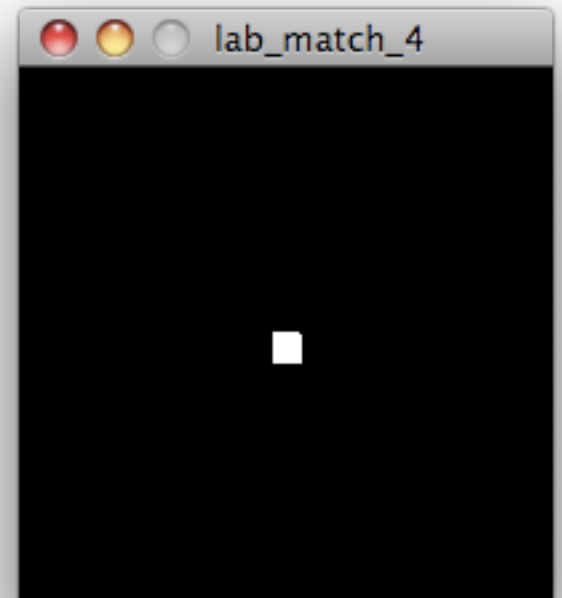# Fundamentals of Physical Computing

Instructor: Rob Faludi

Plan for Today

- Lab Review

- Prototype Presentations

- Serial II

- Readings & Assignments

Lab Review

Prototypes

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
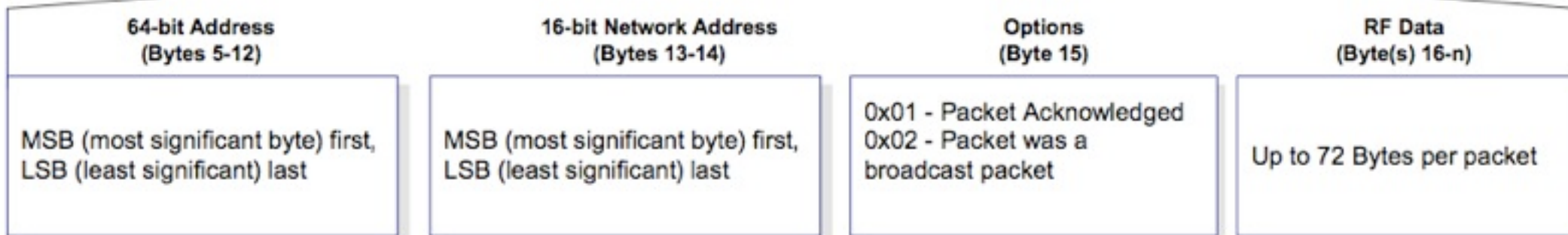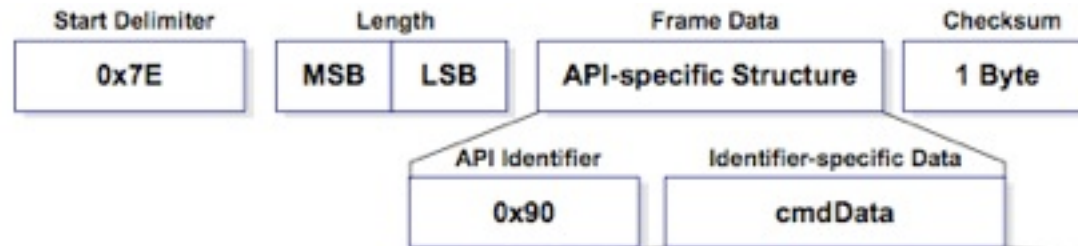
Final Projects

New Groups!

Grpmxrbeta

Which group of students?

| Class of 2011 ▼ |

How many groups?

| 5 ▼ |

How should the groups be named?

| Numerically ▼ |

(Mix)

Final Project

- Work in groups to create a system or device of your choosing. Your creation should use demonstrate a mastery of the fundamentals of physical computing and high-quality interactions.

- This is potentially a challenging assignment in a short period of time so consider what you know about collaboration. Keep moving forward.

- Presentations begin six weeks from today.

- You'll have the opportunity of volunteer for first round presentations, after which slots will be randomly assigned.

- Guest critics and gallery TBA

Readings and Assignments

- Readings

  - Physical Computing, chapter 7

- Assignment

  - Serial Lab

  - The best way to have a good idea is to have a <u>lot</u> of ideas, so put that into practice by preparing six different project ideas to present to the class. You'll enlist their help to choose one.

  - *Get your labwork and documentation posted!*