

Wireless Sensor Networks

Understanding Complex-Engineered
Systems By Example

Questions

- What is the course about?
 - What are complex-engineered systems?
 - What is a wireless sensor network?
- What topics will we cover?
- How does this course work, anyway?

MUSE Teaching Team

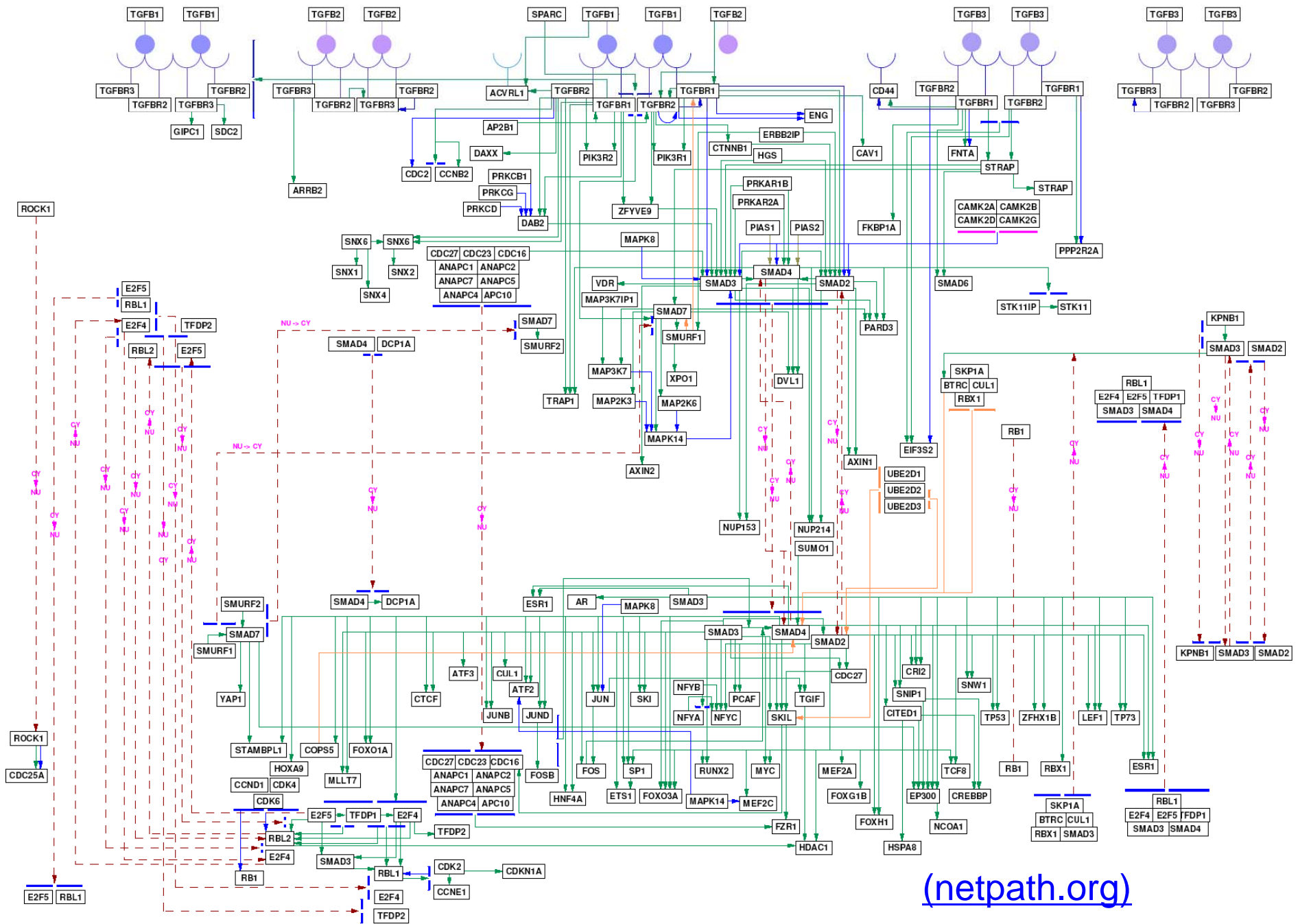
Tom Weller teaches EE at USF. His research interests include adaptive microwave materials and circuits, EM sensors and antennas.

Jeff Frolik teaches EE at UVM. His research interests include sensor networks and wireless communications.

Paul Flikkema teaches EE at NAU, and is interested in networked embedded systems, wireless communication, inference on sensor networks, and environmental monitoring applications.

