Villanova University
Department of Electrical and Computer Engineering
ECE Day Professional Assessment Essay
STUDENT ASSIGNMENT

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All ECE 4970 and 4971 students are required to write four separate essays, a minimum 200-words each on the essay topics listed below as 1,2,3,4.

Please submit the essays, combined into one Word document via the Blackboard system, no later than Thursday, November 17, 2016. This assignment is part of the ECE Day requirement of the ECE 4970/1 course and counts as 10% of the final grade.

The aim of this essay assignment is to reflect upon the topics addressed by the ECE Day speakers, in terms of technological, global, societal, and ethical impacts.

Support your comments with concrete references to articles or texts. Include appropriately cited references.

Topic descriptions (you need to write one essay per topic)

1. Lifelong Learning

With regard to the ECE Day presentations, cite specific examples of a) knowledge that the speakers had to learn/develop during their careers (rather than during their formal education), and b) knowledge related to the presentations that you do not expect to possess at the time of graduation. If you wanted to gain this expertise after graduation, how would you go about getting it? (Please respond with a separate minimum 200-word essay.)

Limited:	Does not see the need for life-long learning and continual professional improvement.
Satisfactory:	Sees the need for life-long learning and can cite several specific examples
Mastered:	Sees the need for life-long learning, and can cite several specific examples, and has a concrete plan/strategy for continued life-long learning and professional development.

It's an important point to make that learning does not stop after formal education. I have subscribed to the notion that experience is the best teacher. Formal education in the form of grade school, college/university, and graduate school serve as the very important and crucial foundation on which you build after you graduate and enter the workplace. The four presenters we had last Thursday perfectly showed that they continued to learn after they graduated. Michael Gallagher and Ryan Rathbun, for instance discussed how they learned of the many connected devices in homes and their security risks. With the internet of things being a relatively new idea, it just didn't exist when either of them were in school. They had to learn about these devices, and come up with solutions to the security risks they pose. Sridhar Solur from Comcast Cable and Xfinity Home talked about how he founded HP's mobile printing service, ePrint. I don't expect to know how to accomplish such a task right out of receiving my bachelor's degree, or perhaps even my master's degree. Solur spent some time working for HP before developing this service. I think it's important to have mentors to work closely with. These mentors can be coworkers, professors, supervisors, or anyone who possesses skills or knowledge you desire. There's a saying that you should never be the smartest person in the room. And I agree with this statement completely. You should always have someone to look up to and learn from.

2. Contemporary Issues

With regard to the ECE Day presentations, cite a specific example of a project that was discussed that pertains to important contemporary issues. Demonstrate your knowledge of these issues (you may need to research this), and explain the connection / relationship to the project. Examples of contemporary issues include but are not limited to: safety, mobility, security, privacy, hunger, health care, violence, poverty, stereotyping, individual freedom, free enterprise, social justice, sustainability, unemployment, terrorism, social networking, and the environment. (Please respond with a separate minimum 200-word essay.)

Limited: Demonstrates little knowledge of contemporary issues.
Satisfactory: Demonstrates concrete knowledge of several contemporary issues
Mastered: Demonstrates concrete knowledge of several contemporary issues and explains how these are related to a specific project.

Medical care can receive enormous benefits from fully utilizing the Internet of Things. Sridhar Solur from Comcast mentioned the idea of personalized medicine. He also mentioned that we will soon be exposed to 1000s of sensors of all types every single day. Each of these sensors could measure something different. For example, it could measure blood glucose if you have diabetes. Potential services could look at your medical history, family history, current medications, drug interactions, height, weight, sex, age, brain wave activity, heart rate, calories burned, hours sitting, BAC, macronutrients and micronutrients from food you eat, and the list goes on all to give you feedback on what medicine is best for you. We're already seeing a form of this with the Apple Watch and Fitbit, where it monitors your activity, calories, and even caloric intake. Apple's Healthkit can be integrated with this to provide doctors a holistic view of your body to make an educated and informed decision on prescribing medication. I can foresee a future where we have nanobots inside our bodies monitoring for any abnormalities (ie. detecting a virus, bacteria, etc), and rectifying the situation in any way shape or form. Our bodies are intricate, yet delicate, machines. If we could harness the power of technology and the Internet of Things to help monitor our bodies, keep them healthy and free of disease or illnesses, I do not even have to mention how much society would benefit from that.

3. Ethical Issues
With regard to the ECE Day presentations, cite a specific example of a project that was discussed that also presented some ethical issues. Describe / explain the ethical issues involved, and suggest how they might be addressed by practicing engineers. (Please respond with a separate minimum 200-word essay.)

Limited: Recognizes few if any ethical component of a project with little or no explanation / justification.
Satisfactory: Recognizes several ethical components and provides some explanation / justification
Mastered: Recognizes most or all of the ethical components of an issue with clear explanation / justification, and also describes how these might be addressed by practicing engineers.

In Michael Gallagher and Ryan Rathbun's presentation, they talked about the fact that with the growing presence of "enchanted objects" or the Internet of Things, there is also a growing risk of a security breach. I believe they said something along the lines of that the Internet of Things is growing faster than cybersecurity can deal with. For example, in respect to vehicles becoming connected to the Internet, there was a group of guys who hacked a Jeep to cut its power when driving on a highway. This is not only a huge security risk, but it is also a huge safety issue. Gallagher and Rathbun both emphasized that engineers need to spend more time focusing on making their products more secure. The product design and development needs to take a more holistic approach. We have to focus on not only the functionality, but also any security risks. For medical care, this is especially important. With more and more medical devices being connected to the internet every day, the amount of sensitive information that could easily be accessed by a malicious person is immeasurable. As engineers, we have to make sure that the products we help create are secure. Not only that, but we have to create easily accessible documentation for said products so that the consumer can easily understand the steps they need to take in order to be secure.

4. Societal Impact
With regard to the ECE Day presentations, cite a specific example of a technology that was discussed and describe the different impacts it might have on society, whether positive or negative. Provide justification as to their impact. (Please respond with a separate minimum 200-word essay.)

Limited: Identifies very few possible societal implications of a given technology and presents only a weak case for how these are related to each other.
Satisfactory: Identifies several possible societal implications of a given technology and presents a case for how these are related to each other.
Mastered: Identifies most possible societal implications of a given technology and presents a strong case for how these are related to each other.

Without a doubt, autonomous vehicles are poised to revolutionize the way we get around, transport goods, and live. Sridhar Solur from Comcast mentioned self-driving cars in conjunction with the butterfly effect. In his presentation, he touched on the fact that new technologies can have unforeseen outcomes or consequences. For instance, he noted that there are twenty-one states in which truck driving is the number one profession. When self-driving cars become the norm (and it isn't a question of *if* it is more a question of when), what will happen to these truck drivers? Without truck driving out of the equation, this opens up many more avenues and opportunities for them to seek out. Transporting goods would then become significantly cheaper without having to pay someone to drive. Hence, all goods would see price drops (that is unless corporations decide to keep the same price and enjoy a large profit margin). Regardless, people who currently drive for a living would have to find other jobs. Perhaps, this opens them up to pursue their intellectual passions. Perhaps there's a completely new set of jobs that we have no idea about yet. In addition, without human error, we would see a huge drop in automobile accidents and fatalities (essentially zero). This means, insurance would be much cheaper, hospitals could focus their resources on non-automobile related accidents, and much more. Solur mentioned that cars connected to the internet would change leasing rates and hence change business models. Of course, this is a very limited scope, but we can begin to see the huge range of impacts and societal benefits self-driving cars have.