Welcome to CS 4833 Embedded Systems

Fall 2018

Instructor: Dr. Dakai Zhu

About Me: Dakai Zhu (sounds like Zoo ☺)

- Research Interests
  - Real-time/Embedded systems
  - Scheduling algorithms and resource management
  - Low power computing: make your phone last longer!
  - Fault tolerance: make systems more reliable!
  - Object detection/recognition/tracking for robot auto-driving
- Embedded systems: performance vs. power
  - Robot platform: LEGO EV3, Tetrix, and Pioneer 3AT robots
  - Embedded computers: RaspberryPi, BeagleBone Black, ODROID XU4, Nvidia TK1 and TX2 etc.
- Research opportunities
  - Talk to me anytime !

Lecture Outline

- Introduction and attendance sheet
  - Self introduction: name, when to graduate, and future work interest etc.
- Operational information
  - Our class **contract** ☺
- Introduction to Embedded Systems

Operational Information

- Office: NPB 3.338
- Office hours:
  - Tuesday: 10am – 11:30 am
  - Thursday: 6pm – 7:30 pm
  - Or by appointment
- Contact information
  - *** Email: dakai.zhu @ utsa.edu (preferred contact)**
  - Phone: 210-458-7453

Textbooks and Class Webpage

- Required textbook:
  - ***Embedded System: A Contemporary Design Tool***
    *by James K. Peckol (**JKP**), Wiley, 2008; ISBN: 978-0-471-72180-2*
- Prerequisites:
  - **CS 3843: Computer Organization**
  - **Good programming skills**
- Class materials: **Blackboard**: http://learn.utsa.edu/
  - Course materials (slides, homework, labs/project)
  - Homework, and labs/project submission
  - Grade report (required by UTSA)

Course Objectives

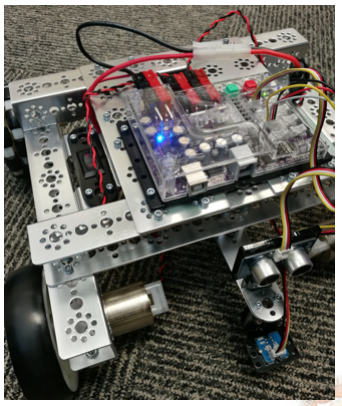
- Learn basic concepts of embedded systems
- Understand design principles and technologies behind the embedded systems
  - Hardware/software technology capabilities and limitation
  - Design tradeoffs evaluation methods between different technologies/approaches
- Learn programming with embedded systems
- Obtain hands-on experiences
- Improve team-work skills

Topics (Tentative)

- Embedded System Structures and Design Principles
- Hardware: Gates, Processors and Memory technologies and composition
- Software: UML diagram
- Interact with physical world
  - I/O, sensors and actuators (motors)
  - A/D and D/A conversion
  - Interfacing and communications
- Real-time and Control Systems
- Robot programming: Python (RP3) and Arduino C

Programming Platform: The Mobile Robot !

- Each set: >**$1,000:** do NOT miss or break parts
  - TETRIX MAX programmable robot w. PRIZM controller
  - RaspberryPi 3 + BrickPi



Labs and Final Project

- Several (about 4) labs + one final project
- Labs/project: **teamwork**
  - Only have 10 sets: a group of 3 students per set
  - **All teammates are responsible for the equipment**
    - ✓ **If broken, will be asked to replace them at your cost ☺**
  - Labs/project will be conducted in the classroom during lecture time
  - Experiment sets need to be returned after each lab and can NOT be taken home
- Grading for labs and project: same for all members
  - Report on each member's contribution!

Overview of Course Work

- **Good part: NO final exam! ☺**
- Two midterm exams (**40%**)
  - **20% each**
  - closed books/notes
- Homework and labs/project (**60%**)
  - A few (2 or 3) homework: 10%
  - Labs (4) and final projects: 50%
  - About 6-7 weeks (out of 16 weeks) for labs/projects
- **Attendance** to lectures/labs is **mandatory!**
  - **Miss 3 lectures/labs → one grade mark down!**

Grade Policy: Yah, This is Important ^_^

- **No makeup exams !**
  - Two midterm exams: in class, 75 minutes
  - Tentative dates: **weeks 6 (Sept. 27) & 12 (Nov. 8)**
- **No late** homework and labs/project
  - Except for University sanctioned excuses
- Final grade:
  - >= 90% → A;
  - >= 80% → B;
  - >= 70% → C;
  - >= 60% → D;
  - <60% → F