Project 1

Due: 9/14/23 September 2021

For this project, you will work with a partner to design a visual protocol for sending text and binary data down Wheeler Mall.

Objectives

In the course of this project, the successful student will:

- devise a codec (protocol) for transmitting data across a physical medium
- analyse codecs for their strengths and weaknesses

You are encouraged to research similar protocols but you must cite any sources.

Requirements and restrictions

Assume that most data intended to be sent in this medium is text, but that the protocol must be *able* to send arbitrary binary data (sequences of bytes) when that is called for. (That doesn't mean you have to send individual bits one-by-one, just that you have to be able to handle them.)

- The medium is visible-spectrum light, i.e. pure visual. (No megaphones, trebuchets, etc.)
- The transmitting process can (and presumably will) involve moving around but can't involve depositing ink or paint on surfaces, even temporary ones. (No spray paint, no whiteboards—what would be the fun in that?)
- The required process can't violate any other university policies. (No smoke signals!)

Design work

Your group should have a draft idea of your transmission concept in time for class on Thursday the 9th. Though you don't need all the details worked out, you should know:

- what kinds of movements/motions you'll be using
- how or if you'll be handling text messages differently from binary messages in general
- how you'll handle clock issues

and have that written down (either on paper or in a document on a laptop you have with you). We'll be talking about the project in class that day.

Receivable #1: the protocol

By the 14th, you need to give me a document fully documenting your protocol. You can use tables, diagrams, whatever you think will most effectively communicate your protocol. Be aware that your document will be printed out for use by the testers (see below).

The test environment

On demo day (16 September, rain date 21 September) each pair will be handed the protocol of a different group, and split up with one person at one end of Wheeler Mall and one at the other. Everybody will have a few minutes to carefully read the protocol as specified, but not to ask for verbal clarifications from the author—it all needs to be in the document.

I will have, for each group, three messages to transmit. They will be two text and one binary, not necessarily in that order, with each text message being a word or short phrase and the binary message being just two or three bytes long. For convenience, on the text messages, each character will be shown with its corresponding character code in both decimal and binary (in case you want to make use of that info), and on the binary, each byte will also be given in its nonnegative decimal form. The sender will be handed the

messages and expected to start transmitting them basically right away; the receiver will execute the protocol on their end and do their best to record what was sent and reconstruct the original messages.

Getting through all three messages in a couple minutes would be great, but definitely plan for no longer than 5–6 minutes (we have to get through everybody!). If it looks like it's going to go much too long, I may cut you off.

I will video the senders and link it to help with later analysis.

Receivable #2: the analysis

By the 23rd, your group will hand in an analysis of your own protocol and of the one you demoed. For each, you'll discuss

- overall strengths and weaknesses of the protocol in the context where it was used (perhaps including strengths and weaknesses that were not clear until they were tested on demo day),
- a measurement of its actual data rate and an estimate of its maximum data rate if both sender and receiver were reasonably fluent at the protocol, and
- at least one proposed improvement to the protocol, and its expected impact (on accuracy, speed, whatever).

You'll also submit, each separately, a brief summary of who did what in your group.

I will normally assign both partners the same grade, but I may make adjustments if circumstances warrant.

Scoring

Rubric details TBA, but as of right now this is my intended points breakdown (out of 100):

10 Design work

35 Protocol

15 Good faith best effort at executing the other group's protocol

20 Analysis

20 Analysis