

EE 193: Networked Embedded Systems

Steven Bell

18 January 2024



This is a course about embedded systems.

But what *is* an embedded system?



embedded system



Privacy, simplified. ▾



All



Images



Videos



News



Maps



Shopping

Settings ▾

All regions ▾

Safe search: moderate ▾

Any time ▾

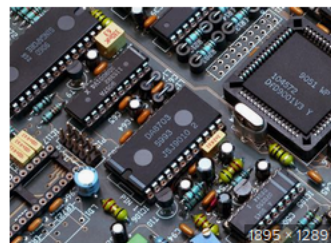
All sizes ▾

All colors ▾

All types ▾

All layouts ▾

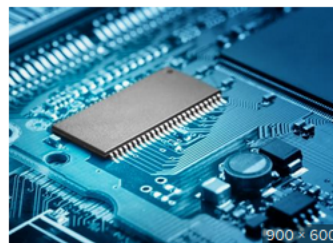
All Licenses ▾



Embedded Systems—An Introduction
spectramagazine.org



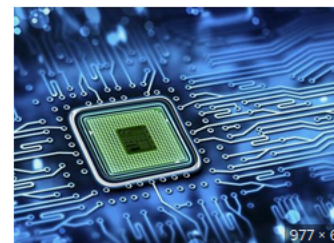
Using Embedded Systems In Industrial A...
digitroniklabs.com



Why Embedded Systems are Popular in t...
computerhowtoguide.com



What Is Embedded Systems ? - The Eng...
theengineeringprojects.com



Basics of Embedded Systems | Slideshow
electronicsforu.com



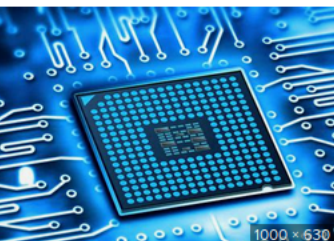
Brief Survey of the Different Types of Me...
a-wit.com



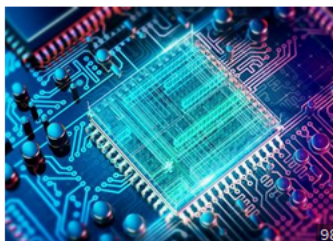
Embedded System Design - #1 Trusted E...
tronicszone.com



Embedded System Design and Devel...
ececinc.com



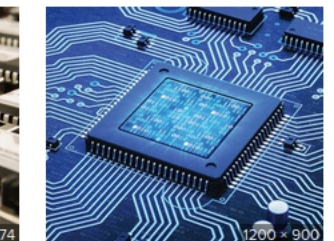
Embedded System(6 months)
tims.edu.in



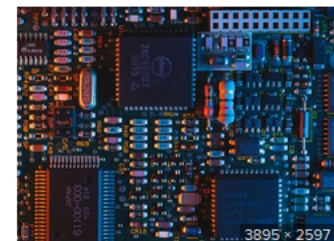
Is embedded systems a good career choice? - F...
fridaymagazine.ae



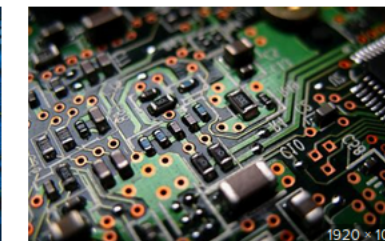
What Is Embedded Systems ? - The En...
theengineeringprojects.com



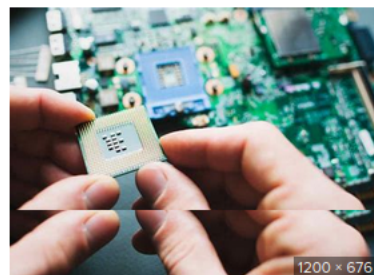
Functional Safety of Embedded S...
ul.com



A guide to getting started with embed...
yinka.dev



Embedded Systems Wallpapers - Top Free Emb...
wallpaperaccess.com



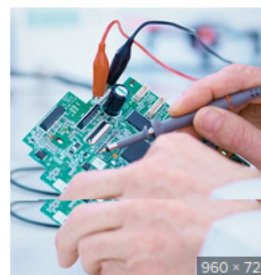
Characteristics Of Embedded Systems | Triba...
tribalmicro.com



Starting your Career In Embedded System Design a...
medium.com



8 Real Life Examples of Embedded Systems - Tal...
learning.shine.com



Embedded System
arcgeodesy.com



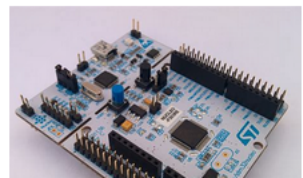
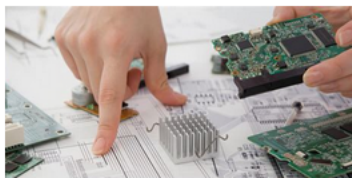
Real Life Examples of Embedd...
theengineeringprojects.com

