

EE 193: Advanced Embedded Systems

Steven Bell

15 February 2022



Roadmap

We have hardware!

Today: Programming your microcontrollers

Up next:

Measuring power consumption

Assembling PCBs

Various networking projects

What is Espressif IDF?

IoT Development "Framework"

A collection of libraries/tools based on FreeRTOS

Ok, but what's FreeRTOS?

It's a free (MIT-licensed) real-time operating system

freertos.org

Ok, fine, what's an RTOS?

Traditional OS

Manages I/O + peripherals

Virtual memory

Manages tasks/scheduling

Security

Filesystem

Networking

RTOS

X

X

Real-time

X

X

?

Possible schedulers

Random scheduling

Round-robin + blocking/yielding

shortest job first

preemption

priority

power management

What could possibly go wrong?

Mutex m;

Thread 1

m.lock()

Serial.print("Thread 1");

m.unlock()

Thread 2

m.lock()

Serial.print()

m.unlock()

So what?

Last week I was denouncing the lousy performance of Arduino, and "magical" integration of the user's code.

That's not to say frameworks are bad.

You just need to know what's under the hood.

Homework 2

Get blink and ADC working on your platform