Humanity+ Reality Augmentation Project Proposal

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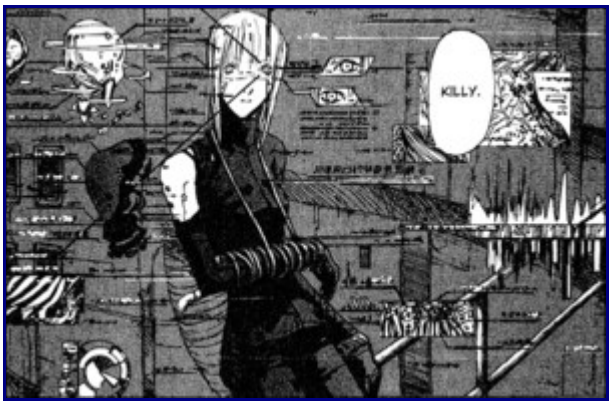
A common problem: modern computer users spend an inordinate amount of time sitting inside, hunched over a tiny screen and generally unaware of their surroundings.

The CyberFenn wearable computing and sensory processing system is intended to increase the wearer's level of situational awareness, while also providing standard personal computer functionality in a significantly more ergonomic form factor. It's a bit difficult to pin down exactly what a wearable computer "does" - what does a laptop do? The possibilities are limited only by the software running on the device, and which attachments are currently plugged in.

"The most salient aspect of computers, in general, (whether wearable or not) is their **reconfigurability** and their **generality**, e.g. that their function can be made to vary widely, depending on the instructions provided for program execution. This is what sets the wearable computer apart from other wearable devices such as wristwatches, regular eyeglasses, wearable radios, etc." - S*teve Mann*

Nevertheless, here are some possible popular use cases:

- Remembering a person's name (context-sensitive face recognition)
- Looking up a word, (in Spanish), (automatic web search on spoken audio)
- Taking a picture of what happened ten seconds ago, in the dark
- Overlaying information on the scene, i.e. directions, assembly instructions
- Keeping track of the day's activities
- Remembering where you last saw (x), i.e. your keys
- Writing a novel on the beach
- Turning on a flashlight when both hands are full
- Carrying on two conversations at once, one spoken, one textual, while riding a bike
- Coping with age-related sensory and memory degradation



(Display as seen from the user's perspective)

The system will be capable of displaying processed data from a wide range of sensors. The data will be shown in context, for example a person's name next to their face, or an object's absorption spectrum and possible material types listed as tags.

Additional information that may be distracting in normal use, such as infrared imagery and low-confidence inferences, can be called up by the user with a gesture.

How the device will work, and what parts and components will be used

For a technical overview of the system components, see http://fennetic.net/irc/cyberfenn/layout.yaml.

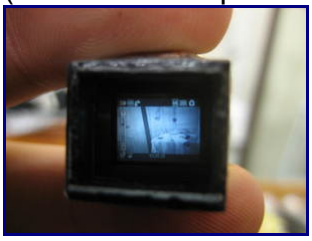
You have this pile of computer parts. Some of the pieces are wireless and have their own batteries built in. Most of the pieces are encased in rubberized black plastic, and have wires and nylon straps connecting them. You wrap it around your body in such a way that it doesn't restrict your movement, and it doesn't fall off. It's always turned on, like your brain. Even when there isn't any sensory input, it's busy doing something - thinking about past events, or dreaming.

The system must function reasonably well without an internet connection. This means most of the sensory processing will be done on board, even if we have giant data centers full of racks of servers. When under-stimulated, the system will start in-depth analysis of recently acquired data, for example doing face recognition and speech recognition code that is too slow to do in real-time.

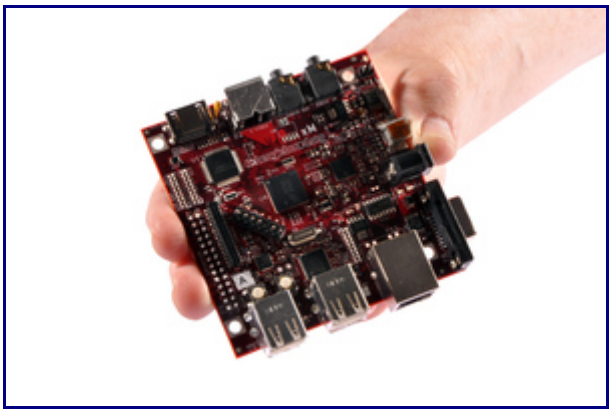
There are many ways to interact with the system, depending on which attachments you wear. You can type on a chording keyboard, which is sort of like playing a small piano. Or you can point to something with your eyes and double-blink. Or you can subvocalize, and sensors will pick up the twitching of muscles in your larynx.


(Chording keyboards)

(Wearable computer fashion concept)




(Hacked MyVu micro optical display)



(Beagleboard single board computer)

Estimated completion times

Robert Castle took 2 years to design, build, and program a wearable active vision system for augmented reality. I'm hoping to do a lot more. That was in 2006-2008, so a lot more software is available in the field and this will be easier. But, he also had the resources of a university to back him up, for what that's worth.

Unfortunately, projects always seem to take five times longer than I expect, even when I take into account that it will take five times longer than I expect. The idea of "evidence-based scheduling" appeals to me, but unfortunately I don't have any records of past estimates to calibrate against.

I will have to design and build some custom stuff, but really most of what I'm doing is system integration.

Cost Estimates

Per system costs:

- About $550 for a computer core
- $350 +- $100 for fabrication supplies and things to make work easier
- $250 for experimenting with various sensors
- $100-200 for an EMG sensor

Expect this list to grow as I have to buy replacement parts.

I'm going to be using homebrew construction techniques for the circuit boards, simply because it's a faster design cycle and not such a big deal if I mess up. Professionally made circuit boards only make sense when you're doing more than 10 copies. I might need a wax printer (or solid ink printer) in order to get fine resolution; we'll see.

My living costs are about $1,000/month, which is relatively modest around here. Since most of the work will be in software and component integration, this is where I expect most of the

project budget to be spent.