

Optical Communication System

EEL 5500 - Digital Communications I

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Abstract

Purpose: The purpose of this project is to create a communication channel that transmits and receives data via Amplitude Shift Key (ASK) modulation of electromagnetic carrier waves [1]. In particular, we will adjust a potentiometer to a resistance value of R and this value will be transmitted via fiber optic cable and displayed on an LCD screen connected to the receiver part of the system.

Approach: We outline the schematic of our system as follows.

1. Create and upload a program to a 1st arduino that will read the resistance value of the potentiometer and convert it to binary.
2. The 0s and 1s will modulate the voltage supplied to a fiber optic transmitter module through an appropriate driver circuit so that the intensity and amplitude of the wave changes accordingly [2].
3. The modulated wave will travel through a fiber optic cable to a fiber optic receiver module.
4. The photodiode inside the receiver module will drive a current that is proportional to the intensity of the light signal, which will then be amplified and converted into a logic-level signal via a 2nd arduino [3].
5. The arduino on the receiver side will interpret the contents of the signal into text characters which will finally be displayed on an LCD screen.

References

- [1] In: *Wavelength Electronics* (Dec. 2022). URL: <https://www.teamwavelength.com/modulation-basics/>.
- [2] Arun K. Majumdar. "Free-space optical communication". In: *Free-Space Optical Communication - an overview — ScienceDirect Topics* (). URL: <https://www.sciencedirect.com/topics/physics-and-astronomy/free-space-optical-communication>.
- [3] Jacob Smith. *Build a laser communication system - projects*. URL: <https://www.allaboutcircuits.com/projects/build-a-laser-communication-system/>.