Defining Complex-Engineered Systems

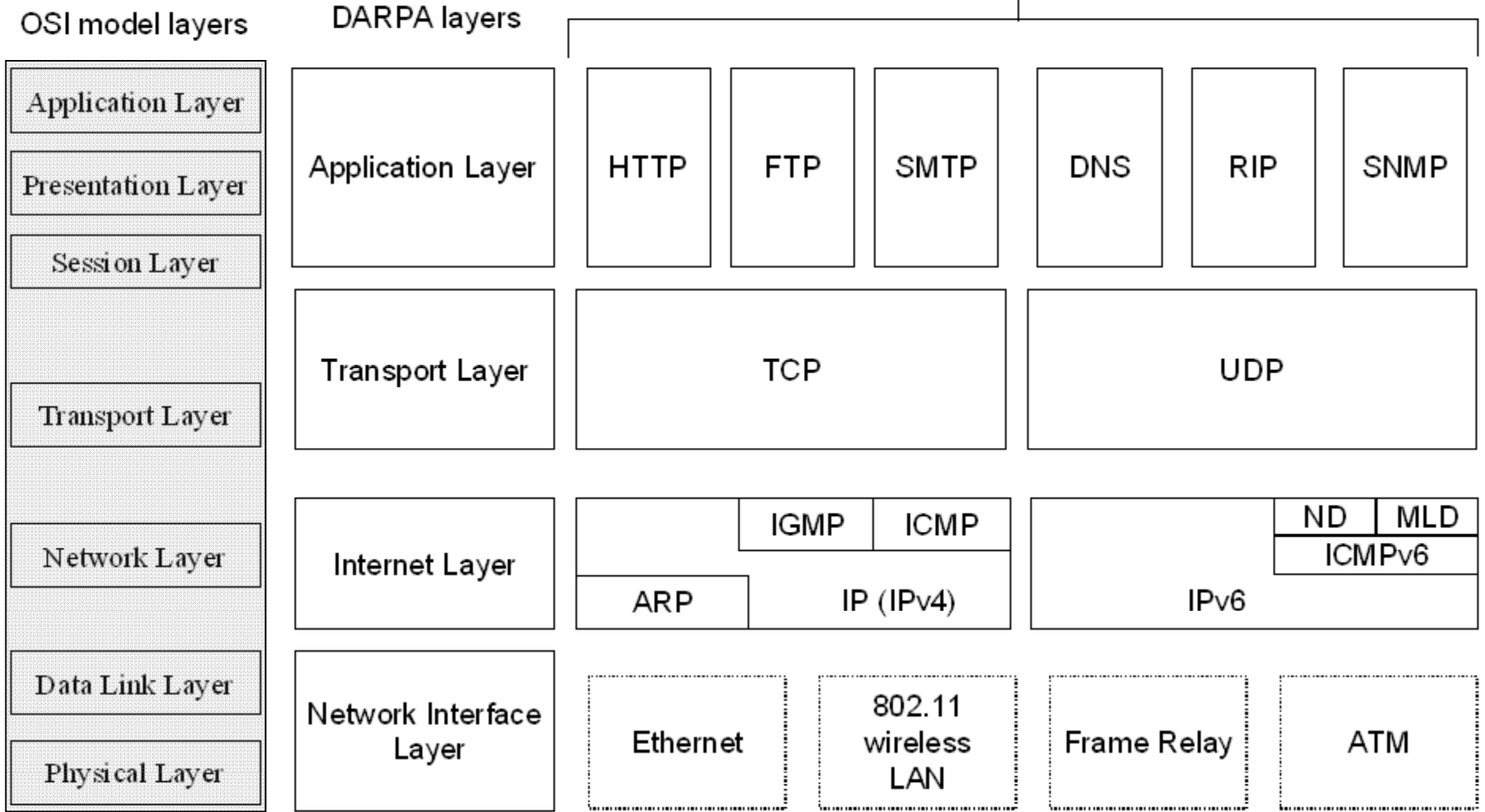
One subsystem...



(netpath.org)

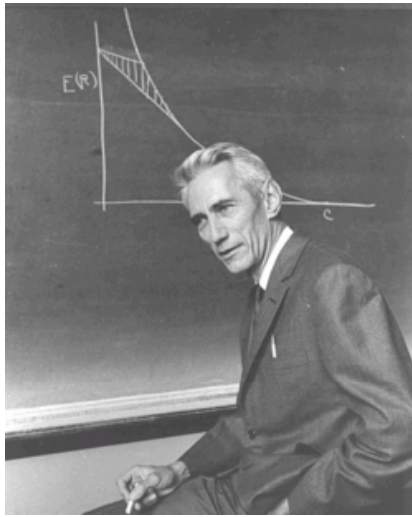
How do we comprehend them?

