EECS 388
Computer Systems and Assembly Language
Class website:
http://wiki.ittc.ku.edu/ittc/Eecs388

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Welcome !

- Today we will just cover programmatics and gee-whiz introduction

1. Office Hours

Andrews: Rm 2032 Eaton. MW 2:00 - 3:00 are “open times”.
Other times can be arranged (best by email).

Agron: Rm 3043 Eaton. MW 2:00 - 3:00

jagron@ittc.ku.edu

Baijot: Rm 3043 Eaton. MW 2:00 - 3:00

bricefab@ittc.ku.edu

Programmatics

1. Grade Breakdown
   1. 2 exams (Mid/Final) := 20% each. Exams are cumulative.
   2. Homework := 10%
   3. Laboratories := 50%
2. Midterm exam date announced 2 weeks before exam.
3. Class = Lecture + Lab
   1. Lectures: Concepts and theory
      3:1 rule applies (Three hours study for every hour lecture)
   2. Labs: Application of Theory
      Frustrating but satisfying and fun ! You get to build things.

Programmatics

- Homework: Assignments given in class (will try for Weds). Usual due date is 1 week later.
    - Gives you a chance to read, try and then ask questions in next class.
    - Due at Beginning of class. If you come in late, the assignment is late.
        - Each late day costs 10%
        - Will waive for valid reason presented before due date

Programmatics

- Labs
  - Posted on website. You may be required to have pre-lab work done to get into lab.
  - TA's have full authority on lab grading.

Programmatics

- Lectures: There is no textbook.
  - Links to reading materials and lecture slides will be on webpage.
  - Reading materials will be posted the weekend before. You need to read and familiarize yourself with materials before lecture.

Programmatics

- Academic Honesty: Very important. You are required to do your own work.
  - Labs will be done by partners. It's ok to work together in lab, get together after to discuss. However, you need to write up your own report in your own words.
  - TA's will give you formats and expectations for reports.
  - Dishonesty will be dealt with swifty ! If 1st offense, you get a zero on assignment and note in your records. If second offense, guaranteed F in course and possible dismissal from School of Engineering.

DON'T DO IT !

