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Handout #11
July 11, 2016

Final Project

Project registration due:	**Sunday, July 10**
Abstract due:	**Monday, July 11**
Annotated bibliography due:	**Wednesday, July 13**
Miniconference dates:	**July 15**
Web site due:	**Monday, July 25**

This handout describes the final project for the course. The basic idea behind the project is for you—*working together in a small group of between three and four people*—to investigate some issue in the practice of computer science and engineering that raises significant ethical questions. The deliverables for the project are as follows:

- *Topic registration.* The first step in the process is to choose a topic and a project group consisting of three or four people. When you have figured out who your partners will be and what you want to do, please send me an e-mail message indicating (1) the names of the people in your group, and (2) an ordered preference list of topics. Because we will not allow two different groups to work on the same topic, sending in your response early ensures the widest possible choice.
- *Abstract.* By Monday, July 11, each group must submit an abstract of their project, which should be no more than 300 words in length and may not include any content other than text. Be sure to include the title of the project and the names of your team members.
- *Annotated bibliography.* To make sure that each of the groups is making progress, we're also asking each group to develop a reference listing for your topic. Each reference should include 2-5 sentences summarizing how the source contributes to your project. These background materials can come from a variety of sources—books, journals, the web—but must include at least one source that was (at least at some point in its life) non-electronic. You will, of course, presumably find additional material before you finish your web sites. We will try to direct you to additional sources if we know of material that might be useful.
- *Miniconference presentation.* During the last day of class, we will hold a miniconference on "Current Social, Ethical, and Public Policy Issues in Computer Science." Each of your groups is responsible for giving a 15-minute presentation of your topic that offers an overview of the central issues. Your project group is responsible for organizing the presentation, which may involve a single speaker or multiple members of the team. The presentation will be evaluated on the basis of its clarity and the success with which information is conveyed to the audience.
- *Web site.* Because the oral presentation is short, it can highlight only the main points and cannot cover any topic in detail. To provide the in-depth analysis, your project team is also required to construct a set of pages for the World Wide Web that offers more detail. Because web pages are hypertext documents, it is appropriate—and

indeed expected—that your pages will contain links to pages at other sites. Even so, your web site should present a running narrative and analysis that is complete in itself, relying on the external links primarily as supplementary background or reference material.

Evaluation

The division of labor for your project team is up to you to decide, but you should attempt to balance responsibilities among the team members so that no one is overloaded. Because the oral presentation is short, only one person—two at the most—should actually deliver the talk. Note that it is expected that all team members will be at the presentation. It may therefore make sense to assign to other team members the task of supervising the development of the web page. Even so, the work for the projects should be done as a team, with all members providing some input to each component of the task.

Unless there is compelling evidence to suggest otherwise, all members of the project team will receive the same grade, even though there will clearly be individual differences in the level and quality of effort. Thus, it is in the interest of every team member to ensure that the quality of all aspects of the project remains high.

Choosing a topic

The first step in the final project consists of choosing a project. The topic must be one in which the use of computers raises significant social, ethical, or public policy issues, but must not be one that has been covered extensively in class. Some possible projects include:

1. *Reliability of the cloud.* For a week in the middle of April, 2015, serious problems at Amazon's data center in Virginia led to major slowdowns in its cloud-based services that it contracts out to other companies. As a result, websites for several firms (including, for example, Quora, Foursquare, and Big Door) were unavailable or sluggish for extended periods of time. At almost the same time, Sony admitted that hackers had broken into its cloud-based record system for its online-gaming system, stealing information from over 75 million users. How have these and other failures affected the growth of cloud-based services, which have been all the rage in recent years?
2. *Using artificial intelligence for command and control.* For many years, a number of countries have been working to apply artificial intelligence to military problems, many of which have taken the form of building smarter and more autonomous weapons systems. For the last five years, a consortium of British universities and military contractors have been working on a project called ALADDIN, which is an acronym for Autonomous Learning Agents for Decentralised Data and Information Networks. The point of ALADDIN is to coordinate the actions of human soldiers, taking the role of the senior officer in the field. What is the current state of development for the ALADDIN project? What ethical and political issues does such a system raise?
3. *Smart phones and economic development.* On March 10, 2005, *The Economist* ran a cover story describing mobile phones as the next "killer app" for the developing

world, citing a growing body of evidence "that the mobile phone is the technology with the greatest impact on development." Since that time, the computational power of mobile phones has increased substantially, making them even more important to economic growth in developing and newly developed nations. It would be interesting to report on how the increasing power and availability of smart phones is changing the economies of developing countries.