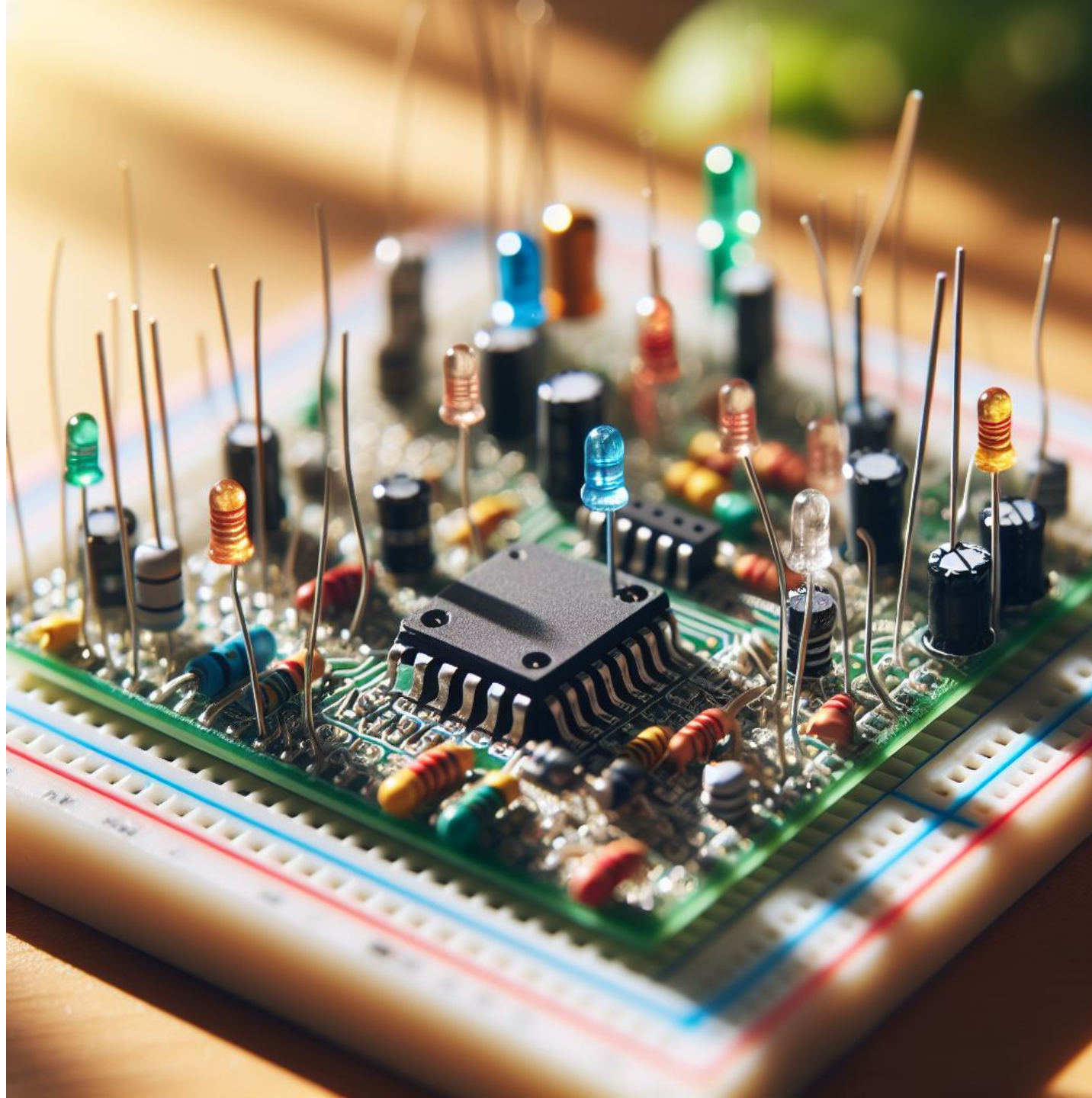


Embedded systems: Meet the technol...
enterpriseiotinsights.com



6 Critical Challenges Facing the Embe...
infochips.com





"Embedded System"
- DALL-E via Bing

Your turn:

What is an embedded system?

