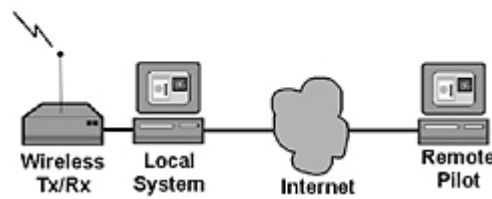
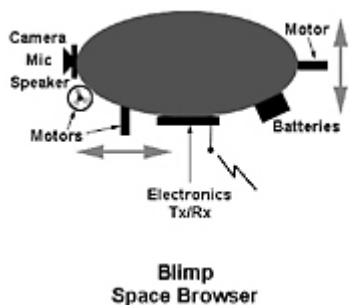


PRoPs: The Avatars Are Loose in the Hauptplatz!

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If Baron Frankenstein had been a little more understanding, he would have foreseen his creation's need to escape the laboratory. As a sentient being, the creature was bound to evolve and discover new environments. It was only doing what it was programmed to do. Not by Frankenstein, but by the much cleverer design of its genetic and memetic raw material.

Avatars are the human life-support system in the world of bits. They also allow us to mediate distance, take on new identities, and do real work in new kinds of social space. In their own environment, they are a highly successful species. They were bound to escape from

cyberspace sooner or later. PRoPs are the evolution of avatars into hardware, and they inhabit the plazas and cafes of the real world. A PRoP is a Personal Robotic Presence. It is a telerobot driven by a human pilot over the internet, and it gives them a rudimentary physical body in a distant place. PRoPs are not flesh, but they live in our world. Should we choose, they give us alternative bodies to experience the world through. They support collaboration at a distance in the same way as avatars, and they can be built in the same outrageous shapes and primary color schemes. They can no longer be kept inside the machine. They extend the reach of Internet users back out into the world, but can emerge somewhere far removed from the pilot's computer. They are steerable cameras with wheels, tracks and propellers that will get up and walk out of the computer room as soon as they can.

Telerobotics began because of the limitations of human skin. We moved into the atomic age and then the space age, and realized that armor had its limits, and that remote control is cheaper and safer. The Australian artist Stelarc has exposed the fragility of human skin through his suspension events. Lately he has cracked into the body's control system with his Ping Body series. Stelarc sees these kinds of violations as typical of what the body must deal with in the modern age and concludes that it really isn't up to it and is "obsolete". He has become an early adopter of Cyborg technology [his third arm].

Another branch of telerobotics is a toolmaking craft. Telesurgery and tediagnosis place remarkable instruments in the hands of a surgeon who is nowhere near the patient. Imaging and simulation expose the patient's organs instead of a rib-spreader. Projects like the Telegarden [Ars Electronica Festival 96] and Legal Tender [SIGGRAPH '96] take the tools of gardening and currency testing respectively, and make them available to the Internet community. They also engage the visitor in a dialogue about some real objects in a real but distant place. PRoPs are the application of telerobotics to puppetry. They are specialized for social tasks and provide, in the best case, the dexterity of a puppet hand. But they do provide the pilot/puppeteer with many avenues for self-expression. For telework, this is surely their most important function.

We have been building PRoPs for about three years. A PRoP's pilot sits at a normal PC somewhere on the Internet. The PRoP sends its pilot live video over the Internet, and it has two-way audio that allows the pilot to talk with people around it. Our latest PRoPs have rudimentary vision and gestural capability. They can be described as mobile video-conferencing systems, but that reduction hides most of what is interesting about them. That difference is what our research is about. We are trying to answer the question "what is the difference between communicating and being there?". The same question is being asked by people studying online communities. With PRoPs the differences are sharp because, but for the telerobot, we see social interaction between humans in a familiar human environment. In cyberspace, there is the nagging doubt that a subtle aspect of human interaction has already been lost in the choice of digital representation.

When deciding on a body for a PRoP, it's difficult to resist the temptation of flight. Our first PRoPs were all indoor blimps. They were similar in size, but not in posture, to a large human being. They fly without tethers using batteries and radio links, and use small electric motors and propellers for thrust. They now have sonar for height control and an electronic compass for steering, and can be quite easily driven over the mainstream Internet. We called these gadgets "space browsers" because they seemed to have evolved from web and VRML browsers into tools for moving around in physical space. They were good for getting around in galleries and other large spaces, and do give the pilot new perspectives when the ceiling is high enough.

We could have continued endowing PRoPs with super-human skills like flight, but instead our research took a sharp turn in another direction. We discovered that the most interesting things about blimps were their social skills. They allowed roaming, snooping, chance encounters, and they attracted people's attention. Blimps were not ideal for these kinds of things. Superhuman skills are great for superhuman tasks, but if Über-Mensch flies to work, he misses the shared experience and verbal exchange with his colleagues who travel on the ground. Blimps and humans don't even exist in the same medium. By nature, terrestrials are at rest. Blimps by nature are always in motion. A terrestrial PRoP is better when the goal is sharing experiences with humans.

Our current generation of PRoPs are therefore terrestrials. They are best described as stick figures that have a mobile base and a steerable camera at head height. Our first gesturing PRoPs use a small laser pointer which is steerable in two dimensions. The pointer allows the pilot to point at objects in the world and to make gestures that comprise motion only [there are no hands to shape]. We are not interested at this point in building android robots. PRoPs can have many useful social skills without looking human at all. If we can successfully impart a social skill to a PRoP without copying the human medium, we have learned something important about that skill. Anthropomorphism generates high expectations which these robots often cannot meet. Worse still, an anthropomorphic image conveys emotions and a state of mind which have nothing to do with the pilot's unless they are precisely controlled. Such control is complex and subtle, and well beyond our agenda for now.

Like any projection through a digital medium, PRoPs are impoverished compared to a live human being. When we describe the total experience of being there, we add "in the flesh". Flesh is our original interface to the world. It is one enormous sensor of warmth, moisture, texture, pressure and shape. There are many barriers to moving from PRoP presence to real presence, and the "flesh barrier" is an impassable one. Our response is to continue anyway. Human beings are master users of media, even impoverished ones. Especially when we communicate electronically with live human beings, we apply our full creative and improvisational skills to project ourselves into the other space. The medium itself melts away, and what is most real is the meeting of several individuals. Our research agenda is to find out what PRoP users want to do and express, and to capture and transport that action. The challenge for us as scientists is to avoid the instinct to name and circumscribe an action [what does it mean?]. Instead we must look for connotations [what could it mean?], and strive to preserve all of them.

Our PRoP exhibit includes terrestrial and airborne telerobots. The PRoP's designs are representative of just how much [or how little] of their pilot's presence is being projected into the remote space. Computer users within the Design Center, Linz, or from the Internet will drive them and will be able to converse with pedestrian visitors within the center. The blimp PRoPs will be easy to find. The stick figures will prove harder. On the surface, they are conspicuously inorganic, made from polyurethane and other plastics. After all, they have only recently evolved from pixmap values. But in reality they are just other visitors to the Ars Electronica festival. They share with you a fascination for the strange and new, and a craving to explore. You will find you have a lot in common.