**Freshman Seminar Proposal by Alden Wright, Computer Science**

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**Proposal**

I have taught **CSCI 216E Technology, Ethics, and Society** three times since it was approved in the spring of 2009 as a Gen Ed Ethics and Human Values course (under the course number **SCI 220E**). I have submitted a proposal to have the course approved as a lower-division writing course. I propose this course with minor modifications as a freshman seminar for fall semester 2012. This offering of the course would concentrate on robotic, artificial intelligence, and genetic engineering technologies.

**Background**

Robots have been improving the productivity of manufacturing for many years. More recently, robots, including unmanned aerial vehicles (drones), are changing the nature of warfare. Robots are likely to play an increasingly important role in our lives. Applications of robots are likely to include elder care and child care as well as more mundane applications like janitorial jobs and driverless cars and trucks. The close association between robots and people raises a number of ethical and social questions. We naturally tend to interact with humanlike robots as if they were people despite the fact that emotions shown by current robots are purely simulated. We form emotional attachments with them, and these attachments can replace or interfere with our relationships with people (Turkle, 2011). Is it ethical for robot to set up an expectation of a personal relationship that it cannot fulfill? This is one question of the new field of machine ethics (Anderson, 2011).

Computer scientists have been working on artificial intelligence (AI) for at least the last 55 years, and steady progress has been made. For example, the data mining techniques currently used to analyze “big data” are derived partly from AI research. On a more personal level, interacting with a smart phone via speech recognition is becoming common. It appears that current supercomputers have the computational capability for human-level intelligence but we don’t know how to write the software to achieve this. One way that more human-like intelligence might be achieved is by reverse engineering the low-level processing of the brain. This approach is being followed by only a few research groups (Hawkins, 2005), (George & Hawkins, 2009), but positive results might inspire others to follow. The ability to run such approaches on small low-power hardware seems likely.

Human genetic engineering has the potential to change what it means to be human. Preimplantation Genetic Diagnosis (PGD) is a commonly used procedure for screening embryos for genetic defects as part of in vitro fertilization. It is (primitive) germ-line genetic engineering. Other non-germ-line genetic engineering techniques are being tested as therapies for a number of genetic conditions. Will human genetic engineering cross the line from therapy to enhancement?

Digital interfaces to/from the nervous system also have the potential to change what it means to be human. For example, a quadriplegic human has controlled a robot arm (USA Today, 2011), a monkey has controlled his paralyzed arm, and a monkey has felt what it was holding with a robot hand, all through brain interfaces. It seems likely that this technology will become a standard treatment for paralyzed humans. These techniques raise the possibility of brain-to-brain communication between people and direct brain-interfaces to artificial intelligence. Will people choose to use these technologies for enhancement? Our experience with cosmetic surgery suggests that the answer is yes.

The long-term sustainability of humanity depends on the resolution of these and similar issues.

How can we prepare for these possibilities? The ethical attitudes and approaches taken now towards current technology will set precedents for future technology. This course will consider the ethical issues that arise from current technology with consideration of the possible longer-term effects. Students will be encouraged play a role in global society by expressing their views on these issues in appropriate forums.

While learning about these technologies and related ethical issues will be valuable to students, the most important objectives of the course are in the areas of critical thinking, writing skills, and presentation skills.

**Proposed Catalog Description**

**New technologies expand possibilities for the individual and society, but also generate new ethical questions, debates, and dilemmas. This course will examine these ethical issues in the context of ethical theory in the western secular tradition. After a rigorous introduction to the central concepts, principles, and problems of ethical theory, the course will focus on applying these theories to robotic, artificial intelligence, and genetic technologies.**

The course could be offered under the CSCI 216E course description.

**Course Objectives**

* Students should acquire knowledge of at least these basic approaches to moral theory: cultural relativism, utilitarianism, deontology, social contract theory.
* Students should acquire knowledge of current and possible future developments in robotics, artificial intelligence, and genetic engineering.
* Students should develop skills in ethically analyzing realistic cases that involve these technologies.
* Students should develop critical thinking skills such as: clarity, careful analysis, critical reflection, rational argument, evaluation of references, and application of the scientific method.
* Students should learn to evaluate information sources concerning science and technology.
* Students should develop their skills in critical and analytical writing.

**Course Structure and Requirements**

For most class periods, there will b a reading assignment from the ethics text, from the web, or an article posted on Moodle. Students will be asked to write answers to one or two questions relating to the reading assignment on a wiki. I will read these answers before class but not grade them for content if they do a reasonable job of answering the questions. There may be an unannounced quiz on the reading. Then the reading assignment will be discussed in class, sometimes with the class divided into groups.

There will be seven writing/presentation assignments:

* A mini-research paper on a specified topic. Students will need to use citations and references in APA format.
* A full research paper with a topic, a first draft, and a final draft graded.
* Two ethics case study analyses. These assignments will lead into the ethics bowl.
* An ethics bowl which is a debate on ethical issues.
* A presentation.
* A position paper.

The full research paper will be on a specific technology topic of the student’s choice. The position paper is similar except that students are to advocate a particular position. In all writing assignments, students are expected to use high quality references with citations and references formatted according to APA specifications.

Students who write strong research or position papers will be encouraged and assisted to further develop their research paper and/or position paper for submission to the undergraduate research conference.

**My background**

**I was a 1964 Phi Beta Kappa graduate of Dartmouth College and a 1969 Ph.D. graduate the University of Wisconsin Madison, both in mathematics. I was a mathematics professor at the University of Utah and Western Michigan University until 1983 when I joined the Computer Science department at the University of Montana. When I left Western Michigan, I was a tenured full professor. I have approximately 50 refereed research publications including 26 since 2000.**

I officially retired as of June of 2009 after 26 years in the computer science department, the last 6 as chair. Currently, I am a research professor and have Emeritus status. I continue to do research in evolutionary computation and bioinformatics. I am being paid for teaching as an adjunct at the rate of $5000 per course. My teaching is arranged semester by semester.

I have had a passion for science since I was a child, and I will continue to remain involved with the University and the CS department as long as I can make a meaningful contribution.

**References**

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