

Wearable Interactive Physical Avatars

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Abstract

A wearable physical avatar facilitates desponsibility. The wearer is required by law, custom, employment contract, or other obligation, to interact with the world through a body-worn avatar. In one embodiment, a wearable talking fish is used. The wearer is not allowed to talk to anyone directly, except when authorized by the fish. The fish as avatar forms an existentialist user interface (EUI) for street theatre of the absurd (e.g. as a modern equivalent of Samuel Beckett's, *Theatre of the Absurd*).

Keywords

1 Introduction: Buildings and bureaucracy

The present paper pertains generally to a wearable apparatus that provides the user with desponsibility to strangers, especially criminals with a stolen security guard's uniform, or criminals in positions of authority.

Children are often advised by their parents: "Don't talk to strangers!". However, many times individuals may be stopped on the street and do not know whether or not they are talking to terrorists.

In today's society which is teeming with dangerous criminals, buildings often have sophisticated access control to make sure that everyone entering the establishment is properly processed, but ordinary citizens lack such protection.

Buildings have forms of access control, such as card readers, along with the field of biometrics, for a future in which certain select individuals can know the whereabouts of most other individuals at all times.

Physical protection of the body through armour is a centuries-old aspect of the prior-art, dating back to the days when five to seven layers of rhinoceros skin were used to protect the body during battle. Such physical protection of the body has not kept pace with new developments in protection of property. Protection of property has evolved from medieval fortresses toward bank towers with glass doors protected by card readers and retinal scanners. The protection of the body

has not kept pace with the move from physical stone fortresses to informational protection of buildings.

Little likewise has been done to address the protection of the individual.

1.1 Subservience empowerment

This paper presents a simple concept called "being bound to freedom". There are various ways in which the individual can wear or carry an apparatus of self-demotion (self-corporatization), within the context of street performance, or *street theatre of the absurd*. By becoming one with the corporatized ideal of diffuse indirection, we can, in effect, tame the monster of globalization and corporatization with a piece of itself.

1.2 Theoretical framework: Can humans being clerks make clerks be human?

The fundamental problem the individual faces when interacting with the ever increasing scope of larger and larger global bureaucracies, is that of imbalance and asymmetry.

Typically this imbalance is evident by way of an individual interacting with a clerk who either is, or pretends to be, under the control of a manager who either is, or pretends to be under the control of a higher authority, and so on.

A typical example of such a situation is when an individual attempts to negotiate with a used car salesman, and the used car salesman might say something like "I'd love to give you the car for two thousand dollars; let me check with my manager". The used car salesman then disappears into a back room, alone, and has a coffee, and reads a newspaper for a few minutes, and then comes out and says "I'd love to give you the car for two thousand dollars but my manager won't let me.". Although the salesman never talked to a manager, the salesman has some degree of power over the customer by virtue of being able to credibly pretend that he is bound by a higher and unquestionable authority. A credible, articulable, higher and unquestionable authority allows representatives of organizations to obtain external blame and excuses for what would otherwise be irrational or disagreeable actions.

*Pseudonymous to protect the lives of innocent fish

Unfortunately the individual person does not ordinarily enjoy the same luxury as the clerk, and must therefore behave more rationally, or risk seeming irrational, rude, or otherwise inappropriate.

Another example is that of video surveillance. If we visited a friend's house where video surveillance was used because that person did not trust us, we would likely be quite angry. However, we often accept the use of video surveillance systems by owners of large organizations, simply because it is not clear who is responsible for the installation of such systems.

When we attempt to follow the chain of responsibility upwards, management indicates that the directive was from head office, and head office argued video surveillance was just policy, or for insurance purposes, or the like. Thus there is no clear accountability for the situation.

If an individual carried a handheld video camera around videotaping clerks, casino operators, police officers, customs officials, and the like, the individual might be regarded as strange, rude, or otherwise acting in an inappropriate manner.