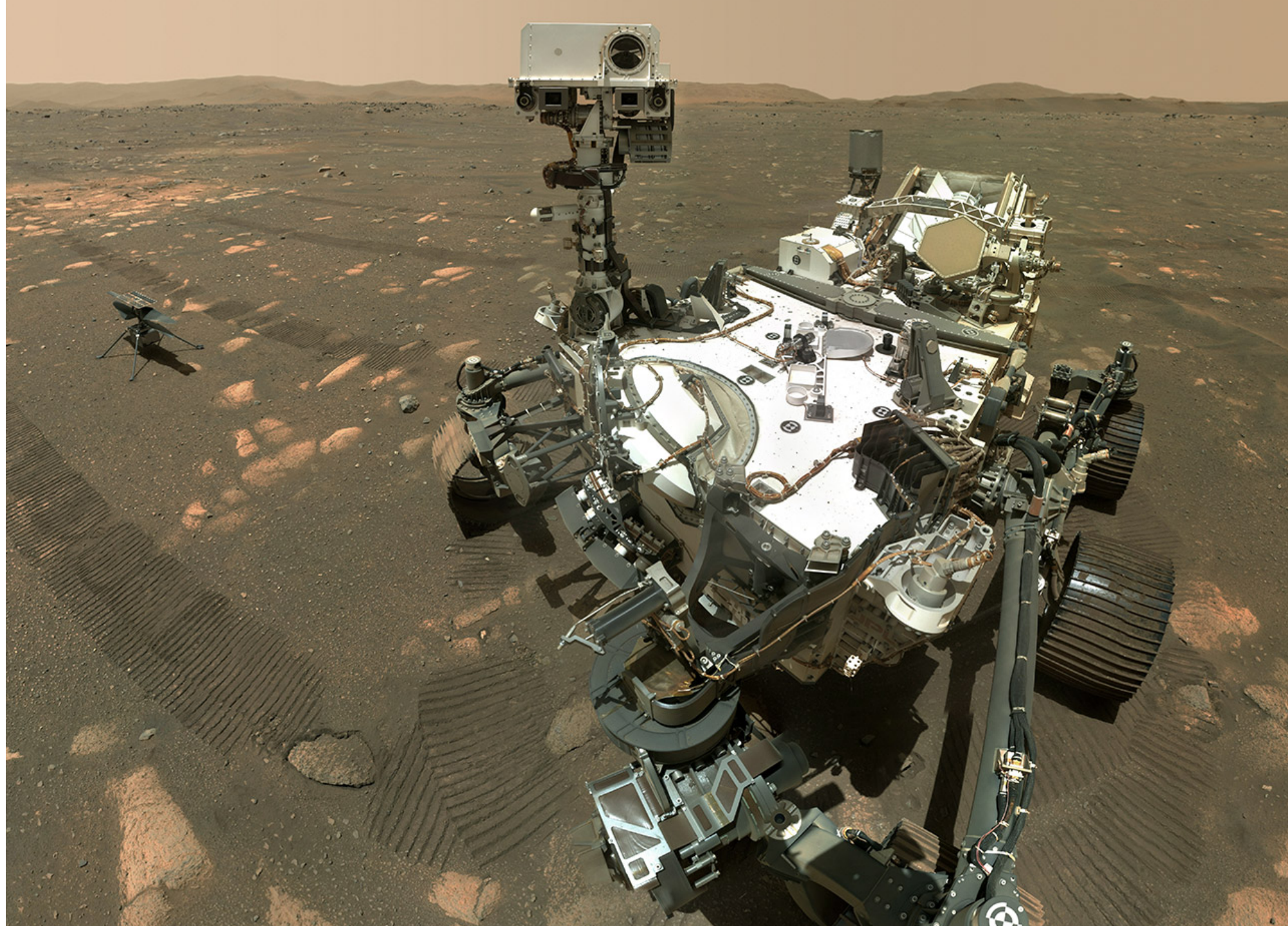
Respond at **PollEV.com/stevenbell**

"An embedded system is
when you're writing code for something
that isn't a computer."

(Elecia White)

What makes embedded systems hard?

Let's explore some examples...





Fitbit Inspire 3







The New York Times

7.5 Million Baby Shark Bath Toys Are Recalled After Reports of Children Being Injured

At least a dozen people have reported being injured by the toy. The top fins pose a risk of “impalement, lacerations and punctures,” the U.S. Consumer Product Safety Commission said.





mountwashington.org

What will we do in this course?

Go from "Arduino on a breadboard" to "real device deployed in the field"

What are we building?

A fleet of battery-powered nodes which monitor outside temperature across campus.

Three iterations

Iteration 1: sensor, dev board, USB power pack, tupperware

- Design a PCB

- Get started with ESP32 + WiFi

- Analyze performance of the microcontroller

Iteration 2: your own design

- Design + build a bigger PCB

- Manage power consumption

Iteration 3: fixing all the bugs

- Web dashboards and fleet management

What will we NOT do in this course?

High-performance embedded systems

Real-time embedded systems (take "Embedded medical devices")

Safety-critical applications (take "Software for regulated industries")



Warning!

This is only the second offering of this course,
and I'm changing tons of things from the first time around.

So things will be unrefined (or totally broken) at times!

Course format

Sometimes we will meet here for "lecture"

Sometimes we will meet in 550 Boston for "lecture" + "lab"

My office hours will be in Nolop, 1-4pm on Wednesdays

For Tuesday

Sign up on Slack

Read the syllabus (on the course website)

Complete the intro survey (link posted on Slack)

Bring your computer - We'll be searching Digi-Key on Tuesday!