4. *Micropayments and the web.* One of the hot topics in recent years is the possibility of developing a secure, reliable system for assessing very small charges called *micropayments* for web content. To make economic sense, the cost of assessing micropayments cannot be too far out of line with the payments themselves, which has historically proven to make such schemes unworkable for small charges. New firms such as Peppercorn (one of whose founders is Ron Rivest, the "R" of RSA encryption) are seeking to change that economic equation. What sorts of technological, economic, and social issues arise in such schemes?
5. *Net neutrality.* In the United States, defenders of a free and open Internet have been campaigning for *net neutrality,* which holds that Internet Service providers should be barred from placing restrictions on either the traffic that flows over the network or on the types of devices that can be connected to it. Commercial interests—particularly those that control both content and infrastructure—have typically sought to restrict or privilege particular types of content for their economic advantage. A project surveying the current state of the net neutrality debate and how that debate is being played out in Congress would be very interesting.
6. *Self-driving cars.* With the first fatal crash involving self-driving cars, folks have realized that there is a significant policy vacuum concerning how these cars should be regulated. This is a great opportunity to look at many of the ethical issues involved, and to craft appropriate policy recommendations towards what we, as a society, should do in regards to these cars.
7. *Nonwestern perspectives on computer ethics.* The philosophical positions examined in the second day of the course were all part of the Western tradition. How would other established philosophical traditions look at the issues raised by the computing age? To make this topic manageable in size, it is best to pick a particular philosophical framework and consider it in depth rather than a very general survey.
8. *Technology trends in developing economies.* Even as the number of students pursuing computing degrees declines in the developed world, emerging economies such as China and India are putting significant resources and effort into developing their high-tech workforce. How well is this campaign working? Do highly skilled workers continue to support their home economies, or do they use their talent to find positions in wealthier countries? In what ways does the high-tech boom in places like Bangalore create social and economic imbalances for these countries?
9. *International trends concerning freedom of information in the electronic commons*. Individual countries apply widely divergent policies and rules for the Internet, even though the system itself increasingly transcends the notion of national borders. China, for example, imposes significant regulation on the content of Internet sites, but so do many other countries in what are perhaps less draconian ways. In much

of the European Union, for example, it is illegal to sell Nazi memorabilia, and online retailers like eBay have been blocked from advertising such material there. At the same time, there is a strong sense among much of the Internet community that "information wants to be free." How has the situation changed in recent years and where are things headed?

10. *Code and the regulation of the Internet.* In 1999, Lawrence Lessig published a thoughtful book entitled *Code and Other Laws of Cyberspace,* in which he argues that the Internet will be controlled by two kinds of code: the software that shapes the technology and the legal constraints under which it operates. A synopsis of this book that seeks to combine Lessig's analysis with additional examples and commentary would be an interesting project.
11. *Press freedom for bloggers.* In November 2004, details of the Apple's forthcoming Asteroid application were published anonymously on several bulletin boards that cater to Apple enthusiasts. Apple filed a court request for a subpoena that would force the ISPs to reveal the identities of the posters. Several civil-liberties organizations have argued that the postings represent online journalism and that they should therefore be granted the same press freedoms that apply to traditional journalists. Two courts, however, have so far ruled in Apple's favor. There should be enough material in the Apple lawsuit and other similar cases to make a solid project.
12. *The Google Books project*. In December 2004, Google unveiled an ambitious plan to digitize and republish a massive collection of books in public domain. The company now has agreements with several large university libraries—including those at Stanford, Harvard, and Oxford—to scan the books in their collections. That process, however, has included the scanning of books still under copyright and those for which the copyright status has not been determined. Google has argued that scanning such works is within the domain of "fair use" as long as the complete scanned text is published on Google Books. Several publishers have disagreed and sued Google for copyright infringement but reached a settlement in 2008. In March of this year, however, Federal Judge Denny Chin rejected that settlement, leaving the legal status of the project uncertain. A project that reviews the state of the project and analyzes the competing arguments would be very timely.
13. *Virtual worlds*. In the quarter, we talk a bit about the growth of virtual worlds such as Second Life but will by no means exhaust the topic. Particularly if you include Massively Multiplayer Online Role-Playing Games like World of Warcraft in the virtual-world genre, the number of people involved in this particularly immersive form of virtual reality is large. How are these virtual worlds changing in recent years, and how is the culture as a whole changing in response?
14. *Technology and transhumanism.* The convergence of computing and biotechnology over the last several years have fostered greater interest in the possibility of using technology to enhance human beings. In the vision of the most enthusiastic proponents, human capabilities would soon be expanded to such an extent that the result would be a new species, transcending the biological limits on humanity. This movement—which has many names including *transhumanism* and *extropianism*—has found many of its adherents in the high-tech communities of Silicon Valley. It