Gee Whiz

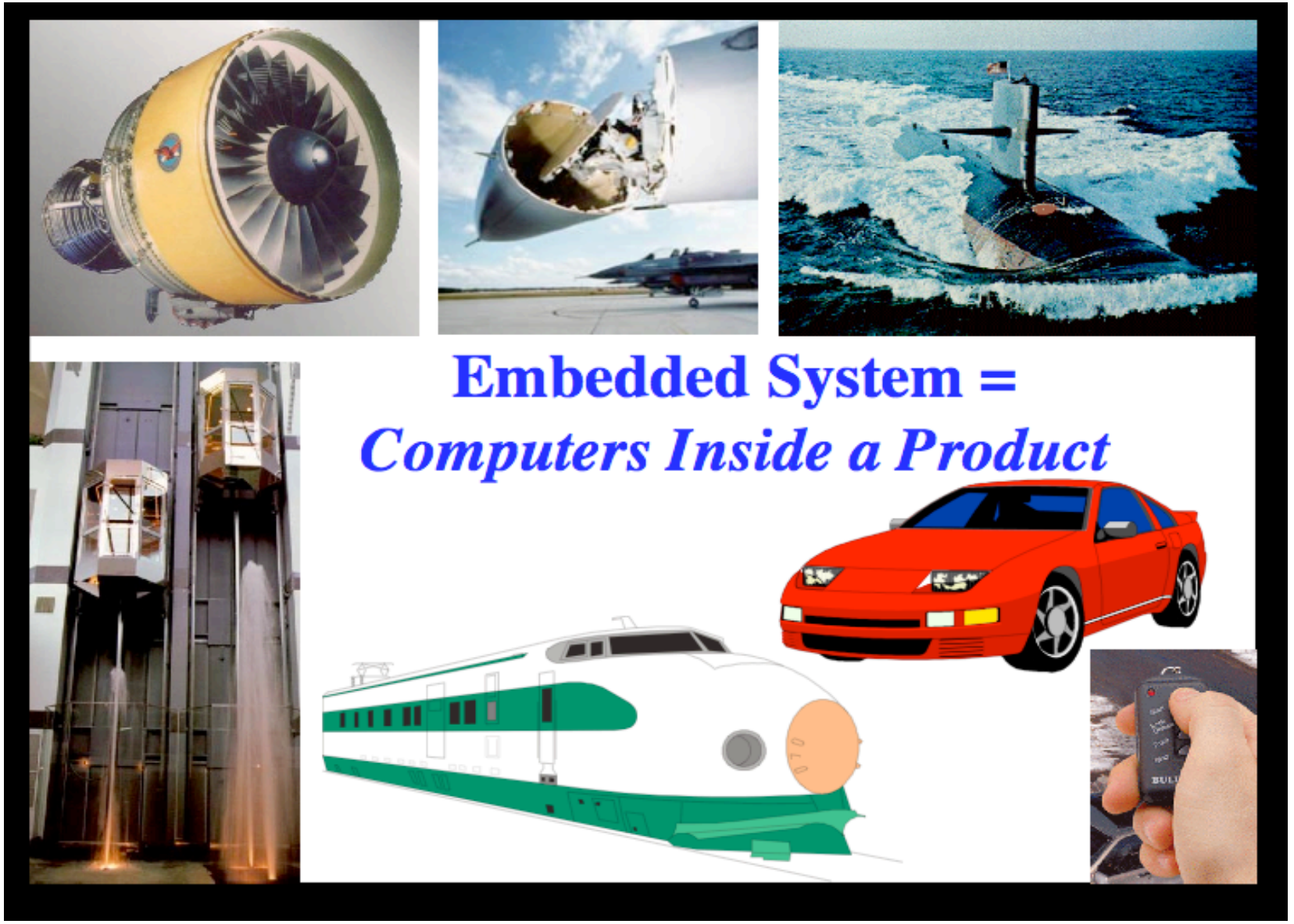
- What you will study:
  - Embedded Systems interfacing and design
  - Where Hardware and Software co-exist
    - Hardware Organization:
      - CPU: Basic components (how to build in EECS 443)
      - Bus Interfacing: Signals and protocols for communication between CPU & all other components
      - Memory: Decoding and hooking up to Bus
      - Peripherals
        - » I/O getting data in and out
        - » Priority Interrupt Controller: How things get the CPU's attention
        - » Custom Components: Accelerators and additions

Gee Whiz (Continued)

