EL-GY 6483: Real Time Embedded Systems
NYU Tandon School of Engineering
Fall 2019

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1 Course Information

Instructor:	Matthew Campisi *mcampisi@nyu.edu*
Office hours:	Thursday 10AM - 12PM, 370 Jay, 8th floor
	Other available by appointment
Lectures :	Thursday 6PM - 8:30PM, JAB474
Prerequisites :	Basic knowledge of C, computer architecture
Teaching assistants:	TBA
TA office hours:	TBD
Textbook:	No required textbook. Optional references:
	1. Computers as components: principles of embedded computing system design. Wolf, Marilyn. Elsevier, 2012.
	2. Real-time systems design and analysis: tools for the practitioner. Laplante, Phillip A., and Seppo J. Ovaska. John Wiley and Sons, 2011.
Required materials:	Feather M0 with WiFi, info TBD
	Available from many online retailers for about $20
Grading:	Homeworks: 20%
	In class quizzes (Open notes): 40%
	Final Project: 40%

2 Course Description

This course provides an overview of the unique concepts and techniques needed to design and implement computer systems having realtime response requirements in an embedded environment. It contrasts the concepts and techniques of real time and embedded systems with those of more traditional computer systems. Topics include: Basic concepts of real time and embedded systems, hardware features, sensors and actuators, programming languages, real time operating systems, synchronization techniques, performance optimization and current trends in real time and embedded systems such as incorporating internet connectivity.

3 Outline

The following is a outline of the course topics:

- Preliminaries : definitions, examples of embedded systems, computer organization concepts, memory
- ARM Cortex M0+ Hardware Overview: Ports, Registers, GPIO, Analog I/O, ADC/DAC
- Communication : Parallel, USB/Serial, USART, SPI, TWI, Ethernet, Wireless
- Interrupts and Timers : ISRs, counter management
- Programming Languages: C for embedded systems and ARM specifically, Assembly, software development environments and methods of programming
- RTOS Characteristics: Scheduling, priorities, reentrancy
- Modeling embedded systems : finite state machines and extensions
- Future of embedded systems : Networking and IOT (Internet of Things)

4 Policies

- Please familiarize yourself with, and follow, the university policies on add/drop deadlines, missing classes for religious observance, accomodations for students with disabilities, and other special circumstances.
- This class has open-notes in class quizzes. "Open notes" means that you may use any printed or handwritten material. However, you may not use electronics, speak to other students, or share written materials with other students.
- More information on the Final project will be provided in class