EECE 2160 - Embedded Design: Enabling Robotics Spring 2016

Paper Assignment: Two-page (single-spaced) technical brief
Due: Thursday, April 21st (11:59pm on Blackboard)

During this course you have been implementing embedded systems in both software (using C and C++ on an ARM microprocessor) and in hardware (using Simulink on a Xilinx FPGA). There are a number of tradeoffs associated with implementing a system in software versus hardware. This assignment will allow you to consider some of these tradeoffs.

Pick a technology of your choice, new or existing, research the technology, and propose new developments, or implementation of the same or similar technology.

Evaluating various subsystems of the technology (e.g. sensing, motion, control, etc.), discuss which elements, or subsystems (two or three), of the embedded design should be implemented in software and which ones would be better implemented in hardware, and why.
In your discussion, address the following points with careful thought and consideration:

1. What processor and/or FPGA board would you use? Justify your choices.
2. What programming language would you use in the processor? Justify your choice.
3. What would you use to program the hardware? Justify your choice.

4. Discuss any safety issues that might be of concern with the design and use of the technology. As the designer, what would you do to reduce these issues?
5. Discuss any ethical issues that may result from the use of the technology.

Answering these questions is going to require that you to perform some research on FPGAs, CPUs, programming languages and hardware description languages. Do your best to justify your choices. Make sure to properly cite your sources.

Your two-page (single-spaced) paper should have at least the following sections:

a) Introduction
b) Main body (may or may not have subsections and figures)
c) Conclusion
d) References

Note: This is a technical brief. Try to keep it at 1-2 pages only. It can include diagrams and tables within the 2 pages.

Examples of technology

- *Vacuum robot*
- *Self-balancing smart wheel*
- *Quadcopters and drones*
- *Mars rovers*
- *Humanoid robots*
- *Gaming devices*
- *Your choice*