most cases the rear doors would be welcomed.

2) Learning to listen to users

Sophie (my wife) uses a Macbook for most of her computing tasks. She also uses my desktop occasionally, and she uses my HTPC to watch TV and movies in the living room. She said that she is satisfied with the interfaces on all three machines, for the most part.

When prompted, her first complaint was about the HTPC. It has a hardware problem that causes occasional crashes\(^1\). I know about the problem, and have a part waiting to be installed, but haven't gotten to it yet. Sophie said the crashes are very frustrating, but she still uses the malfunctioning system because it usually works fine. Intermittent hardware problems are a real situation for computer users. The casual user might think they have asked too much of the machine, or done something wrong, without realizing the system actually needs repair.

Sophie also mentioned a problem with iTunes. She likes to manage her iPod using her Macbook, and she also likes to add music to her iPod from the larger music library located on my desktop. The problem is that iTunes tries (in vain) to block this functionality. I have successfully used third party software to add music from my desktop (without erasing any existing content) a few times, but when she adds new music from her Macbook, the music I have added is lost. I can only assume Apple is hoping to generate a few more sales on their online content store with this behavior. If they want more people to buy music and movies, they will have to provide a system that is convenient. Battling with DRM to simply use two separate systems to manage your

\(^1\) A friend mistakenly plugged an iPod output directly into the audio output on my HTPC. The iPod was fine (as far as I know), but the computer’s onboard sound card was damaged. I am able to work around the problem by configuring another audio jack to act as the audio-out, but the sound driver still crashes occasionally.
iPod is definitely not convenient. I feel that music bought should be music owned... not just permitted to play back on one or two of the many devices I own.

My father uses a desktop PC at home and various specialized PC based workstations on the job. His biggest complaint was that one system in particular prompts many times when given the log out or shut down command. This is very frustrating and cumbersome because it is a shared workstation, which needs to swap users frequently. He would like a single button or command to log the system out. He said that it should be positioned and labeled so that everyone instantly recognizes its purpose. He would like users to be able to press a single button and immediately get up and walk away from the system. Some of the engineering workstations at school feature just that: a large red LOGOUT button. One press and students can walk away from the machine safely, knowing that all of their private data is safe.

I called my father and asked him for some complaints about computers. He immediately brought up slow booting and login delays. I'm sure this is a common concern, and it is being addressed with faster hardware and special power state transitions featuring quicker "waking" from a low-power mode. However, this area is not receiving as much attention as system speed after booting, but it probably should.

My father is unsatisfied with the email system used at his new job. I'm not sure why they are not using one of the well-known clients available now. Their current system apparently does not save outgoing mail (most clients save a copy in a "sent folder" or "outbox"). Another gripe about email has to do with sending pictures. He would like his email client (Gmail) to have the option to automatically resize and compress pictures when he sends them. This would be possible using a Java applet or something, and frankly I would also love to see this done.

My friend Jeff, a fellow student in CS465, was my third interviewee. We share some of the same complaints about our very similar computing environments. We are both fairly advanced multi-platform user/developers. He complained about native incompatibilities of many file systems. I agree, and think that Microsoft and Apple ought to work with the open source community to develop a universal file system, or at least work together to make all of their proprietary file systems work together more smoothly. Jeff also mentioned Windows' 1GB limit for SD cards. Apparently he has a larger SD card in his camera, and cannot use a card reader with it. I only use Compact Flash cards, simply because my cameras use those, and I use an internal card reader to
access them. I can imagine it must be quite annoying to be forced to use the camera’s USB cable to transfer pictures, as that method is much slower & it drains the camera battery. Jeff also hates windows machines without windows keys, such as the older IBM Thinkpad. There is no good reason not to include that key, since it is used for many things on the Windows OS. The laptop even has a blank where the key would fit, but it is simply missing.

3) Power Law of Practice

Using the program from the web board to collect data:

![Graph](image)

The power regression curve that best fits these points is close to \( y = 10.3 * x^{(-1/2)} \). The \( R^2 \) is about 0.70 for this data.

4) Choice Reaction Time

*Used Hick’s law formulas for the following calculations.*

a) approximate how long...

\[ n = 12, \ k = 150\text{ms}. \ \text{RT} = 150 \times \log_2(12 + 1) = 555.1\text{ms} \]

b) suppose the first 4 menu items are placed dynamically...

*Used choice time for each part separately, then combined with probability weights.*

**First Section**

\[ n = 4 \]
k = 150ms
RT = 150 * log2(4+1) = 348.3 ms

**Second Section**
n = 8
k = 150ms
RT = 150*log2(8+1) = 475.5ms

50/50 = (0.50) * (348.3) + (0.50) * (475.5) = **411.9 ms**
75/25 = (0.75) * (348.3) + (0.25) * (475.5) = **380.1 ms**
90/10 = (0.90) * (348.3) + (0.10) * (475.5) = **361.0 ms**

Min = 90/10 @ 361.0 ms
Max = 50/50 @ 411.9 ms

c) what are some limitations of applying Hick’s Law...
If the options are lengthy, and require a certain level of ‘study’, then it doesn’t apply. It only applies where a simple decision is required from multiple options.