MACHINE-MACHINE TO MAJOR TOM: CYBERETHICS[*]

The Honorable John McClellan Marshall[**]

I. INTRODUCTION

In the fourth century, B.C., Plato noted that Socrates was fond of beginning many of his dialogues with the phrase "Know thyself." The statement, in effect, prefaced that what was going to happen next would be in its very essence both personal and human and set the tone for what was to happen in much of Western civilization for the next two thousand years. The advent of the Space Age in the late 1950s fostered a shift in the fundamentals of social interaction that became reflected in the reaction to that shift of the ethical system that had, until then, been at the base of Western culture. It is in this context that the technology created by the Space Age ultimately fostered development of the *machine-machine interface*. The requirement for human action was steadily reduced in direct proportion to the increased ability of machines to communicate with each other and accomplish tasks. Both chronologically and philosophically, the issue for society now is one of *cyberethics*: the relationship between the ethical and

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legal systems that have been developed to serve humanity from ancient times to the present as expressed in our philosophical and ethical systems of thought and the judicial process as contrasted with the ability of computer-driven technology to operate outside those conventions with almost no limits. At its simplest, the issue could be framed in the question, "Is your car smarter than you are?" At its root, however, is the more important question of, "Does the machine feel, know, or even care?"

II. HISTORY

A. *MAN-MAN INTERFACE*

One way to address the shift in the fundamentals of social interaction that had, until the Space Age, been at the base of Western culture is in the interface relationship between humans and their technological creations. Prior to the eighteenth century, much social, cultural, and commercial interaction could be described as stemming from a *man-man interface*. In other words, people related to each other in a face-to-face mode, whether it be in shopping, voting, or even in wartime. Ethical and value systems reflected this relationship as society developed concepts of "right," "wrong," "good," and "evil," and then refined them based upon the common experience of mankind. Technology in such a circumstance clearly was a tool to implement these values and was unquestionably under the control of human beings. Whether it was a sword or a

printing press, the human element had to be present in order for it to function. For that reason, ethical behavior was never not present in this system.

B. *Man-Machine Interface*

During the Industrial Revolution of the nineteenth century, the socio-economic structure of society underwent a transition to the beginnings of what can be termed a *man-machine interface* in which technology became an extension of man in his activities. The impact of this shift can be seen in the development of the assembly line, automobiles, and post-World War II Levittowns, which were communities composed of preplanned "cookie cutter" residential development. Obviously, the factory system and the automobile were extensions of human beings in terms of enabling them to perform tasks and to extend themselves well beyond what had hitherto been possible. This process accelerated dramatically with the Cold War and its demands for technological superiority over potential threats to global survival.

C. *Machine-Machine Interface*

It is in this context that the Space Age wrought its magic on the society that existed in the middle of the twentieth century and created the *machine-machine interface* in which the requirement for human action was steadily reduced in direct proportion to the increased ability of machines to communicate with each other and accomplish tasks. With the diminution of the role of humanity, the ethical and value systems that had hitherto defined human society

likewise appeared to be diminished. As the humanity that had driven the functioning of the system has been steadily replaced by machine logic, the result has been that the system that we have known as "Western civilization" may have been deprived of one of the bases of its validity and may well need redefinition. Thus, both chronologically and philosophically, the issue for society now is one of *cyberethics*: *the relationship between the ethical and legal systems that have been developed to serve humanity from ancient times to the present as expressed in our philosophical and ethical systems of thought and the judicial process as contrasted with the ability of computer-driven technology to operate outside those conventions with almost no limits*.

III. PRESENT CONTEXT OF CYBERETHICS: THE DEVELOPING COLLISION BETWEEN HUMANKIND'S ETHICS AND THE UNFEELING MACHINE

A. *MACHINE-MAN INTERFACE*

As time and technology have progressed beyond Apollo 11 and the space shuttle and toward the close of the twentieth century, there has been another, almost imperceptible, yet undeniable, shift to a *machine-man interface* that reflects the action of a machine programmed to perform increasingly complex tasks formerly done by a human being. As human beings more and more depend upon (read "defer to") the ability of their creations to relieve them of responsibility for decisions, man has tended to become the extension of the

machine that he created. The most catastrophic example of this deference is the *Columbia* disaster in which a factor was the inability of the crew to counteract the computer-driven response to the overheating of one side of the spacecraft.[1]

At its simplest, the issue could be framed in the question, "Is your car smarter than you are?" If a driver should be tempted to answer "Of course not!" then consider first whether the car will automatically refuse to start if it does not recognize his or her fingerprint or voice, or if it tells the driver that he or she is too close to another car (which, by the way, is warning its driver that he or she is too close). At its root, however, is the more important question of, "Does the machine feel, know, or even care?"