TCP/IP Protocol Suite



(Microsoft)

Getting specific: WSN's

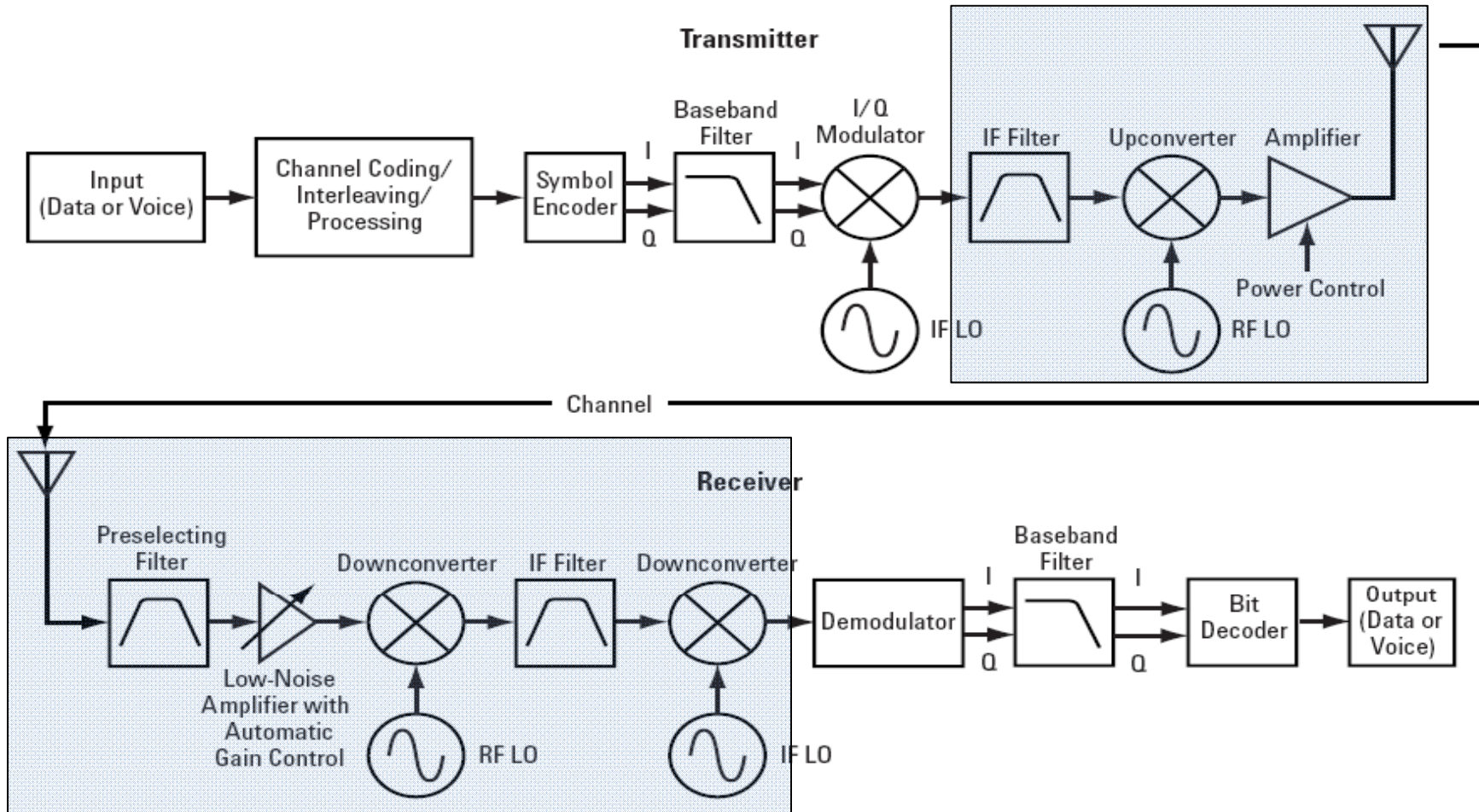


Claude Shannon
1916-2001

Shannon says...