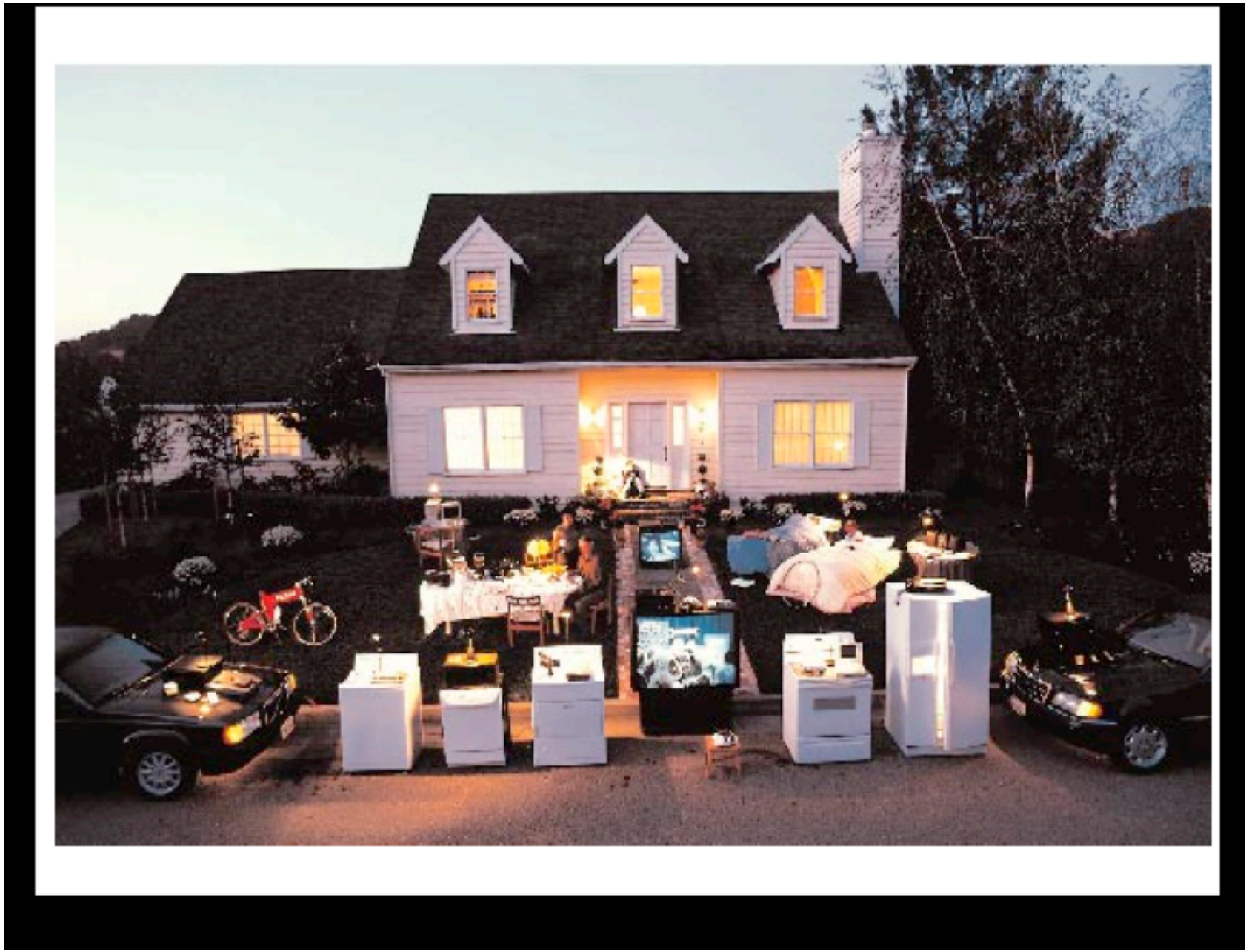
- What you will study:
  - Embedded Systems interfacing and design
  - Where Hardware and Software co-exist
    - Software Organization:
      - Assembler := CPU's language.
        - » Internal CPU Arithmetic and Boolean Instructions
        - » Data Movement into and out of CPU: How to communicate with other system components
        - » Protocol Stacks (How C/Java Functions & Subroutines actually get implemented)
      - Interrupt Routines:
        - » Special Instructions that allows external devices to request service

GEE Whiz

1. What is an embedded System ?
2. Why are embedded systems important ?
3. What do you need to know ?



From Koopman http://www.ece.cmu.edu/~ece649/lectures/01_intro.pdf

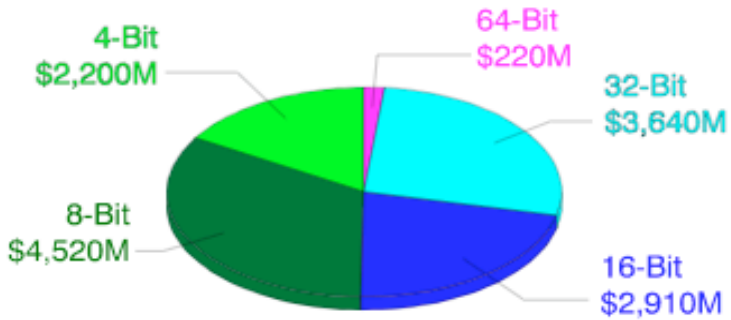


From Koopman http://www.ece.cmu.edu/~ece649/lectures/01_intro.pdf

> 99% of CPU's sold go into Embedded Systems

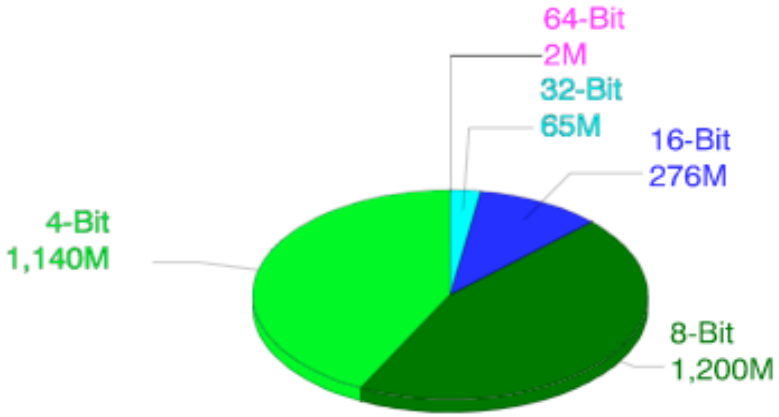
Small Computers Rule The Marketplace

- **~80 Million PCs vs. ~3 Billion Embedded CPUs Annually in 1995**
  - 150 Million PCs and 7.5 Billion embedded CPUs + in 2000