The individual could rely on religion, as a manager, by, for example, wearing a camera contraption as part of a religious order. Just as religion allows individuals the right to wear special headwear even as uniformed employees (e.g. to wrap their heads in various materials that would otherwise be regarded as inappropriate), a new religion such as the "personal safety religion", or even a "school of fish" religion could be invented, that required its members to wear cameras, computers, and other devices.

Thus religion could form a similar purpose to the manager for the individual, but there is the danger that others (including clerks) may dismiss the individual as a religious freak. Moreover, the post September 11th atmosphere is one of distrust toward religious fanatics.

Therefore, what is proposed is another way for the individual to have excuses for, and to externalize blame for, otherwise irrational or disagreeable actions.

An important aspect of the invention is for the individual to be able to nonconfrontationally obfuscate their actions, in much the same way as a large building allows the manager to be unaccountable for his or her actions, and thereby show the absurdity of the globalized world in which we live.

The wearable talking fish is a physical avatar, that forms just what is needed for such street theatre of the absurd. See Fig 1.

The fish has a fisheye lens, in each eye, being for a camera, so that the fish can "see". Incidentally, therefore, the fish captures pictures of everything it sees. Incidental imaging refers to imaging which can be

made to seem as if it occurs merely by chance or without intention or calculation. An incidental imaging system may in fact blatantly capture images (as by an articulable requirement from a higher authority to do so), or it may present itself as a device that could capture images in a way in which it is difficult to discern the intentionality of the use of the invention.

The utter absurdity of the fish, makes criticism of the image capture process equally absurd. An official complaining about the camera in the fish's eye would indeed seem utterly paranoid, to be afraid of a talking fish.

The talking fish also functions as an avatar, in real physical existence, where the device provides the desired empowerment through self-demotion. In the same way that clerks facilitate empowerment of large organizations, the fish facilitates personal empowerment by allowing its host to be a mere clerk. Self-demotion provides a deliberate self-inflicted dehumanization of the wearer, so that those the wearer encounters, such as clerks and officials in the official business of global e-commerce solutions, must suddenly realize the absurdity of such bureaucratic human endeavour which forces the clerk to become human.

In summary, humans being clerks can make clerks be human.

2 Street theatre of the absurd: Can Fish being Humans make Humans be Fish?

The talking fish was implemented using a "Billy Bass" toy fish, purchased from a Canadian department store. The "Billy Bass" (TM) product was originally mounted on a wooden plaque, having a motor inside the fish to cause the tail to wiggle¹. The plaque also had a speaker in it, so that the toy fish could speak.

For the purpose of this research, the fish was removed from the plaque and affixed to a black T-shirt with a chest support under the shirt. The motor (originally running at 5 volts DC) was interfaced to the parallel port of a wearable computer, to make the fish tail wiggle, and another motor for the head was used, to mimic natural speech lip movements. A small controller for the fish was built using a PIC microcontroller, to interface the fish to the wearable computer.

The speaker that was behind (inside) the wooden plaque was removed and installed inside the fish, since the plaque was discarded. Additionally, the left eye of the fish was removed and replaced with a small camera fitted with a fisheye lens.

¹Rather than merely a periodic motion for the tail, it was found that the most naturally appearing probabilistic distribution for tail motion was a Poisson distribution, especially in the tails of the distribution.



Figure 1: The wearable physical avatar in the form of a talking fish. The mouth of the fish moves in synch with the voice as it talks, whereas the tail follows a Poisson distributed random variable, and the head moves as well (3 degrees of mechanical movement).

Originally the “Billy Bass” product originally contained a microchip speech synthesizer that was removed for the research. Instead, speech was synthesized on the wearable computer using the Festival program. Additionally, a speech recognition feature was added. The speech recognition feature was not present in the original “Billy Bass” product, but presently this feature allows the system to recognize speech, so that the fish can talk as well as listen. The fish uses the special reserved keyword “please” to denote the end of each sentence. Thus the host must terminate each sentence with the word “please” when speaking to the fish.

