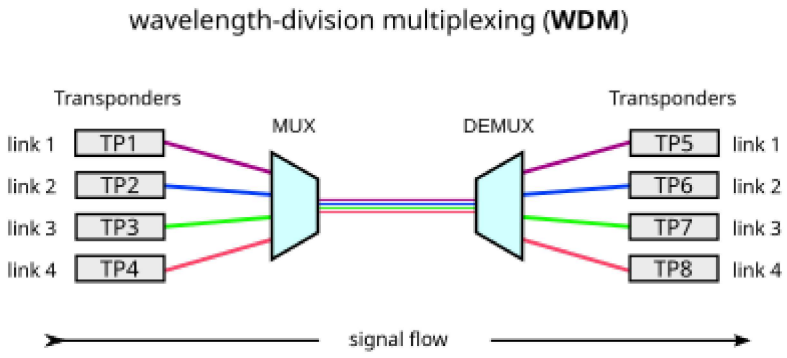
EE 134 Project Proposal

Title: Dual-Wavelength Fiber Optic UART Communication Between Arduinos

Key Learning Objectives:

- Understanding Optical Communication: Learn how fiber optics can be used for serial data transmission and explore its advantages over traditional wired communication.
- Implementing UART over Fiber Optics: Develop a system that transmits and receives UART data between two Arduino's using fiber optic cables and optical transceivers or photodiodes.
- Analyzing Optical Signal Integrity: Study optical signal transmission characteristics, and evaluate factors affecting communication reliability.

This project aims to implement a fiber optic communication system using two distinct wavelengths of light to establish a UART connection between two Arduinos. By leveraging different wavelengths for bidirectional communication, we will investigate signal integrity, transmission speed variance, and error rates. Using spectrometry and photodetectors, we will measure data transmission accuracy and signal integrity. The expected output includes performance comparisons, error rate analysis, and efficiency evaluation of multi-wavelength UART communication. Results will be verified through repeated experiments and data validation techniques. Success is defined by achieving a stable and reliable UART link with minimal data loss. The expected output is successful data transmission between the two Arduinos over fiber optics, with received messages either accurately being displayed on a serial monitor or being used to call some function on the Arduino e.g. operation of an LED. Additionally, we expect to analyze potential transmission errors. The project will apply concepts from signal processing and optical waveguides while incorporating the fundamentals of Ray and Wave optics.



Reference:

EE 134 PROJECT

Please submit a brief description of your final lab project. Here are the details and requirements:

1. Give the title of the project.

2. Describe three key learning objectives of the project.

3. Describe the project. Make sure you answer the following questions when describing the project:

- **a. What are you trying to do with the proposed project?**
- **b. What measurements are you going to take, or where are you going to get your data set?**
- **c. What is the expected output?**
- **d. What will that output mean?**
- **e. How would you verify that the results you are getting are accurate?**
- **f. How would you define success/failure of the project?**
- **g. What concepts from class are you employing? What new concepts will you need to learn?**

After submission and review, a meeting will be scheduled with the me to discuss the scope, challenges, and edits to each proposal.