1. *The Medical-Legal Context of Machine-Man Ethical Issues*

Perhaps nowhere in our society does this collision between the ethics that have defined mankind's behavior for hundreds, if not thousands, of years and the inability of the machine to "feel" take place more frequently than in the practice of medicine. For example, some types of microsurgeries that are routinely performed today, such as certain neurological repairs in the reattachment of severed limbs, did not exist ten years ago because the technology that allows them to be done did not exist. While in many cases, the life-saving and life-altering nature of these procedures is undeniable, the question remains whether merely

[1] Assertion based on author's understanding and knowledge of the shuttle systems and reports on the unfolding of events. *See also* COLUMBIA ACCIDENT INVESTIGATION BOARD, COLUMBIA ACCIDENT INVESTIGATION BOARD REPORT VOLUME I AUGUST 2003, at 73 (2003), *available at* http://caib.nasa.gov/news/report/pdf/vol1/full/caib_report_volume1.pdf.

prolonging existence is an inherently valid societal value to be supported technologically.

At one time in Dallas County, if a patient were taken to an emergency room in a life-or-death situation and was unable to communicate consent to medical treatment, the medical-legal emergency system in place dictated that the treating physician could obtain from a judge a court order allowing treatment to proceed. Of course, the denial of the order was also a possibility, in which case the patient would likely die. Obviously, the burden of the decision rested on the judge involved in the process, and the decision had to be made on very limited, yet real-time and urgent, information, much of which came from machines attached to the patient. Ironically, the decision rested in the hands of a person who is not a medically trained specialist but one more likely to be a product of the liberal arts. The ethical issue arises both because of the source of the information and the fact that while machines can extend human existence almost indefinitely under certain circumstances, the decision itself is characteristically based upon intangible factors utterly external to the machine.

For example, on one such occasion, I received a call that involved a thirty-five year old man who had arrived at the emergency room with liver failure, failing kidneys, and full-blown AIDS. He was going in and out of coma at the time of the call, and the physicians wanted an order permitting them to apply both heroic surgical measures and an open-ended application of machines to sustain

the patient. They admitted that he would likely lapse into a permanent coma soon. I told them to call me back when he went into a coma that, according to at least one psychiatrist and one neurologist, was irreversible, and I went to supper with my family. While at supper, the cashier came to our table with notice of a phone call. The physicians reported that the patient had gone into an irreversible coma. Even if he came out of it, he would be a vegetable and would not live long because of the other problems that he had. I told the physicians to make him comfortable and to let him go.

While some may disagree with the decision, at least it can be said that it retained its humanity, however flawed, and did not abdicate to a mechanical thought process or, worse, to a machine. On a personal level, consider that when there is a family member who is comatose, is on life support, and could remain so indefinitely, the decision as to when, or even if, to terminate the mechanical aid is an ethical one based upon the value system that is in the decision-maker, not a preprogrammed machine.

2. *Transhumanism: A Uniquely Machine-Man Issue*

Particularly in the modern medical context, whether of microsurgery or of life support systems, the reality is that human beings are ever more routinely deferring to robots to allow impaired human beings to perform normal human tasks. This hints that the definition of the *machine-man interface* may be in the process of being expanded by what is sometimes referred to as "*transhumanism*."

The word itself implies that human beings as unaugmented organisms may have entered a period of, at the least, obsolescence in the minds of some philosophers for some purposes. In its most basic manifestations, this is expressed by the use of scientific devices, whether chemical or mechanical, to extend to extraordinary extremes what would otherwise be normal human capabilities.

B. Considering Laws of Robotics as a Solution to the Machine-Man Ethical Problem

It is here that, rather than abdicate trustingly to machines in this process, our society needs to consider Isaac Asimov's First Law of Robotics: A robot may not injure a human being or, through inaction, allow a human being to come to harm.[2] This formulation clearly implied that there is a *machine-man interface* between the robot and the human being in which the human being was viewed as the primary component of the system. In 2009, Professors Robin Murphy and David Woods, from the computer science and systems engineering departments of Texas A&M University and Ohio State University, respectively, formulated the "Laws of Responsible Robotics."[3] Their first law stated, "A human may not deploy a robot without the human-robot work system meeting the highest legal and professional standards of safety and ethics."[4] While this at least injected the

[2] Isaac Asimov, *Runaround*, ASTOUNDING SCIENCE FICTION, Mar. 1942, at 94 (*Runaround* was the original title of the story that became *I, Robot*).

[3] Robin R. Murphy & David D. Woods, *Beyond Asimov: The Three Laws of Responsible Robotics*, IEEE INTELLIGENT SYSTEMS, July/Aug. 2009, at 14-20.

[4] *Id.* at 17.

concept of ethics into the decision-making process, there remains the issue of what the machine might be capable of doing independently, such as making a life-or-death decision, in the absence of close supervision by a human being. This issue of control over the device and the extent of the control by the human being remain at the heart of the debate about the *transhuman* phase of the *machine-man interface.*

One example of the impact of *transhumanism* is the experimental use of the emerging psychotropic drugs to relieve the symptoms of PTSD in military personnel. This introduces the concept of using artificial means of altering the mental processes of an injured person in order to achieve a desirable result in the treatment of traumatically created disabilities. From that, it is merely a short step to the use of technology to achieve similar outcomes. In March 2002, Kevin Warwick, a professor of cybernetics in the United Kingdom, had installed in his own arm a "telepathy chip" that, when connected to the nerves in his arm, allowed his brain to communicate wirelessly with a robotic hand that moved as his brain dictated.[5] The robotic hand that was demonstrated had sensors that allowed it to

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[5] Eben Harrell, *My Body, My Laboratory*, TIME.COM, Mar. 6, 2011, http://www.time.com/time/magazine/article/0,9171,2050030-1,00.html.