would be interesting to hear a report on the fundamental of transhumanist theory along with an analysis of the ethical issues these ideas raise.

15. *Multinational software development*. In recent years, countries within the EU have undertaken several high-visibility projects that involve substantial amounts of software. Such projects, for example, include the new generation of Airbus planes, the Large Hadron Collider at CERN, and the as-yet-undeployed Galileo Global Navigation Satellite System. In some of these projects, software development contracts have been spread across companies in several different European countries as a way of ensuring that the work for the project is more equitably shared. What effect has this policy had on the success of these software development efforts and the projects to which that software applies?

16. *National differences in electronic infrastructure*. Even though we have ourselves all come to think of the Internet as an ever-present part of our daily infrastructure, the availability of Internet resources varies widely around the globe. Despite the fact that the United States led in the development of this technology, the level of Internet penetration on a per-capita basis is lower in the United States than it is in several other countries such as Denmark, Sweden, and Singapore. At the other end of the spectrum, many nations in Africa not only have incredibly low levels of Internet connectivity but also often lack a communications infrastructure on which to base such access. What are the implications of these differences in Internet connectivity on the economic prospects of the nations and regions involved? What strategies have been proposed or adopted to increase the level of access? In selecting such a project, it would certainly be best to concentrate on a particular country or region.

17. *Licensure and other regulatory strategies to improve software quality*. Whenever a software failure generates significant publicity, policymakers talk for a while about the need to improve the quality of software development. Additionally, there has been a good deal of discussion recently concerning licensure for those who directly handle sensitive data. Within the US Department of Defense, DoD directive 8570 virtually requires CISSP designation for all those who work with classified data, certainly a form of licensure. One common proposal is to require computer professionals to be licensed in the way that doctors, lawyers, civil engineers, and many other professionals are. Another proposal that surfaces from time to time is the idea of mandating particular software development and testing strategies that help to ensure compliance with best practices. Neither of these suggestions have made much headway in the United States, although a licensing bill nearly passed the Texas Legislature a few years ago. To what extent have other countries adopted measures of this sort? What has been the experience?

18. *Journalism in the Digital Age*. As the availability of news and information on the web expands, newspapers and other traditional media have faced a growing challenge. The advertising revenue that once made it possible to support an expensive news desk has moved online, forcing many newspapers to discontinue their operation. In the United States, the trend has reached the point at which many journalists fear the complete collapse of their profession. Europe presumably faces some of the same pressures, but there are also differences. How are newspapers,

magazines, and other print media holding up? Are there any differences in strategy that might be relevant to their counterparts in differing countries?

19. *Free expression versus maintaining social cohesion*. Few countries other than the United States take a relatively absolutist view in terms of protection of the freedom of speech. In Germany, for example, the government outlaws neo-Nazi propaganda and Holocaust denial in the interest of preventing a recurrence of the fascism and genocide of World War II. As clips we'll see from the film *HATE.COM* later in the course make so vivid, it is much more difficult to control the spread of information in the age of the Internet. What strategies have the countries in the European Union (or elsewhere) attempted in their attempt to control information that is profoundly dangerous to society?

20. *Computers and the environment*. Given software's abstract nature, those of us who build software often think about computing as an environmentally friendly undertaking. As it happens, however, the manufacture of computing is often anything but "green." Silicon Valley is home to some of the most polluted Superfund sites in the country, and the rapid obsolescence of hardware ensures that a steady stream of outdated machines piles up at local landfills. What are the environmental issues that arise in computing manufacture and what steps are being taken to reduce similar problems in other countries?