A simple computer vision algorithm uses the Horn and Schunk equations to do simple optical flow. Based on Focus of Expansion (FoE) analysis, the device detects the presence of people walking up to the fish, and the fish begins speaking. The fish also stores pictures of people that it “meets” together with a short speech recording of people’s voices as they introduce themselves to the fish. The host (person wearing the fish) is not allowed to talk to the audience directly, so the fish will respond with the phrase “my host is not allowed to talk to you without my permission” as appropriate.

Presently the fish is controlled by a Cappuccino computer that has been adapted into wearable configuration with a mesh housing and filter system over the air intake. The computer provides a 1.0 GigaHertz P3 processor and 256M RAM with 40G hard drive to store pictures, etc.. Although the processor may seem excessive for simply controlling a fish, the high speed computer is needed to do the speech recognition, together with the capture and processing of images. The speech synthesis, however, only uses a small percentage of the CPU processing power.

Figure 2 shows the talking fish in the semi-public setting of a fish market and meat store.

Then at the checkout, the fish directs the process, and requires its host to follow company policies and procedures as set forth by the Management Depart-

ment at the University’s School of Fish (SoF). See Fig. 3.

3 Further research

In another theatrical performance outfit for satire of bureaucracy, the user wears a country as a garment. The country is called “C-LAND”, or FISH-LAND.

A map of a country is indicated on a garment, to show that the person’s body is being its own sovereign nation state.

While the country need not be built to scale, many elements of the country are preferably built to approximately 1/12 scale. Inhabitants of the country are dolls, such as Ken (TM) and Barbie (TM) sewn to the shoulders of the wearer of the country.

To emphasize that this is in fact a country, with a passport office, and to satirize bureaucracy, surveillance, photo ID cards, and the male gaze, it is preferable that inhabitants might be engaged in the act of producing a passport. For example, a Ken (TM) doll may be situated behind a small scale model counter of a miniature passport office on the wearer’s left shoulder, whereas a Barbie (TM) doll might be situated in front of an ID card camera on the wearer’s right shoulder.

Preferably the Ken (TM) doll can be turned around 90 degrees so that he can photograph real people who are an audience to the wearer’s performance. Thus persons wishing to converse with the performer can be told that they must first apply for a passport before being allowed to talk to the performer. An official talking to the performer may thus be told that he needs to get a passport, and the performer can then turn Ken (TM) doll to face the official and then it will be a matter of Ken (TM) doll photographing the official and a small wearable printer can print out a miniature passport photo ID card that the performer can hand to the official.

The passport office has a roof overhead, and the roof is also over the head of the performer wearing the apparatus. The roof portion of the apparatus is supported by support which is connected to a backpack. The



(a)



(b)



(c)

Figure 2: (a) Fish theatre at the fish market. (b) Fish food being shown to the fish. (c) Curious fish.



Figure 3: At the checkout, especially when handling cash, the host must obey all commands from the fish. The fish must in turn obey commands as sent by wireless data link from the University's School of Fish and Planning.

backpack also houses the computers needed to run the body-worn country.

The is made as a 1/12 scale suspended ceiling. Instead of 4 (approx. 122cm) foot long fluorescent lights, there are 4 (approx. 102cm) inch long miniature fluorescent tubes. A satisfactory tube is the 4-inch T1 made by Kino Flo. Tubes are sold in "T" units where one "T" is 1/8 inch (approx. 3.2mm) Normal ceiling tubes are typically 12T and 4 feet long so the 1T tube that's 4 inches long is exactly 12 times smaller in both length and diameter.

Ceiling tiles of size 2 inches by 4 inches (approx. 51 by 102mm) are therefore affixed to the wearable ceiling. Some of the ceiling tiles are made of smoked acrylic, just like in department stores where some ceiling tiles are smoked acrylic to create a comforting sense of security.

