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Computer Science Ethics

## Ethics Surrounding Computer Control of Complex Systems

There seems to be a dichotomy in our society, in which we mistrust computers and those that are responsible for their creation and abilities, while at the same time, constantly integrating their usage into our everyday lives.

Technological demonization has become more and more prevalent in people's examinations of society. *The Matrix* is a superb example of artificial intelligence "gone awry." At the same time that very movie made broad use of computer based special effects. Again, we see the dichotomy between people's distrust of technology while depending on it at the same time.

This solid integration between humanity and computer has both positive and negative effects on society. At the same time there does not seem to be much discussion of the effects of this integration on humanity, nor is there any discussion of the morality of computer systems in general. Because of these two distinct topic areas, it is necessary to take a two tiered approach to this discussion.

### **Effects of Automation on Society**

In the last several years there has been an explosion of technological automation in almost every facet of our society. Often time's people are completely unaware when

they are interacting with a computer system. Even more surprising is the replacement of humans when dealing with very complex systems. Often times people have begun to think that computer systems are more trustworthy in some situations that are “mission critical.” Even more amazing is that some systems being developed require a computer system to operate, as they are too complex to be operated by human elements.

When dealing with national defense, the United States Department of Defense (DOD) has invested billions of dollars into computing research. The Anti-Ballistic Missile (ABM) developed by the DOD is a prime example of a system so complex that the only way for it to work is if the system is controlled by computer systems. David Lorge Parnas states, “It is clear to everyone that computers must play a critical role in the systems that SDIO (Strategic Defense Initiative Organization) is considering.” A system so complicated that it must make use of computers to complete computations in time to intercept ICBM’s (Intercontinental Ballistic Missiles). These systems often involve very power counter weapon systems that are in turn controlled by these computer systems. We must ask ourselves if we’re willing to relinquish control of these systems to software control.

People have become blissfully unaware of how embedded software systems are becoming in our society. Nuclear power facilities depend upon computer systems for monitoring and maintaining many of the systems found therein. Modern cars have firmware controlled navigation and transmission systems. We have to decide if we’re willing to relinquish control of these systems. So much of the “wow” technology of our modern times only further entrenches technology into society, and we need to decide to what level we’re willing to allow this.

On a much smaller scale, Computer Science as a science is beginning to feel the pinch from this automation of underlying systems. “Programmers” can now create graphical user interface software with Microsoft’s Visual Basic or Visual C++ without any knowledge of the underlying even driven nature of the software system. Many compiler classes are taught using Lex and Yacc to generate parsers. Again, the Computer Science community must decide to what extent people must understand the underlying systems they are using.

It is also useful to examine how computers affect human interaction at it’s simplest levels. New research is being conducted to examine how people interact differently in a electronic mediums. TRURL, a simulator created at Tsukuba University by Takao Terano attempts to examine social interaction between individuals by having software based agents interact with human based agents in an online virtual world. The hope of the system is to better understand the interaction between humans in general. (Terano)

Along the same lines however, when we are dealing with the integration of technology into society, we must examine to what extent we are willing to allow computer/software/firmware systems to be integrated not only into society, but into humanity. It’s important to realize that it has already begun to some extent, cyborgs have been a part of society for a long time. We just need to make some decisions about to what extent we’re willing to allow this sort of integration.

To what extent are we sacrificing our humanity when we hand power over to these systems? On the other hand, how much are we limiting ourselves when we don’t make

use of these computer systems to assist us in reaching greater heights? We as a society have to make a decision as to what extent we are willing to allow ourselves to relinquish control of these complex systems to complex systems of our own design?

### **Morality of Software Systems**

Although as a society we may be willing to hand over control of complex systems to computers and software, it is beneficial to examine the abilities of computers when it comes to making “judgement” calls. The question we really begin to ask is if a computer is capable of making moral or ethical decisions. At the same time, we must then decide if we are willing to stand by that computer system when it has to make a “tough call,” as we are willing to stand by doctors when they have to make unpopular decisions in the operating room.

When we discuss the morality of computer systems (Machina Sapiens, according to Dan Dennett’s Darwin’s Dangerous Idea) we call into question some of the elements that make us “human.” This probably is why the topic of moral or intelligent computers brings about so much controversy, as we are examining ourselves and admitting that possibly something non-human can exhibit these properties.

Denis Susac of About.com states quite well, “Is it possible for there to be a morality higher than that preached by our greatest religions and philosophies?” When dealing with computer systems and their morality, we must at the same time be willing to admit that quite possibly a machine could be more moral than a human. Much like when we deal with intelligent systems, we must allow the system to be greater than

human intelligence. I think that this is primarily where some of the fear aspects of artificial intelligence come into affect. Admitting that we are not the ultimate creation in the universe is quite an ego hit. Not to mention the idea that humanity could possibly create something beyond itself.

If humans have the Ten Commandments (for example) as their judge of morality, should not robots have a similar set of rules? Isaac Asimov has proposed that robots and software systems have three rules, the “Laws of Robotics.”

- 1.) A robot may not injure a human being, or, through inaction, allow a human being to come to harm.
- 2.) A robot must obey the orders given it by human beings except where such orders would conflict with the first law.
- 3.) A robot must protect its own existence as long as such protection does not conflict with the first or second law.

I think the real key to robotic / software morality lies in the abilities of those programmers creating the systems being moral individuals. If a moral individual creates a system, the system will strive to be moral as well. Of course this leads us back to the real question, and that seems to be are there any moral human beings? Of course, concerning Asimov’s laws, I have to ask, “What makes humans so special?”

The issues surrounding computer control of complex systems is one that requires some examination of more human issues, as well as examining the social effects of what happens when computer systems begin to replace those in the work place. We must make a judgement on what “matters” in our society. We must also be willing to accept that computer and software systems can display typically “human” characteristics.

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