ECE 100 - ITP

Lecture 4

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Questions?

- Lab Assignments & Design Portfolio
  - Remember: you are creating a design portfolio for others to use.
- All written work must be your own! Zero credit for any report with any duplicated material anywhere. Referred to ECE Department.
- How do I prevent a costly $300 repair bill?
  - Be careful! Be patient.
  - Don't short circuit a port or device.
  - Don't let motors stall!
- HandyBoard/Interactive C/motors/sensors/LEGO

Hardware Issues

- Don't put any pressure on the LCD screen.
  - It can create a short-circuit with the chip underneath.
- Motors are not guaranteed to be identical. Robot might drift.
- If your robot goes too fast and slams into wall, then your robot can be damaged.
  - We don't have spare motors nor sensors.
- Don't need to use ports 0 and 3. Can use motor ports 1 and 2.
- If you notice strange behavior, then turn off HandyBoard and get TA.
- Beware of hot components, especially voltage regulator.
  - If any chips are hot, then get TA immediately.
- Sensor/motor **plugs** may need a rubber band to hold them in place.
  - Do not flex/strain wires nor wire solder joints.
- Touch bumpers should be friction free and responsive to light touch.

Post-lab 3 presentation - week of Sep 17

- See previous lecture slides on Oral Team Presentations
- Peer evaluations
  - Everyone in the lab section will evaluate you and your team
  - You do not evaluate yourself
  - Individual category
    - Delivery (voice, eye contact, etc.)
  - Team categories
    - Slides (easy to read, illustrative examples, etc.)
    - Complete (contains all elements of Design Portfolio)
    - Persuasive

Executive Summary Assignment

- Due in **lecture** on October 15.
  - One page writing assignment to be reviewed by the Writing Lab Instructors in the Writing Lab (2nd floor Siegel Hall)
  - The "Executive Summary" is an argument, i.e., you will present a thesis, your analysis, and some evidence.
  - See links on ECE 100 web page
    - Technical Communication Resources; Argument Fundamentals
- Topic: autonomous robot design proposal
  - You are the lead engineer for autonomous robots at a hi-tech automation and robotics firm
  - Senior management has requested a design proposal for a robot that will meet a variety of customer needs with a better price/performance ratio than your competitor's current product
  - Use your LEGO robot prototype to demonstrate the strength of your design

Lab 2 Observations

- You may modify your robot, but keep it robust! You only have 60 minutes to prepare your robot for competition.
  - Document your design.
- Feel free to modify your code. Simplicity is key.
  - Break the problem into smaller subproblems, i.e., modular components.
  - Write testing routines.
    - Turn time tester: "for" loop that turns right four times.
    - Forward tester: "while" loop that runs forward for a fixed amount of time.
    - Curve tester: "while" loop with various "motor" values
  - Take risks and learn from your mistakes.
- How many ways can you stop the motors?
  - Four solutions. Re-read Appendix E.

Interactive C Questions

- Syntax
  - Check syntax with Interactive C 8.0.2
- Spacing
  - Code readability - important for humans
- #include
  - Global scope - only needed once
- float timer ()
  - Uses global variable "_timer"
  - Also depends on "reset_timer()" and IC library function "seconds()"
- Global variables
  - Can be declared anywhere; scope not limited to file which contains declaration
- Metasens
- arrays

Bad right touch sensor - bad IC code?

```
/* main1a.ic */
#include "turtle.ic"
void main() {
    while (1) {
        forward();
        if (digital(LEFT_TOUCH)) {
            backward(); sleep(0.6);
            right(); sleep(0.4);
        if (digital(RIGHT_TOUCH)) {
            backward(); sleep(0.6);
            left(); sleep(0.4);
            }
        }
    }
}
```

```
/* main1b.ic */
#include "turtle.ic"
void main() {
    while (1) {
        forward();
        if (digital(LEFT_TOUCH)) {
            backward(); sleep(0.6);
            right(); sleep(0.4);
            if (digital(RIGHT_TOUCH)) {
                backward(); sleep(0.6);
                left(); sleep(0.4);
            }
        }
    }
}
```

```
/* main2.ic */
#include "turtle.ic"
void main()
{
    while (1)
    {
        forward();
        if (digital(LEFT_TOUCH))
        {
            backward();
            sleep(0.6);
            right();
            sleep(0.4);
        }
        if (digital(RIGHT_TOUCH))
        {
            backward();
            sleep(0.6);
            left();
            sleep(0.4);
        }
    }
}
```

Brainstorming Exercise

- What attributes do you expect in high quality products or services? Consider a variety of markets, such as:
  - Consumer electronics
  - Education
  - Health services
  - Infrastructure
  - Residential
  - Transportation
- What is the most important attribute?