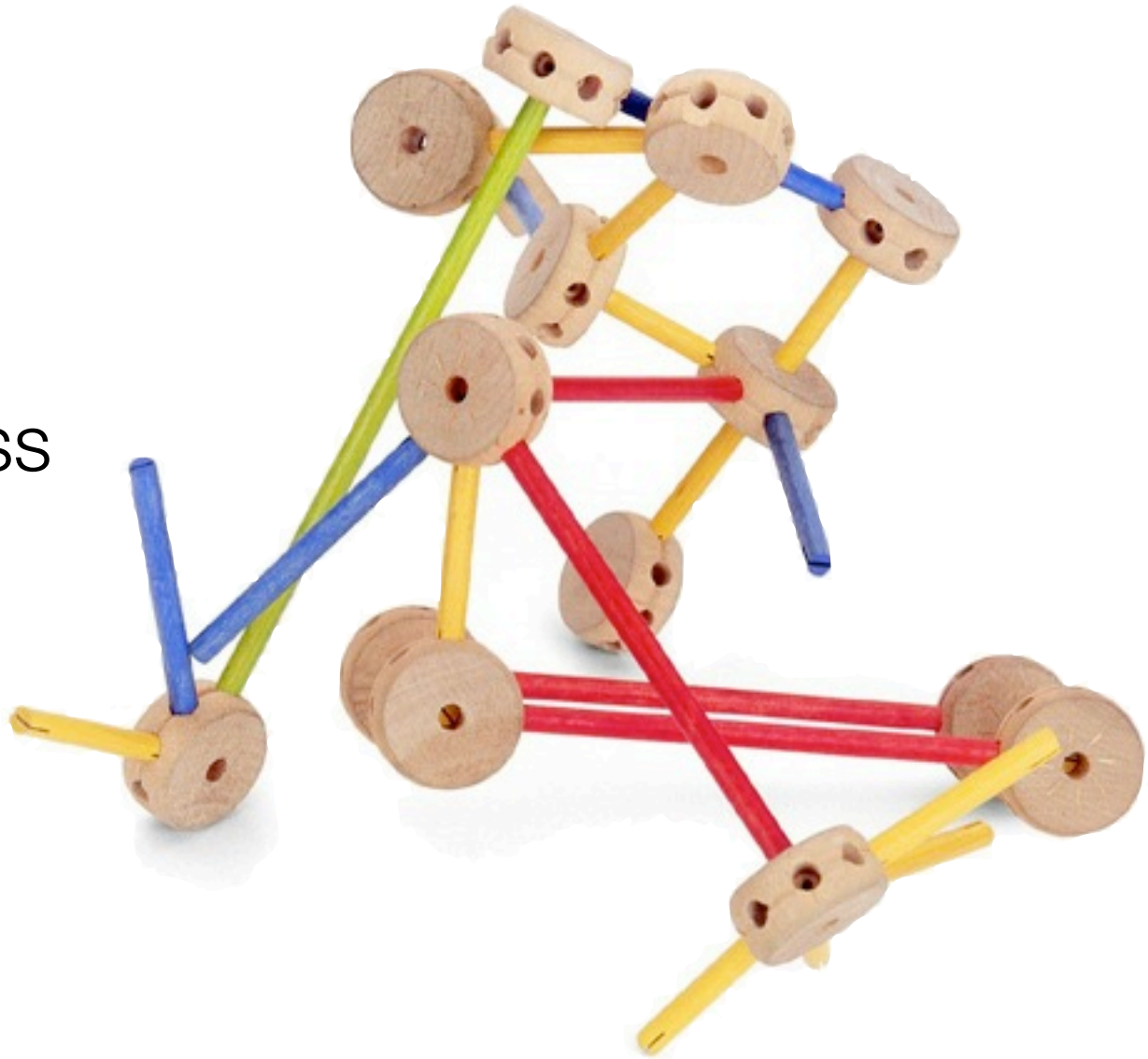
Fundamentals of Physical Computing

Instructor: Rob Faludi

Plan for Today

- Final Project Progress Reports
- Final Project Timeline
- Serial Protocols
- Radios (Intro)
- Readings & Assignments

Final Project Progress



Final Project Suggested Timeline

- Week 10: ~~Make observations, select your idea and finalize your group~~
- Week 11: **Build a prototype and test it. Observe the results.**
- Week 12: Build a revision and test it. Observer the results.
- Week 13: Create a final that works well, with a presentation and demo that tells its story
- Week 14: Final Presentations
- Week 15: Final Presentations

Serial Communications II

Protocols

- Streaming
- Start / stop
- Call / response
- Type
- Address
- Checksums
- Collisions

Protocols

- What is the simplest protocol?

