Visible Light Data Transfer (VLDT):
A Research Tool for Data Transmission Using LEDs

The Project:
Due to overcrowding of transmission frequencies using visible light as a wireless transmission medium has become a popular idea due to its low congestion. [1] To gain a stronger understanding of this concept we created a device allowing users to perform data transmissions using an LED with various encoding schemes, transmission rate, and potential noise injection selectable by the user.

Materials and Methods:
In order to accomplish this project a user interface was created using two Raspberry Pis and Raspberry Pi touchscreen attachment for each. One was used for the transmission end and the other for the receiving end of the system. These devices handled the controlling of the noise injecting LED(transmission end), statistical computation(receiving end), interaction with the user(both ends), and communication with the microcontroller(both ends). The microcontroller was used for to a digital to analog converter for sending data. The receiving end used the analog to digital converter that is onboard the microcontroller.

Results:
The following graph was created by running transmissions of the phrase “Hello World!” We were able to prove that encoding multiple bits into a symbol can increase the data rate of visible light data transfers.

Parts:
- Raspberry Pi (2)
- Raspberry Pi Touchscreen (2)
- Texas Instrument TM4C123GHPM (2)
- National Semiconductor DAC0800
- TAOS TSL12S Light-To-Voltage Converter

Future Uses:
- Li-Fi
- Network Bridging
- Peer-to-Peer Communication