$13,490M Total

1994 Worldwide
Microcontroller Revenue
($Million U.S.)



2,683M Total

1994 Worldwide
Microcontroller Units
(Million Devices)

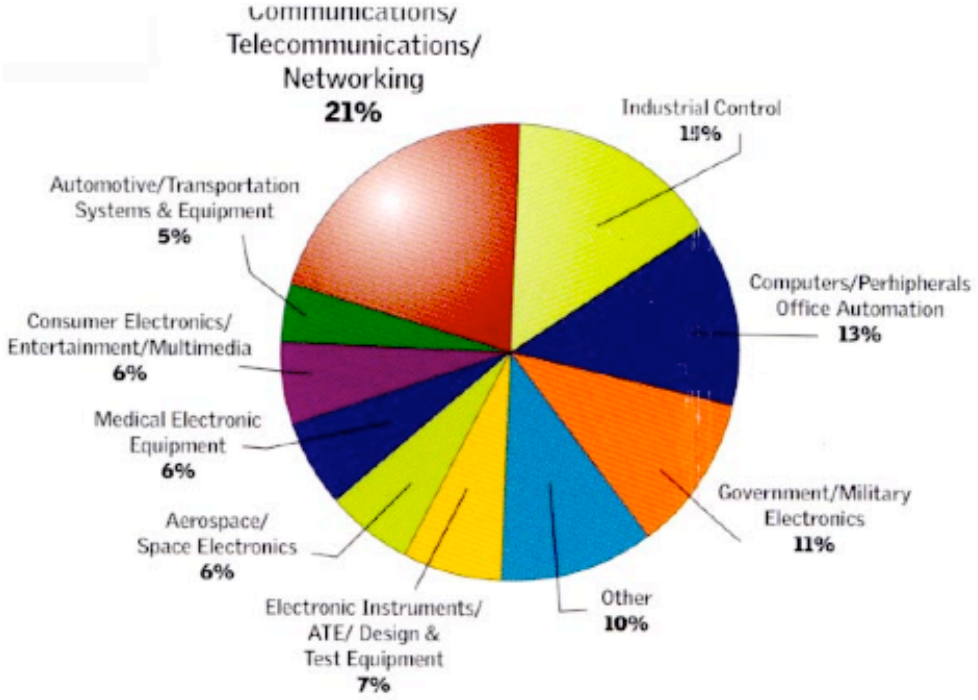
Approximated from EE Times, March 20, 1995
Source: The Information Architects

From Koopman http://www.ece.cmu.edu/~ece649/lectures/01_intro.pdf

There Are Many Application Areas

Primary End Product of Embedded Subscribers

Source: *ESP* Dec. 1998 BPA Audit



Which one will you be working in ?

From Koopman http://www.ece.cmu.edu/~ece649/lectures/01_intro.pdf

Generic Embedded System Designer Skill Set

- **Appreciation for multi-disciplinary nature of design**
  - System skills; system = HW + SW + …
  - Understanding of engineering beyond digital logic
  - Ability to take a project from specification through production
- **Communication & teamwork skills**
  - Work with other disciplines, manufacturing, marketing
  - Work with customers to understand the real problem being solved
  - Make a good presentation; even better -- write "trade rag" articles
- **And, by the way, technical skills too…**
  - Low level: Microcontrollers, FPGA/ASIC, assembly language, A/D, D/A
  - High level: Object-oriented Design, C/C++, Real Time Operating Systems, Critical System design
  - Meta level: Creative solutions to highly constrained problems
  - Likely in the future: Unified Modeling Language, embedded networks
  - Uncertain future: Java, Windows CE

From Koopman http://www.ece.cmu.edu/~ece649/lectures/01_intro.pdf

GEE Whiz Summary

- This course will give you appreciation for the fun and difficulty of designing and building and embedded system
  - If you are a “Software Person”: you will learn how your software is being implemented. You will learn how to write embedded software
  - If you are a “Hardware Person”: you will learn how your hardware is being used and controlled. You will learn how to create hardware that is usable by software.