Stream

- 210 210 211 211 211 211 211 211 210 208 205 203 198 197 197 197 197...

- But what if we have two values?

Start byte

- **255** 210 48 **255** 210 49 **255** 212 51 **255** 213 52 **255** 213 52 **255** 212 54 **255**...
- what if the start byte is in the data stream?
    - rounding
    - escaping (esc subValue) (esc esc)
- Streaming is a bandwidth hog. What if we want to be quieter?

Call Response

- if received = ‘A’ {
  Serial.write(value);
  }

- But what if we don’t always send the same number of values?

Length byte

- 255 **2** 110 189 255 **4** 110 189 13 73 255 **1** 110 255 **2** 111 188 255 **2** 110 188...

- So how about if there's different kinds of messages, for example some are data and others are control requests?

Type byte

- 255 **5** 0 1 0 1 255 **6** 2 110 189 255 **5** 1 1 1 0 255 **6** 3 110 189 37 255 **4** 18 255...

- What if we have more than one sender?

Address byte

- 255 5 **3** 0 1 0 1 255 6 **3** 2 110 189 255 5 **4** 1 1 1 0 255 6 **3** 3 110 189 37 255...

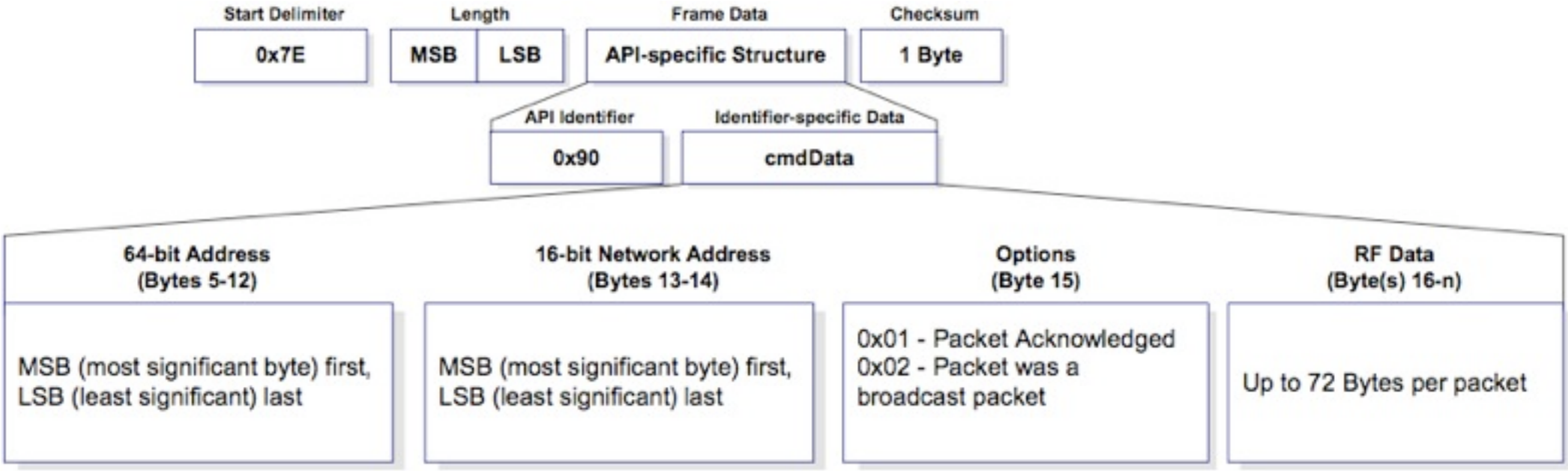
- Uh oh, what if something goes wrong? What if there's an error in receiving the information?

Checksums

- Summary made remotely, compared locally
- simple, send number of values: 255 123 18 **2**
- better: add values
  - 2 2 4 = 2 2 **4** (2+2=4)
  - 2 2 4 ≠ 2 3 **4** (2+3≠4 so something went wrong)
- retransmit? ignore?
- more sophisticated checksums are available

RX Packet

- Maximum of 72 bytes of data per packet
- RF Data section is basis for I/O packets



Readings and Assignments

- Readings
  - Making Things Talk, Chapter 7 (optional)
- Assignment
  - Wireless lab (optional)
  - **Build a prototype and test it. Observe the results**.

Happy Thanksgiving!

http://www.instructables.com/id/Build-an-Arduino-powered-talking-robot-head/