ECE 471 – Embedded Systems Lecture 27

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Announcements

- Project ideas! Will get back to you

- Veterans' Day Friday, no class

- Midterm Monday

- In-class assignment Wednesday

- Warn the website may go down

Homework 8 Review

- Some C coding mistakes
  - Error checking. Exit if cannot open. If you don't, can segfault if try to scanf error fd
  - Returning -1 on error might be bad idea
  - Check for errors! What could go wrong? What if different sensor used, don't segfault.
- Why need Vdd? To provide enough current for this particular chip needs extra current if you want parasite mode.

You can try without Vdd but you will always read out 85C.

Manual suggests MOSFET, but apparently it's possible on Pi if use 4.7k resistor as well as "strong-pullup=y" kernel command line option.

- Because of distance, 1-wire
- shell script

Trouble if edit on windows, why (linefeed vs carriage return)

Midterm Review

- Booting on the Pi
  - What a bootloader does
  - Why Pi is unusual
- Real Time
  - Definitions
  - Is this hard, soft, firm
- i2c/SPI/1-wire
  - Know the tradeoffs between
  - Be able to follow the C code for them

- Security
  - Buffer overrun, why it is bad
- Coding Practices
  - Be aware of the case studies we suggested
  - Know of some of the recommended ways to write safer C code

Stuff from last time

Good Test Practices

- Unit testing

- Test Driven Development – tests written before the code happens, needs to pass the tests before done

- Fuzzing

- Documentation
  Source control

Space Shuttle Design

- HAL/S high-order assembly language (high-level language similar to PL/I)

- PASS software – runs tasks. Too big to fit in memory at once

- BFS – backup flight software. Bare minimum to takeoff, stay in orbit, safely land, fits in memory, monitors pASS during takeoff/landing Written by completely different team.

- 28 months to develop new version

- IBM

- originally 424k of core each

- Extensive verification. One internal pass, one external

- 4 computers running PASS, one running BFS

- Single failure mission can continue; still land with two failures

- 4 computers in lock-step, vote, defective one kicked out