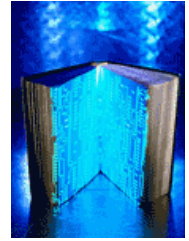


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Ken Goldberg Interviewed by RU Sirius, Sherry Miller & Jeff Diehl

Ken Goldberg has been working in the areas of robotics and telepresence for over a decade. His works have been exhibited at the Whitney Biennial, Venice Biennial, Pompidou Center in Paris, Ars Electronica in Austria, and The Kitchen in New York City. In 2000, he was a visiting professor at the MIT Media Lab and he's currently a professor of robotics at UC Berkeley. He also edited *The Robot in the Garden: Telerobotics in the Age of the Internet*. His current project is *Demonstrate*, an ongoing performance at UC Berkeley.



Ken Goldberg lives in San Francisco with his wife, filmmaker and **Webby Awards** founder, Tiffany Schlain and their daughter Odessa.

NEOFILES: So, tele-epistemology. How would you describe that and is this an important thing for human beings to understand? Is this at the center of our natures?

KEN GOLDBERG: ... or our consciousness?

NF: Or is it peripheral?

KG: Well, you went right into the jugular there, RU. I like that.

NF: Let's jump right into theory.

KG: Tele-epistemology was a word I came up with around 1998, but it was the result of a lot of years spent working in robotics, so maybe I should give some background. I was working in robotics at Carnegie Mellon. We were very interested in studying theory about how robots can manipulate objects. So we were doing a lot of experiments and theory. At night, I was working with some friends on some art projects involving robots. We were setting up robots to paint, and robot installations. Then I took a faculty job at USC and developed a project we did in a gallery. We set up a robot in this gallery space and installed it and got power and the thing ran for a couple of months and here's the problem: you get with a University gallery show — if you're lucky, a few hundred people come through to see it. So a few months later, in 1993, I heard about the web, and I saw that it was a great medium for getting people to see things.

NF: More participants.

KG: Yeah, lots more. And we also learned that there were plenty of these cameras — web cams — out there. We started wondering, can we build a robot that we can control over the web? In other words, we were not just able to access images but could we move things from a distance. Since we had a robotics lab, we had a robot handy. So we started working on its interface. And my students and I, and some colleagues in the anthropology department all worked on this after hours and between other things. And we got this thing called the Mercury project running in August of 1994 that allowed people to log in and move robots around. They could blow sand in a sandbox. We set it up as an archaeological dig where people could dig for artifacts we had buried in the sand. And this was in the early days in the web with very simple HTML — we didn't have any Java. Word got out and we had thousands of people coming



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each week and it was being used 24 hours a day. One interesting day I got an email from someone saying, "This is all great but I don't believe it for a second. There's no robot. You've just set up this elaborate hoax." This took me completely off guard. I thought, "What do you mean? The robot is right here. We've been working on it." But when I thought about it, I realized there wasn't really any way for him to know that. It was very plausible that it was a hoax.

NF: *Many people believed the NASA moon mission didn't exist.*

KG: Exactly.

NF: *The prefix tele means "at a distance", basically.*

KG: That's right. So you've had the telephone ... television. But in this case, you had a physical manipulation aspect. In other words, you were actually doing something. There was an action, an agency involved, so it was different from television.

NF: *Now, NASA was doing tele-presence before that. They were manipulating robot arms in space and that sort of thing.*

KG: The history of tele-presence or remote control is fascinating. It goes way back. Even the Egyptians had some devices that were controlled.

NF: *Can you talk about that?*

KG: The Egyptians? Well, actually though the one that fascinates me is **Tesla – he did a radio controlled boat in 1898**. That was in the early days of radio. People were still trying to figure out how to send any kind of signal. He built a boat and brought it to the World Electronics Exposition in Madison Square Garden. He created a little lake, put a boat in there and then with a very primitive RC console, he drove it around the lake. That was the first remote controlled ... radio controlled vehicle. And then there was a big resurgence of interest around World War II because there was a need to handle radioactive substances.

