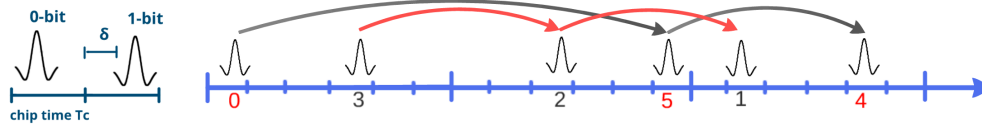
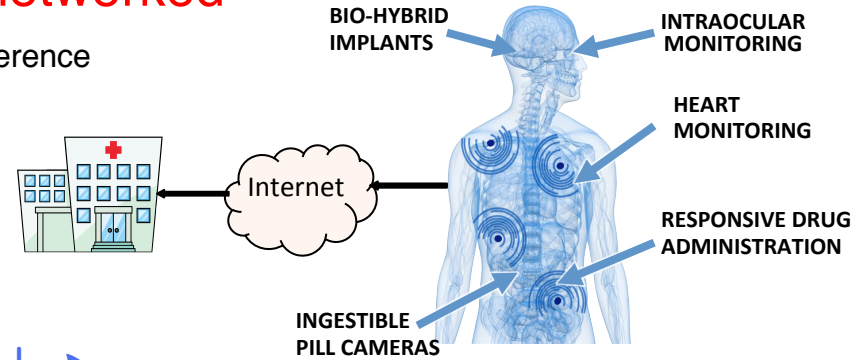


Sonar Inside Your Body: Toward Ultrasonic Intra-body Sensor Networks

• Implantable medical devices need to be networked

- **Problem:** RF is absorbed by tissues and is prone to external interference
- **Solution:** Ultrasonic waves
 - Propagate better than RF in human tissues
 - Long used in medical imaging and proven to be safe



Main Contributions

- **Ultrasonic Wideband:** theory and practice
 - Impulsive PHY/MAC protocol with optimal rate adaptation
 - 700kbit/s at 10^{-6} BER, low energy consumption
- **Optimized Stochastic Medium Access**
 - Lightweight, asynchronous
- **Software Radio Prototype**
 - First practical demonstration of Ultrasonic comms in tissues
- **Ultrasonic networks at the nano scale**
 - Opto-ultrasonic communications for nano-medicine apps