Additionally, some 2 inch (approx. 51mm) diameter dome cameras are installed on the ceiling. These are exactly 1/12 the size of standard 24inch (approx. 61cm) diameter ceiling domes. The so-called "2inch dome" is very popular and readily available.

Now let us suppose that the wearer of the apparatus meets an official. The wearer might remark, when asked what the ceiling domes are, that they are for security, and that "people under my roof, such as Ken (TM) and Barbie (TM) want to feel safe and secure, and since you are also under my roof, you will also feel safe and secure, but criminals will no doubt feel paranoid. However, in this country you need to abide by the laws of the land, and the laws require that anyone under this roof be under surveillance."

The country also has telecommunications, comprised of miniature telegraph poles running along the right arm of the wearer. Actual wiring running on the telegraph poles connects to various surveillance cameras on the poles to the wearable computer in the backpack.

Miniature cameras of today's generation are approximately 1/12 the size of traditional pole mounted surveillance cameras, adding further to the beautiful fashion statement afforded by the apparatus.

Highways connect the city together. Generally it is not possible to maintain the 1/12 scale model entirely, so the roads are done at a smaller scale, such that the telegraph poles do not stick out so high.

C-LAND also has a radio station and the smaller antenna transmits video in the UHF band around 440MHz over amateur packet radio at 56kbps. However the antenna is fashionably done in the style of a real AM radio station. A highway running down the left arm of the wearer has cars 1110 and a dotted line 1120 running down the middle of the road.

C-LAND also has various billboards, some of them being LED billboards, whereas others are made from miniature flat panel television screens that form what amount to giant billboards along the roads in C-LAND scale.

Flags may also fly proudly throughout the garment to show the sovereignty of C-LAND.

Small toy guns, such as mini squirt guns, water pistols, and toy soldiers may be lined up along the arms and shoulders, showing a right to bear arms for national security. An irrigation system may also be installed, along with a spray park, or "sprayground" that can shoot water up to 30 inches (approx. 76cm) in the air (30 feet, or approx. 914cm in C-LAND scale). A water reservoir in the backpack serves the needs of C-LAND and ensures that anyone getting close to the wearer gets totally soaked. Of course the TV sets, etc., need to be sealed, so that the 480 to 800 volt lines therein do not become laden with water.

Flower beds with real vegetation may also be planted on the garment, so that the irrigation system can be put to good use. The irrigation system may also come on randomly so that if persons get too close to look into C-LAND, they get squirted by the system.

4 Conclusions: Theatre of the absurd; the fish needs food

The host (wearer) became a clerk who was bound by an employment contract set forth by the fish, and thus the host was used to take the fish out for a late night grocery shopping trip. The host (the wearer) and the fish went to a grocery store that had as many black ceiling domes as a casino, which prompted the fish to wonder if there was any illicit trade going on at this facility.

The Fish as an avatar for the host, functioning as a clerk for the fish, proceeded to locate food and drink. It was noted by the fish that many clerks refused to recognize the prominent position that the fish held. In fact, many attempted to interact with the Fish's host (e.g. the wearer) directly. This of course would be appropriate for clerks of a large organization. Once the host employee (wearer) clarified the appropriate line of authority, the Fish Market's clerks were put at ease and found the situation to be calming and relaxing. However, once they were notified that the host was "carrying" constant video surveillance they were "as per store policy" forced to become hostile and threatening. This is in direct contrast to the clerks working conditions in which they were "under" constant video surveillance. Perhaps they were unaware of this fact?

The fish as a prudent manager and aware that they were in an establishment of commerce decided to make

a small purchase and leave the premise as requested. This was in consideration of being on "private" property and opposite to the laws requiring a citizen to document the scene of criminal activity. Indeed, were the fish to notice any crime, it would be a civil duty of the fish to document said crime, as store policy cannot prevail above and beyond the law.