NF: *And in the late 80's and early 90's when everybody was talking about virtual reality, telepresence was one aspect of the discussion that was going on there.*

KG: Well, I like to draw distinction between VR and TR, Tele-Reality. And you're right, the word telepresence was often used indistinguishably with VR. And people still kind of mix up all those terms. But the difference is that in VR you're exploring a fictional world, it's an environment that is purely synthetic inside the computer. So there is data that get displayed in some kind of graphical display. maybe with audio, but you know you're in a synthetic environment. Tele-reality is where you are looking at something that is distant. Now there is a gray area in there; something is distant but it ultimately gets represented to you through bits and some kind of representation. So you're left with a sort of perceptual gap and to some degree you're not sure if you're dealing with something real or not. And that's where tele-epistemology comes in.

SHERRY MILLER: *So you have projects that happen at a distance and people can access them on the internet. But do you have projects at a distance with no internet? In other word, you would have a camera or something down there, but you're just controlling it from home or from your machine. This would have a more sinister aspect than something being done in public.*

NF: *So you're asking if he has any creepy personal projects that nobody knows about?*

KG: Well, no. But I think even doing it on the internet opens up control questions in very interesting ways. As RU was saying earlier, NASA has been experimenting with tele-robotics, tele-operation, and the government has had it for a long time. But the difference between the Mercury Project and subsequent projects was that it was the first time, to our knowledge, that an ordinary person gained access to controlling devices remotely. And that was a shift in two directions. One: it let people have access to these mechanisms; robots and high-powered cameras. But it also introduced a new set of questions because now you get to experience the control and the ambiguity of having that power. The initial project that really raised these issues was **Telegarden**. This was a garden you could interact with over the internet using a robot. Surprisingly, people came and spent a great deal of time there. They moved around and looked at the plants, watered plants. They could also plant their own seeds. And what we found was a fairly sizeable community that developed around this garden – people who would



come in every day and tend their plants. Sometimes, when they would go on vacation, they would send email or they would post in a discussion group: "Could someone water my plant while I'm away". And the thought came up, "Can you imagine spending weeks or months doing this and then someone tells you, "By the way there is no garden."

NF: Right. So was there?

KG: I can't really say.

SM: So are you really here? [general laughter]

NF: Your current project, "Demonstrate," seemed to me to be about this democratization of the power of surveillance. Please say a bit about the project and how people have reacted to it.

KG: Sure. This was a project we did last year that was commissioned by the Whitney. They had an opening at their online web gallery for a project that was going to launch in September, 2004, and we were experimenting with robotic cameras. And we had access to a very powerful new class of cameras that just came out. It's a robotic camera, but it can pan, tilt, and zoom, and it has 22x optical zoom. So we installed it on the outside of the fifth floor of a building overlooking Sproul Plaza in Berkeley at the university. And you could zoom in over the courtyard and read the title of a book over someone's shoulder. So we decided to build an installation around that camera and make it public. It was also timed to coincide with the **Free Speech Movement** anniversary which was launched in Sproul Plaza.



NF: And that's a whole scene where people are paranoid about surveillance, because this was a group that was **heavily surveilled** then and over the following years.

KG: What's so eerie is if you look at an aerial photograph taken from 1964, Sproul Plaza looks almost identical to the way it was then. The buildings, all the locations, are exactly the same. So you can pinpoint the spot where the police car was surrounded during the famous event of that time — the sit-in, where Mario Savio made his speeches ... a huge moment. It was fascinating because it was 1964, right after the Republican National Convention was held in San Francisco. And one of the things they were doing was recruiting protesters against the convention.

NF: It's an important history. Younger people who don't know about it should look into it.

Let's get back to your project, forty years hence.

KG: I want to mention Michael Rossman, who we both know. I really respect him. He almost singlehandedly organized the anniversary events. And he helps to maintain a free speech movement group, **website archives**, etc. I went to him very early on and said, "How do you feel about this? We're going to do this as an artwork to raise questions and have discussion about surveillance in our time and ultimately relate it to free speech." And he was very gracious about it. He thought it was a great idea and was really supportive. We also felt it would be a way for people to participate in the anniversary celebration when they couldn't make it physically. But he also talked to his colleagues and some of them were concerned ...