21. *Environmental impact of the physical structures of the "cloud"*. The New York Times did a series of articles a couple of years ago on the impacts of the massive server farms/data centers that have been and continue to be built:

    http://www.nytimes.com/2012/09/23/technology/data-centers-waste-vast-amounts-of-energy-belying-industry-image.html

    http://www.nytimes.com/2012/09/24/technology/data-centers-in-rural-washington-state-gobble-power.html

    http://www.nytimes.com/2013/05/14/technology/north-jersey-data-center-industry-blurs-utility-real-estate-boundaries.html

    As this seems to be a direction technology is heading, I think that there are many considerations that are not being addressed. These articles discuss several technical issues, but there are also interesting ethical and policy considerations.

22. *The future of Social Media*. Social Media is not just Facebook/Twitter but includes a vast collection of such other means as Usenet Newsgroups, assorted online forums and mailing lists, customer feedback forums, P2P links, Darknet, etc., etc. 70% of HP's customers have done online search of what they want to buy before they ever walk into a store. The potential of social media to influence world events (think Arab Spring, for example), to be used as an early predictor of things to come, etc., is vast. It is also a vast field for data mining and snooping by governments and by commercial entities. What will be the social media 10-20 years from now?

23. *Working conditions in the developing world*. In early 2012, This American Life ran an episode "Mr. Daisey and the Apple Factory" about the conditions in the Chinese factories that produce Apple devices (and all sorts of other electronics). While Mike Daisey largely fabricated his story (which led to PBS's retraction of this episode, the horrible working conditions about which he writes (from virtual slavery to long

hours to exposure to hazardous chemicals, etc.) have been documented elsewhere, for Apple's subcontractors as well as for other high tech companies' subcontractors. See for example: http://www.nytimes.com/2012/01/26/business/ieconomy-apples-ipad-and-the-human-costs-for-workers-in-china.html?_r=1&hp What special obligations do high-tech companies have towards the conditions of their subcontractors' workers?

24. *Anonymity*. What are the ethics of anonymity? Given that anyone can malign anyone else over the Internet anonymously, should anonymity be banned? But what about the US Supreme Court Decision that stated that anonymity is essential to the ability to express a locally unpopular opinion, i.e. essential for the exercise of 1st Amendment rights?
25. *The value of privacy*. Keith Schwarz came across a recent article in The Economist about a nationwide ID system in India. While the system seems to be a huge privacy invasion (India has notorious poor privacy safeguards), in practice it appears to actually have a major positive impact on the poor: http://www.economist.com/node/21542763. How can governments value individual privacy?
26. *Bitcoin, and its ethical/policy implications*. I was in a café, and noticed that you could pay for your coffee in Bitcoins. An article in the Guardian (http://www.theguardian.com/technology/2013/aug/19/bitcoin-unit-of-account-germany) notes that Bitcoins are now recognized, in limited circumstances, as a unit of currency. This is all somewhat strange to me, especially as the seeming majority usage of Bitcoins is for illegal (and untraceable) transactions. I do see a future world where Bitcoins could be a "real" currency.
27. *The business, legal and ethical Impact of software technology in the music industry*. The Internet has caused a paradigm shift in the way that customers and companies think of music and ownership rights. The digitalization of music led to the increased popularity of content sharing platforms. The increased availability of music in the web changed sales patterns in the industry. The transformation of media distribution from the sale of a physical product to the transfer of intangible data has impacted the perception of the economic value of music. There are many sensitive ethical issues around this, especially in the area of intellectual property and piracy.
28. *Choose a software innovation (e.g. Google Glass, Siri, etc.), and explore the ethical and policy implications of that innovation*. More than one team can choose this option, but the specific innovation must be different. Please send me which innovation you'd like to choose if selecting this option.

If you want to choose a topic other than those listed above, you must get my approval beforehand by sending me a short description of your proposal.

Only one group will be allowed to choose any particular topic, so send in your choices early. First come, first serve.

Important note: Please connect your presentation/web site to the ethical issues and policy considerations we have been discussing in class and reading about over the course of this class.