> [Kevin Warwick] had volunteered to go under the knife so surgeons could hammer a silicon chip with 100 spiked electrodes directly into his nervous system via the median nerve fibers in his forearm. The goal was to fire electrical impulses into his brain to see whether a human could learn to sense, interpret and reply to computer-generated stimuli.
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pick up a glass gently and to put it down without breaking it. In May 2012, a paralyzed patient in the United States demonstrated a similar feat with a robotic arm via a sensor chip implanted in her brain on the motor cortex.[6] The life-altering benefit to someone who had lost an extremity due to misfortune is obvious.

All of these advances undoubtedly have positive potential uses that would greatly assist humans with disabilities and extend their lives almost indefinitely. When applied to such currently intractable issues as astronaut survival on extended interplanetary travel missions, such principles create the appearance of a potential for accomplishing such tasks in the foreseeable future. It takes little imagination to conceive of a cyborg designed to encase the body of Stephen Hawking that then can be operated indefinitely and wirelessly by his brain and could "telepathically" operate other machines as well. In such a circumstance, it would be possible for an astrophysicist to embark upon an extended voyage to

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> The chip in Warwick's arm did what it was intended to do, picking up neural action potentials—the signals sent from the cortex when a person thinks of moving a limb but does not actually do it. That allowed Warwick to use thoughts to control an electric wheelchair and, through an Internet connection, an artificial hand back in his lab in Reading. Six weeks after Warwick was wired up, his brain learned to interpret signals sent back from the chip too; when an improvised sonar device was connected to the implant, Warwick could sense how far away an object was from his arm even while he was blindfolded.

Id. at ¶¶ 1, 3. *See also* Kevin Warwick et al., *The Application of Implant Technology for Cybernetic Systems*, 60 ARCHIVES OF NEUROLOGY 1369 (2003), *available at* http://archneur.jamanetwork.com/article.aspx?articleid=784743 (the article states that Warwick had the chip removed ten days after it was implanted).

[6] Fergus Walsh, *Paralysed Patients Use Thoughts to Control Robotic Arm*, May 16, 2012, BBC, http://www.bbc.co.uk/news/health-18092653 (the patient had the chip installed in her brain in 2006 and demonstrated the robotic arm by having it pick up a metal flask with a straw and bring it to her mouth so she could take a sip).

verify or refute new theories concerning the universe. Indeed, with such "telepathic" chips, it may well already be possible to design a spacecraft that would not only protect the pilot, but would be operated as an extension of the mind of the astronaut to the extent that the two during their voyage together would enjoy a certain symbiosis. Training for such a mission would be quite different from what has gone before, if only because the distinctions in the *man-machine-man interface* thus created would be severely blurred.

Yet, while the machine might well be able to do the task assigned to it by the human brain, the question would inevitably arise as to what the machine might do if the brain were to cease to direct it for whatever reason. It is the readiness, rather than "laziness," of our society to allow the application of such mechanical logic derived from the machine in the drive to achieve a given objective that is the key to understanding the subtle danger posed to our value system by modern technology. To that extent, as Anaïs Nin, the twentieth century erotic author and poet, wrote, "We do not see things as they are, we see things as we are."[7]

IV. CONCLUSION

As matters presently stand, it is clear that, in the words of the old television series *The Six Million Dollar Man*, we physically can rebuild someone better and faster than before, but the question remains, "Should we?" Even if nothing further should be done in terms of mechanical augmentations to people,

[7] ANAÏS NIN, THE SEDUCTION OF THE MINOTAUR 124 (1961).

the cyberethical problem in such a situation has been posed in its most basic form: namely, is the machine to be an extension of the person or *vice versa*? Put another way, does the ability of the machine to extend the limits of human physical existence and capabilities indefinitely in fact "injure" a human being by impacting the totality of his or her humanity in such a way as to violate Asimov's First Law of Robotics? Until the machine that man is capable of creating to extend his or her humanity can "know itself," or at least "feel," the question of whether or not it should be allowed to operate independently will continue to be at the center of the cyberethical problem. Just as Clemenceau once said that "war is too important to be left to the generals," so it may be that how the *machine-man interface* evolves from here may be too important to be left merely to those who can build *The Six Million Dollar Man*.[8]

[8] Originating as the novel *Cyborg* by Martin Caidin and several television movies, the television series ran from 1974 to 1978, starring Lee Majors as an astronaut involved in a catastrophic accident whose injured body parts are replaced by mechanical devices that enhance his physical performance.