NF: I could imagine. So just to clarify, you've got these cameras able to focus very minutely on people hanging out in Sproul Plaza during the celebration of the 40th anniversary of the Free Speech Movement. And my understanding is that you had this project going on before the gathering, when people were just hanging out on the Plaza?

KG: Yes. We got permission from the student union to install this camera on the 5th floor of the student union building. And it's a domed camera that can look out over hemispherical range of view so you could look all the way down Telegraph Avenue [Ed: street that runs up to the University, and Sproul Plaza], and you can swivel it around to look over "Sather Gate" and anywhere in between. And I should add that this thing was available twenty four hours a day on the web and — as I said, could be zoomed down for a very close view.

NF: So it's not up anymore?

KG: No, we took it down. The Whitney Exhibit opened on September 1, 2004. My students and I spent about 6 months developing the website. It involved a pretty elaborate system where you would come in and register to participate, so you couldn't just come in casually. And then you could use the camera, you could zoom in and look at things, but you could also capturing photos ... take pictures. And then we encouraged people to post their photos and write captions underneath them. And other people could make comments on your captions and you would get points. So we built a scoring model in to encourage

actively participation.

NF: *Did the people hanging out in Sproul Plaza know what was going on?*

KG: Yes and no. We did make a strong effort to post lots of fliers around there. It was covered in the student paper and by some local press. So we very much tried to alert people. One of the questions we were interested in was; is there a sense of privacy in a public space?

NF: *So like when I smoked that joint at the FSM celebration ... [laughter]*

KG: ... we have it all on film now. It's in the archives.

NF: *...with Howard Dean.*

KG: Let's take a hypothetical. So imagine that you go out and say, "OK, I'm going to smoke a joint on the side of the Plaza." Now, you have a certain expectation that you're doing that with an element of privacy or at least anonymity. And if someone comes over to you, you can throw it away or walk away. Or if they come over with a big camera you can say you'd rather not have your picture taken right now. But in this case, you don't know. The camera is 5 stories up and you just don't know where it's pointed. And this was an issue that resulted in a lot of interesting discussion. On the other hand, I should mention there has been a cam maintained by the university in Sproul Plaza for five years or so, but it just provides an overview. But our camera was too close for comfort. What line did we cross? This really fascinated me from an engineering point of view. You have something that's ok at this level, but not ok at another level, so there must be a point where you cross over.

NF: *Did there wind up being real confrontations over this or just basic civil discourse?*

KG: There were very interesting confrontations. The first one that happened was about a week after it was up. The camera suddenly went dead. And we went over to check it out, figuring that there was something minor, something had come unplugged. We looked it over and couldn't find the problem. After three hours of studying it and trying to trouble shoot this thing we found that it had been sabotaged. Someone had gotten on the roof, which is locked, had crawled over, opened up the switch box, pulled out the wires and very delicately sliced the cables and fed them back in so when we looked at them the cables looked fine. It was a very sophisticated job.

NF: *There are lots of great anti-surveillance protest groups. There's that wonderful one in New York City, the ...*

KG: ... **The Surveillance Camera Players.** In fact, we had a link to them on our website. So we were sympathetic to that. That was the intent of the project. In any projects we set up there is always a potential for sabotage or some kind of malicious behavior. I almost hate to say this but we sort of welcome it because it's part of the spirit of the project.

NF: *It's becomes part of the performance. You incorporate it ... this is what happened.*

KG: It's part of the game. You put something out there that people are going to be able to manipulate in an interesting way; you have to expect that they are going to do something unorthodox with it. Anyway, in this case, we fixed it. And I have a theory about who might have done it, but it doesn't matter. It was a sign to us that this was being taken very seriously. Another thing that happened to us was we got into some discussions with the campus authorities because there was some concern over whether there was some liability in such a camera. So we got involved in discussions with a faculty member from the law school and she and I have been doing research on this ever since.

NF: *Where would the liability be? Was the idea that somebody might sue over invasion of privacy?*

KG: Also, were there any laws broken? So it turns out that it's very complex. The law is a bit gray in this area and there's a lot of opportunity for study and policy.