Model: Comm System Perspective

Model: RF Circuit and Communication Systems Perspectives



The wireless medium

Capturing the signal

Real -World Problems

Sensing Missions

Embedding Environments

Environmental/Ecosystem

Sensor
Cloud

Wireless Propagation

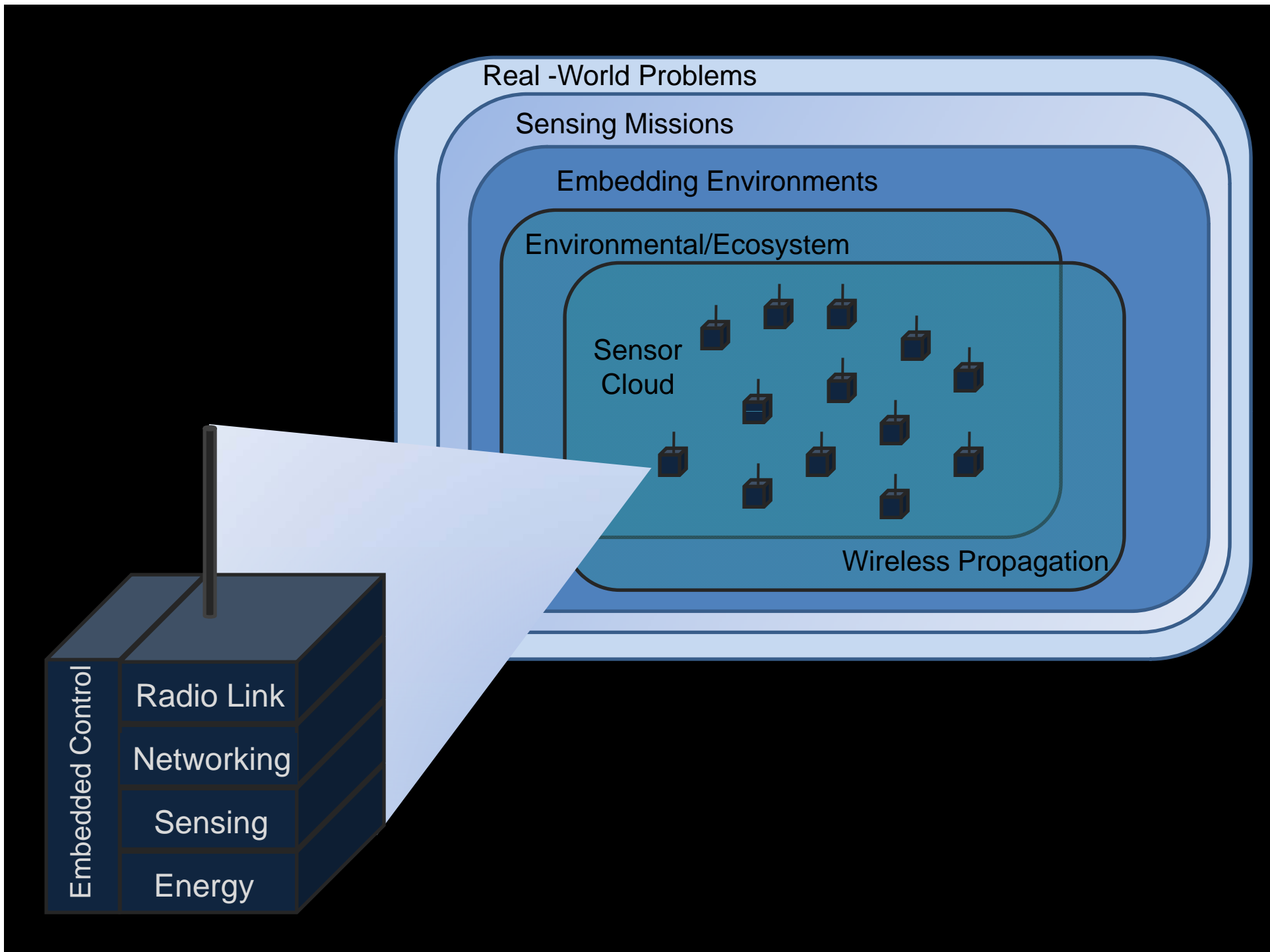
Embedded Control

Radio Link

Networking

Sensing

Energy



Course Structure

- Videos on the web
- In-class Q&A/discussion
- Exams
- Experiments
- Project
- Concept Inventories
- In-class Participation

Technical outline of the course: first half

Week	Modules
1	MOT Motivation INT Introduction and Overview
2	SEA Systems Engineering Applied to Wireless Sensor Networks
3	TDX Transducers
4	ADC A/D Conversion
5-6	RFH Radio Frequency Hardware
7	WCC The Wireless Communication Channel

Technical outline of the course: second half

Week	Modules
8-9	CTA Communication Theory as Applied to Wireless Sensor Networks
10-11	SNA Sensor Network Architectures
12-13	EMC Managing the Sensor: Embedded Computing
14	FIN Bringing It All Together: Systems Thinking in Systems Engineering
15	STV Student Videos

Next Up – **SEA**: Systems Engineering Applied to Wireless Sensor Networks

- Definition of a WSN
- Differences from infrastructured wireless (mobile telephony, WiFi)
- Be able to define embedded computing systems, and how they differ from other types of computing systems
- How WSN's enable new applications
- Mesh-connected society of people and things: pros and cons