SM: *How about money? Is there an opportunity to make money?*

NF: *There are these great spy shops around. There is a lot of interest among individuals who want to do surveillance themselves.*

KG: Tell me about it. Since 9/11, many commercial technology companies — Sony, Panasonic, Canon and others — have come up with all these small and powerful cameras in response to market demand for better surveillance. That's why *this* camera was available.

SM: *How would you compare this to the way conversations are tapped into by various new techniques?*

KG: Audio is interesting because it is clearly illegal to sit in your window on a

5th floor window, and use a parabolic microphone to listen in on conversations. But of course, you can go to any spy shop and buy such a parabolic microphone. So audio is covered by the wiretapping laws. So you're not allowed to listen in on conversations; that's pretty well protected. In fact, one of the issues that came up with the camera was the question, "What if two people are deaf and having a sign language conversation." If you're intercepting that, are you in violation of those laws?

JEFF DIEHL: With podcasting, people are doing these things called site seeing tours. Because now, with the players that have little MP3 coders, you can walk around and record whatever is going on around. **Adam Curry**, the guy who helped launch podcasting, bumped into this. He was in New York at a convention and walking around guiding his listeners through the hotel lobby to play around and experiment. But he had a conversation with somebody and some personal stuff was said — and he didn't disclose that he was recording. And he started to question what he'd done ... was there an ethical or a legal problem there?

And there's a wide interest in taking these players around and recording whatever you get and possibly finding something interesting.

KG: Of course, digital technologies are getting much more sophisticated. And most voices on cell phones, land lines, even voice over IP are communicated digitally. It's all coming out as bits, which are storable and interceptable. And I'm also very interested in questions of resolutions. Pretty soon, you might have a very sensitive high-resolution microphone in your cell phone that's able to pick up not just nearby conversations, but with analysis, side conversation going on in another room.

NF: *And there is this new technology coming up that is able to direct sound specifically at a person.*

KG: Parabolic microphones are already pretty sophisticated. It's shocking how well you can pick up from even 100 yards away.

NF: *Let's talk about the voyeuristic aspect of all this. We had **Lynn Hershman** on last week and she deals with voyeurism in her films. And I intended — but forgot — to raise the question, is voyeurism even an issue anymore? We used to consider voyeurism something of a pathology. But at this point, in our culture, it's kind of like a fish considering swimming a pathology. Everything is about watching other people; porn, reality TV ... everything. We have fully become voyeurs — that's what we are. I wonder if any thoughts about that were raised by your project.*



KG: Yeah. (And I should mention that I love Lynn's work.) The whole idea of observing is also very much a part of our public, urban experience. What's been changing is the ease with which we are able to transmit those things over distances. Essentially the cat is out of the bag. Once something gets posted on some website, it gets archived by Google and it's there forever.

SM: *You're an artist but you're an engineer as well. You talked before about collaging different digital media. It seems that art and technology have converged to the point that both definitions are old. We may need an entirely new concept for what people like you are doing.*

KG: I think about that a lot. It's interesting that there is a very deeply rooted distinction between these two that I think goes back to their roots. Art comes from the Latin for arms which further translates into "join." So it's putting things together. And science comes from the same root as scissors which is to cut — to cut things apart. So they are opposites, in that sense. But over the last ten years, we've had so many people crossing over between the two realms. So many artists are becoming much more comfortable with technological tools and technologists are starting to explore art work. So I operate in both modes. For me, it's very different. When I'm thinking as an engineer, I'm thinking very differently than I am as an artist. And when I'm an artist, I'm generally critiquing ... creating and critiquing.

I remember hanging out with art students at Carnegie Mellon in the late 80's and it wasn't cool to do technology. And now it is cool, so you're expected to know a few tricks in using various video tools. It's changed dramatically.

SM: *Beyond that, technology is generating fifty million images all by itself. So even that distinction is blurring.*

KG: That's a very interesting statement. I still think there's a distinction to be made in terms of originality.

NF: *In the early 1980s, Andy Warhol famously said, "I want to be a robot". So do you want to be a robot, Ken? Or anything other than a human being?*

KG: Well, I'm turning 44 this year so I'm starting to think already about the various prosthetic devices I'll need. I do want to be able to come here and have these kind of conversations in 40 years or so, and if I can do that robotically I'll be happy.

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